

UNIVERSITY OF COLORADO AT BOULDER

# Catalog

2004-05



*CU Changes Lives*



## Academic Calendar

The campus operates year round on a semester system, with fall and spring semesters of 16 weeks each, a 10-week summer session, and a three-week “Maymester” academic period between spring semester and summer session.

### Summer Session 2004

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- Jan. 15 (Thurs.) ..... Freshman application deadline for summer and fall sessions;  
all other applicants, April 1
- May 10 (Mon.) ..... Maymester begins
- May 27 (Thurs.) ..... Final exams for Maymester
- May 31 (Mon.) ..... Memorial Day holiday; campus closed
- June 1 (Tues.) ..... Classes begin for terms A, C, and D; 7:30 A.M.
- July 2 (Fri.) ..... Final examinations for term A (first five-week term)
- July 5 (Mon.) ..... Independence Day holiday; campus closed
- July 6 (Tues.) ..... Classes begin for term B (second five-week term)
- July 23 (Fri.) ..... Final examinations for term C (eight-week term)
- Aug. 6 (Fri.) ..... Final examinations for terms B and D (second five-week and  
10-week terms )
- Aug. 7 (Sat.) ..... Official graduation date. No summer ceremony.



### Fall Semester 2004

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- Aug. 23 (Mon.) ..... Classes begin; 8:00 A.M.
- Sept. 6 (Mon.) ..... Labor Day holiday; campus closed
- Sept. 30 (Thurs.)–Oct. 1 (Fri.) .... Fall break
- Oct. 1 (Fri.) ..... Application deadline for spring semester
- Nov. 25–26 (Thurs.–Fri.) ..... Thanksgiving holiday; campus closed
- Dec. 9 (Thurs.) ..... Last day of classes
- Dec. 10–16 (Fri.–Thurs.) ..... Final examinations
- Dec. 17 (Fri.) ..... Commencement



### Spring Semester 2005

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- Jan. 10 (Mon.) ..... Classes begin; 8:00 A.M.
- Jan. 17 (Mon.) ..... Martin Luther King Jr. holiday; campus closed
- Mar. 21–25 (Mon.–Fri.) ..... Spring break
- April 29 (Fri.) ..... Last day of classes
- April 30 (Sat.) – May 5 (Thurs.)... Final examinations
- May 6 (Fri.) ..... Commencement



*The university's calendar committee requests that make-up time be provided to students absent for religious reasons.*

# University of Colorado at Boulder Catalog 2004–05



## The Catalog

The 2004–05 *University of Colorado at Boulder Catalog* contains a summary of campus facilities, programs, and services; descriptions of colleges, schools, and individual departments; and degree requirements, course descriptions, and faculty listings as of December 2003. Students should refer to the degree, major, and certification requirements listed at the time they formally enter a program. For additional information, students should consult their dean's office.

Because the catalog is compiled well in advance of the academic year it covers, changes in programs, policies, and the academic calendar may well occur. Up-to-date information may be obtained by consulting departmental advisors, checking departmental bulletin boards, reading the *Registration Handbook and Schedule of Courses*, visiting the CU web site ([www.colorado.edu/catalog](http://www.colorado.edu/catalog)), and reviewing registration materials distributed each semester.

All catalog information is subject to change without notice or obligation.

Additional catalogs may be purchased for \$5 (plus shipping and handling) through the CU Book Store, phone **303-492-6411** or **1-800-255-9168** or visit [cubooks.colorado.edu](http://cubooks.colorado.edu).

The *University of Colorado at Boulder Catalog* is published yearly by University Communications in cooperation with the academic departments.

### University of Colorado at Boulder Publications and Creative Services

**Editor:** Linda Besen

**Design and production:** Polly Christensen

**Production management:** Katie Henry

**Front cover image:** Casey A. Cass

This year the Publications and Creative Services Photography Department would like to thank the Ethnic Living and Learning Community (ELLC) program at CU-Boulder for photographs taken at their March 2003 retreat at Balarat Outdoor Education Center west of Boulder. These photographs appear throughout the catalog.

Part of the Chancellor's Leadership Residential Academic Program, the ELLC is a residential learning program that provides students with an intentional, multicultural living and learning experience.

## Statement on Diversity

*We are committed to making the University of Colorado at Boulder a community in which diversity is a fundamental value. People are different and the differences among them are what we call diversity. Diversity is a natural and enriching hallmark of life. It includes, but is not necessarily limited to, ethnicity, race, gender, age, class, sexual orientation, religion, and physical abilities. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others, and communicate openly.*

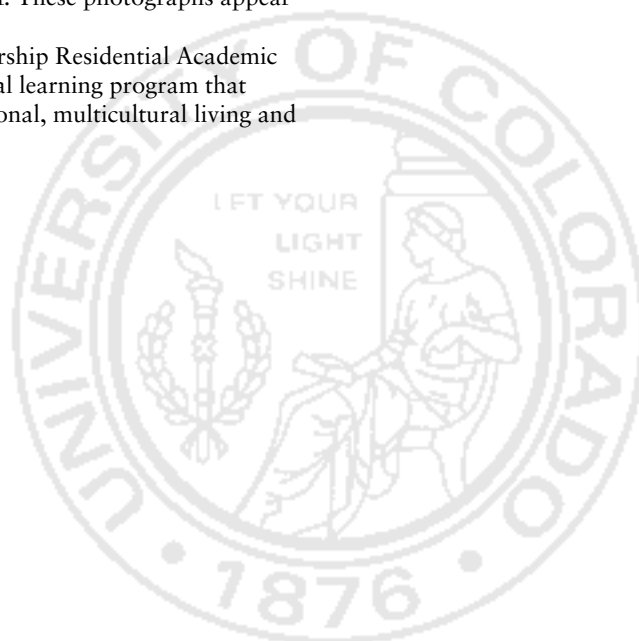
—from the *Guidelines for Diversity Planning*

The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities.

The university takes action to increase ethnic, cultural, and gender diversity, to employ qualified disabled individuals, and to provide equal opportunity to all students and employees.

The Office of Equal Opportunity is responsible for educational and employment opportunity, implementation of affirmative action programs, and coordination of Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1973, the Vietnam Era Veterans' Readjustment Act of 1974, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990. For more information about these provisions, or about issues of equity, discrimination, or fairness, contact Garnett K. Tatum, director of the Department of Equal Opportunity, University of Colorado at Boulder, Willard 209, 144 UCB, Boulder, CO 80309-0144, or call **303-492-6706**.

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## Administrative Officers

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### Boulder Campus

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**T**HANK YOU FOR YOUR INTEREST in the University of Colorado at Boulder, and to those of you who will be attending CU-Boulder this year, we welcome you to the campus community.

In this catalog, you will find many reasons why CU-Boulder changes the lives of its students and alumni. Our graduates tell us that our campus is a unique place where learning and discovery flourish in an exceptional physical environment and supportive community. As one graduate says, “the intellectual rigor and supportive nature [at CU] were central to my personal development.”

Because CU-Boulder is a comprehensive research university, we can offer a wide range of academic programs for your consideration. “There was so much richness . . . the energy almost lifted me off my feet,” is how one CU alumna put it. In this catalog you will find descriptions of more than 3,400 courses in over 150 areas of study.

“What I feel distinguishes CU from other schools is the total learning experience, inside as well as outside the classroom. The social atmosphere—meeting, learning, and developing friendships with people and cultures from all over the United States and the world—is a key component.” As this alumnus expresses, CU adds to the academic experience by supporting students in their development as intellectually curious, creative, and knowledgeable critical thinkers and problem solvers.

CU graduates are life-long learners who are important contributors to the communities where they live and work. Many of our alumni go on to make a difference in the nation and the world because of their undergraduate years spent at CU-Boulder.

If you have made the choice to attend CU-Boulder, congratulations. You are embarking on a life-changing journey, filled with academic possibilities and opportunities for personal growth. If you are still deciding what university or college to attend, take a closer look at CU-Boulder by reading this catalog and visiting our web site at [www.colorado.edu](http://www.colorado.edu). You’ll soon understand why CU-Boulder is changing the lives of so many of our current students and alumni.



Richard L. Byyny, MD  
CHANCELLOR

# CU Changes Lives

## CU CHANGES LIVES

I was a single mom when I entered graduate school in journalism at CU in 1975. When I graduated two years later, I was married and I also was reborn—mainly by the new vision for myself after two focused years of study on the Boulder campus. What did I learn? How to see. And how to listen. And how to ask why. Maybe it's the mountains. Who can look at the Flatirons frosted with snow and not know there's something bigger than oneself to ponder?

—*Patricia Raybon (MA, Journalism, 1977), author, associate professor of journalism and mass communication at CU-Boulder*

The '60s were a different country, and they were especially different in places like Madison and Berkeley and Boulder. The best thing I took away from those college years was the way they forced me to think about public issues.

I lived on the family farm as a student in the late 1960s, and I drove back and forth to campus every day. There I was, living with my extremely conservative, Catholic family and driving up to the Boulder campus every day. The SDS [the radical Students for a Democratic Society] is out there demonstrating against the Vietnam War, and they're burning the flag beside the student union fountain and carrying "God is Dead" signs.

We questioned everything, and the war was tough. It was challenging and it certainly made you think. The classes I took and the professors and the conversations in the cafeteria—I'm glad I went through all that because it was very good preparation for facing up to the kinds of issues that still confront us today.

—*Bob Beauprez (BS, PE, 1970), Colorado congressman (from the May 2003 Coloradan)*

Beyond the strong academic education I received at CU, the student-teacher relationships significantly influenced my life. A favorite English professor, Bill Markward, invited his Oral Interpretation class over to his house for its last meeting and our final presentations. Memories of that snowy night in his home over looking the lights of Boulder reading our author selections seated by the fireplace hearth still remain with me. My replication came without the fireplace but with the last class for each of my education leadership and curriculum courses at a small liberal arts university in southern California. For twelve years, students came to my home for a potluck meal or ice cream at the conclusion of the class. They appreciated being in their professor's home much as I had many years earlier in Boulder.

—*Martha (Marty) Coffin Evans (A&S, 1964), former educational administrator and senior adjunct professor, University of LaVerne, California. Currently president of MACE Associates, LLC, Boulder*





# CU Changes Lives

## CU CHANGES LIVES

Attending CU was like standing in a great river.

I could look in one direction, and say, "That's where I came from."

I could look in the other direction and know, "That's where I'm going. Somewhere, down there."

At first I just stood still in wonder. There was so much flying past me, so much richness on every side of me and on every horizon, the energy almost lifted me off my feet . . . it was beautiful and powerful at once. Soon, I learned to reach below the surface, past the rushing glimmer, and put my hands around ideas, like smooth stones, and lift them, and examine them in my palm. I began to hunt with my fingers for the ones that felt just right. And then I began to discover that there were just as many ideas inside of me as there were surrounding me . . . and there would always be something new within reach if I just took a step.

I had always been curious, ambitious, creative.

CU taught me how to grab the world and GO.

—Amy H. Taylor (BA, English, magna cum laude, 1997),  
marketing communications manager, Ponzi Vineyards, Portland, Oregon

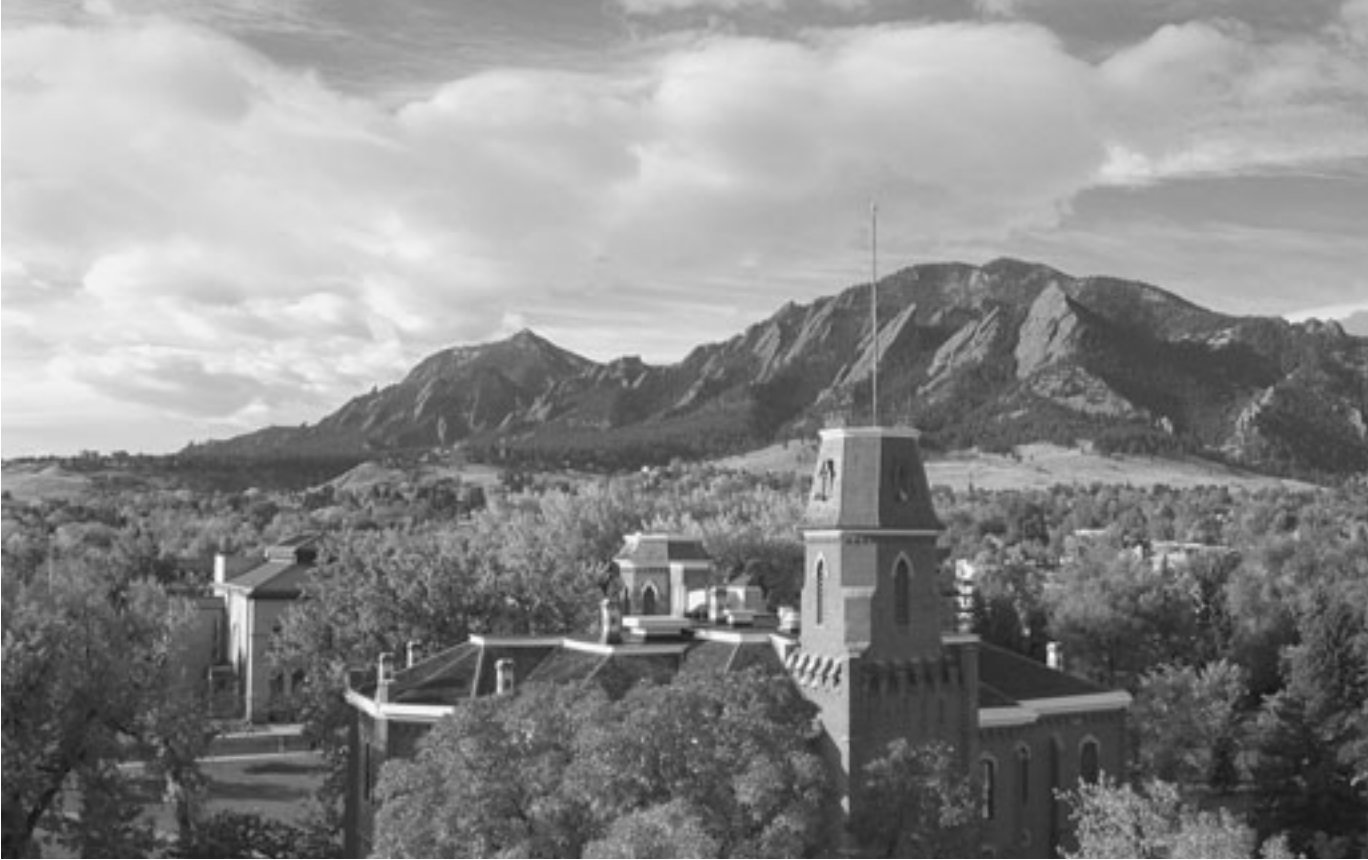
I was involved in a leadership development program at CU called the Presidents Leadership Class (PLC). Honors programs like PLC provide focused study within the context of small academic communities. The intellectual rigor and supportive nature of PLC were central to my personal development as a student. This year I returned to PLC as the assistant academic director and although the program has grown over the past seven years, much remains constant. Classrooms are still filled with lively and challenging discussions about complex global problems demanding effective leadership. Students continue to put their beliefs into action by assuming leadership roles in the community that positively impact others. Equally as important, groups of PLC students can still be found chatting by the UMC fountain, playing broomball together, and supporting each other. This combination of intellectual challenge and a network of supportive friendships were invaluable to me during my time at CU.

—Ty Tashiro (BA, Psychology, 1996), assistant academic director  
of the Presidents Leadership Class at CU-Boulder

I received the instruction at CU that enabled me to make a living in a rather esoteric field: opera singing! My professor, Dr. Berton Coffin, also gave me the tools to become a professor at Rutgers University for 29 years, after the European career. And furthermore, I met my husband of 41 years here—one of those weird actor-fellers (Bill Mooney). CU has been at the center of our lives in so many ways.

—Valorie Goodall Mooney (MM, Music, 1959), Board of Directors,  
CU Alumni Association, Boulder





**A**T ITS FIRST SESSION in 1861, the territorial legislature of Colorado passed an act providing for a university in Boulder. Between 1861 and 1876, Boulder citizens donated land south of town and made gifts from \$15 to \$1,000 in order to match the \$15,000 appropriated by the state legislature for construction of the university. The cornerstone for Old Main, the first university building, was laid in 1875. The university was formally founded in 1876, the same year that Colorado became the Centennial State. The university opened its doors the next year, with 44 students, a president, and one instructor.

## The University System

Today, the University of Colorado system is composed of four campuses—Boulder, Colorado Springs, Denver, and the Health Sciences Center in Denver and at Fitzsimons in Aurora. The campuses have a combined enrollment of nearly 50,000 students. To meet the needs of its students, the university offers an extensive number of undergraduate and graduate degree programs.

The University of Colorado ranks fourth among public universities and colleges in federal research expenditures and eighth among all universities in federally funded expenditures. Sponsored research within the university system represents annual awards totaling over \$500 million. Federal agencies are the principal sources of these funds for research and training contracts and grants. The university's research activity is also supported by appropriations from the state of Colorado, private foundations, and private donors.

The University of Colorado is governed by an elected nine-member Board of Regents, which is charged by the state constitution with the general supervision of the university and the exclusive control and direction of all its funds and appropriations, unless otherwise provided by law. The board conducts its business at regular monthly meetings open to the public and through committees.

The president is the chief administrative officer of the four-campus system, and is responsible for providing leadership to the university. *The Board of Regents of the University of Colorado reserves the right to establish enrollment levels for all academic areas.*

## The Boulder Campus

### Mission Statement

The university's mission is to advance and impart knowledge across a comprehensive range of academic disciplines to benefit the people of Colorado, the nation, and the world. This is done by educating undergraduate and graduate students in the accumulated knowledge of humankind, discovering new knowledge through research and creative work, and fostering critical thought, artistic creativity, professional competence, and responsible citizenship.

### General Information

As a comprehensive university, CU-Boulder is committed to the liberal education of students and to a broad curriculum ranging from the baccalaureate through the postdoctoral levels. The educational experience of CU-Boulder, therefore, is distinguished by the wide scope of its programs and course offerings, the notable reputation of its research facilities, the diversity of its student body, and the professionalism and dedication of its faculty.

With an enrollment of over 29,000 students, the University of Colorado at Boulder is the largest campus in the four-campus system. The student population comes from every state in the nation and from more than 100 foreign countries. Many different ethnic, religious, academic, and social backgrounds are represented, fostering the development of a multicultural academic community that enriches each student's educational experience.

On the Boulder campus, the chancellor is the chief academic and administrative officer and is responsible for conducting campus affairs in accordance with the policies of the Regents. The provost and vice chancellor for academic affairs is respon-

sible for planning and implementing all academic and research activities. The senior vice chancellor and chief financial officer provides management information on topics ranging from finances and personnel to strategic planning, enrollment, and instruction. The vice chancellor for student affairs is responsible for providing direct academic support programs, student administrative support of academic programs, and support of student life on campus. The vice chancellor for administration is responsible for campuswide activities that provide administrative assistance, goods, and services to persons and organizations engaged in instruction, research, and public service on campus.

Faculty participate in campus governance through the Faculty Senate and the Faculty Assembly. Students participate through the University of Colorado Student Union (UCSU) and the United Government of Graduate Students (UGGS).

Full-time instructional faculty members number more than 1,200, with at least 87 percent holding doctorates or appropriate terminal degrees. The faculty includes nationally and internationally recognized scholars with many academic honors and awards, including professor Carl Wieman and adjoint professor Eric Cornell, winners of the 2001 Nobel Prize in physics, and Tom Cech, winner of the 1989 Nobel Prize in chemistry. Six faculty have been named MacArthur Fellows, the so-called "genius grant." Seventeen of the faculty are members of the National Academy of Sciences; 15 are included in the membership of the American Academy of Arts and Sciences; and nine are members of the National Academy of Engineering. Most faculty members, including full professors, teach both undergraduate and graduate classes. Faculty members incorporate their research and creative activities directly into instructional programs.

Research conducted at CU-Boulder is supplemented by research institutes devoted both to the advancement of knowledge in particular areas and to graduate training. Many of these institutes have developed international reputations. For a detailed description of research institutes and other important research facilities associated with the university, see the Graduate School section.

To enhance its research capabilities and to provide collaborative opportunities with government and business, CU-Boulder has developed a 200-acre research park east of the main campus. The park provides expanded room for research agencies that work closely with university researchers.

The educational environment of a research university is characterized by a broad range of experiences in many different settings. While the classroom is the location for most instructional activities, laboratories, seminars, and field work are also important features of the undergraduate and graduate experience. Some programs encourage off-campus internships and training; also, study abroad programs have gained popularity. For students whose interests cross traditional disciplinary lines, a number of interdisciplinary programs are available.

### *The Campus Setting*

CU-Boulder is located at the foot of the Rocky Mountains, at an altitude of 5,400 feet. The Flatirons rock formation is visible from nearly everywhere on campus. The climate is temperate, with generally pleasant days and cool evenings. On the average, the area enjoys about 340 sunny or partly sunny days each year. The main campus covers 600 acres and includes about 150 buildings constructed of rough-cut Colorado sandstone with red tile roofs. The rural Italian (or Tuscan vernacular) architectural style evolved from a master plan developed by Philadelphia architect Charles Klauder in 1919. The Norlin Quadrangle, including the original Old Main building, is listed in the *State and National Register of Historic Places*. The campus has been noted as one of the most aesthetically pleasing in the country.

Boulder County encompasses five ecological zones, from 5,000 feet above sea level (plains grassland) to 14,000 feet (alpine tundra). Downtown Boulder is only 20 miles from the Continental Divide and boasts some of the most spectacular scenery in the United States. The city of Boulder, population 95,000, is committed to preserving its beautiful natural environment and is surrounded by 26,000 acres of open space.

Contemporary environmental design and renovated historic buildings combine to give the city a pleasant, well-planned atmosphere. The natural beauty of the locale attracts a variety of individuals to the area: scientists, business people, and professionals, as well as writers, artists, and crafts people. Consequently, the city is a center of high technology enterprise, scientific research, and cultural activity.

Denver, the state's capital city, is 30 miles from Boulder. Denver offers the attractions and resources of a metropolitan area and is accessible from the Boulder area by traveling on U.S. 36, also known as the Denver-Boulder Turnpike. Denver's international airport is served by most major carriers and is located approximately 60 minutes southeast of Boulder. Boulder and Denver International Airport are connected by a public transportation system.

### *Undergraduate Enrollment and Graduation Rates*

CU-Boulder's fall 2003 entering freshman class numbered 5,571. Of these, 50 percent were females, 56 percent residents of Colorado, and 14.2 percent members of minority groups (African Americans, Asian Americans, Hispanics, and Native Americans). Seventy-two percent enrolled in the College of Arts and Sciences, 13 percent in the Leeds School of Business, 11 percent in the College of Engineering and Applied Science, and 4 percent, combined, enrolled in the College of Architecture and Planning and the College of Music. About 20 percent of freshmen entering CU-Boulder transfer to another college or school within the university before they graduate.

Of the freshmen entering in summer or fall 1997 who enrolled full time, 37 percent graduated within four years; 63 percent graduated within five years; and 68 percent graduated within six years. Of the students who entered in fall 2002, 84 percent returned for their second fall semester.

### *CU-Boulder Academic Programs*

The Boulder campus offers more than 3,400 different courses in approximately 150 fields of study. These courses represent a full range of disciplines in the humanities, the social sciences, the physical and biological sciences, the fine and performing arts, and the professions. CU-Boulder is fully accredited by the Higher Learning Commission and is a member of the North Central Association. (See individual colleges and schools for additional accreditation information.)

For information on the content of academic programs and official degree designations, refer to the appropriate catalog sections. Additional graduate and professional programs are located on other campuses of the university; see the Graduate School section.

### *Colorado Springs Campus*

The University of Colorado at Colorado Springs is a residential campus providing undergraduate and graduate programs to meet the university-level needs of southern Colorado.

### *Academic Programs*

- College of Business and Administration
- College of Education
- College of Engineering and Applied Science
- Graduate School
- College of Letters, Arts, and Sciences
- Beth-El College of Nursing and Health Sciences
- Graduate School of Public Affairs

## Academic Programs

B—Bachelor's Degree  
C—Certificate  
M—Master's Degree

JD—Juris Doctor  
D—Doctoral Degree

### College of Architecture and Planning

Environmental Design B

### College of Arts and Sciences

Anthropology	B	M	D
Applied Mathematics		M	D
Art and Art History	B	M	
Asian Studies	B		
Astronomy	B		
Astrophysical, Planetary, and Atmospheric Science		M	D
Biochemistry	B		
Chemical Physics			D
Chemistry	B	M	D
Chinese	B		
Classics	B	M	D
Communication	B	M	D
Comparative Literature		M	D
Dance	B	M	
Distributed Studies	B		
East Asian Languages and Literature		M	
Ecology and Evolutionary Biology	B	M	D
Economics	B	M	D
English	B	M	D
Environmental Studies	B	M	D
Ethnic Studies	B		
Film Studies	B		
French	B	M	D
Geography	B	M	D
Geology	B	M	D
Geophysics			D
German		M	
Germanic Studies	B		
History	B	M	D
Humanities	B		
Integrative Physiology	B	M	D
International Affairs	B		
Italian	B		
Japanese	B		
Linguistics	B	M	D
Mathematics	B	M	D
Molecular, Cellular, and Developmental Biology	B	M	D
Museum and Field Studies		M	
Neuroscience			D
Philosophy	B	M	D
Physics	B	M	D
Political Science	B	M	D

Psychology	B	M	D
Religious Studies	B	M	
Russian Studies	B		
Sociology	B	M	D
Spanish	B	M	D
Speech, Language, and Hearing Sciences	B	M	D
Theatre	B	M	D
Women's Studies	B		

### Leeds School of Business

Business Administration B M D

### School of Education

Education	C		
Educational/Psychological Studies		M	D
Instruction and Curriculum		M	D
Research and Evaluation Methodology			D
Social, Multicultural, and Bilingual Foundations		M	D

### College of Engineering and Applied Science

Aerospace Engineering Sciences	B	M	D
Applied Mathematics	B		
Architectural Engineering	B		
Chemical Engineering	B	M	D
Civil Engineering	B	M	D
Computer Science	B	M	D
Electrical and Computer Engineering	B		
Electrical Engineering	B	M	D
Engineering Management		M	
Engineering Physics	B		
Environmental Engineering	B		
Mechanical Engineering	B	M	D
Telecommunications		M	

### Graduate School

Cognitive Science D

### School of Journalism and Mass Communication

Journalism and Mass Communication B M D

### School of Law

Law JD

### College of Music

Arts in Music	B		
Music	B	M	D
Music Education	B	M	
Musical Arts			D

## Denver Campus

Located near the heart of downtown Denver, the University of Colorado at Denver is the only public university in Colorado's capital city. Its proximity to the commercial and governmental hubs of Denver provides students the combined excellence of its faculty and the opportunity afforded by a metropolitan environment. CU-Denver is a nonresidential, 12,000-student campus that offers around 80 degree programs at the undergraduate, graduate, and professional levels, with classes held days, evenings, weekends, and online for the convenience of students and employers.

## Academic Programs

College of Architecture and Planning  
College of Arts and Media  
Business School  
School of Education  
College of Engineering and Applied Science  
College of Liberal Arts and Sciences  
Graduate School of Public Affairs

## Health Sciences Center

Currently located on a 46-acre campus within Denver, the Health Sciences Center serves as the hub for a broad network of health care delivery programs. The campus houses the schools of Dentistry, Medicine, Nursing, Pharmacy, and the Graduate School. The center also includes a teaching hospital: the University of Colorado Hospital. A number of renowned research institutes are affiliated with the

center as well. The Health Sciences Center is in the process of relocating to the former Fitzsimons Army Medical Center in Aurora.

### Academic Programs

School of Dentistry  
Graduate School  
School of Medicine  
School of Nursing  
School of Pharmacy

## Academic Affairs

### Academic Advising

Academic advising is an integral part of a college education. Its goal is to assist students in making responsible decisions as they develop educational plans compatible with their potential career and life goals. Advising is more than offering information about academic courses and programs; it also involves encouraging students to formulate important questions about the nature and direction of their education and working with them to find answers to these questions.

#### Responsibilities of Students and Advisors

Within the advising system on the Boulder campus, both students and advisors have responsibilities.

Students are responsible for:

- attending a special orientation, advising, and registration program on campus before enrolling in their first semester;
- knowing the requirements of their particular academic program, selecting courses that meet those requirements in an appropriate time frame, and monitoring their progress toward graduation;
- consulting with their academic advisor several times every term;
- scheduling and keeping academic advising appointments in a timely manner throughout their academic career, so as to avoid seeking advising only during busy registration periods; and
- being prepared for advising sessions (for example, by bringing in a list of questions or concerns, having a tentative schedule in mind, and/or being prepared to discuss interests and goals with their advisor).

Academic advisors are responsible for:

- helping students clarify their values, goals, and abilities;
- helping students understand the nature and purpose of a college education;
- providing accurate information about educational options, requirements, policies, and procedures;
- helping students plan educational programs consistent with the requirements of their degree program and with their goals, interests, and abilities;
- assisting students in monitoring and evaluating their educational progress; and
- helping students locate and integrate the many resources of the university to meet their unique educational needs and aspirations.

*Note:* The university cannot assume responsibility for problems resulting from students failing to follow the policies stated in this catalog or from incorrect advice given by someone other than an appropriate staff member of the college.

### Academic Advising Center

The Academic Advising Center coordinates academic advising, transfer credit evaluation, and graduation certification for all undergraduate students pursuing a program of study in the College of Arts and Sciences and for all Open Option students. All students in the college are assigned to a primary academic advisor in their major field of study. Students are expected to meet with their assigned advisor on a regular basis throughout the academic year.

The advising center also oversees the Preprofessional Advising Center, which provides advising to all students on the Boulder campus who are intending to pursue law or one of the health professions (dentistry, medicine, nursing, pharmacy, physical therapy, etc.).

In addition, through the open option advising program, the advising center provides comprehensive advising services to students who are undecided about their major, or who are considering changing their major. Open option primary advisors are familiar with the courses and degree requirements for all majors offered at CU-Boulder, and assist open option students in exploring majors related to their interests, aptitudes, and goals. Open option advisors also assist students in designing programs of study that meet graduation requirements while providing students with the academic flexibility to pursue whichever degree program they ultimately choose.

Open option or preprofessional students with general advising questions may call the Academic Advising Center at **303-492-7885** or visit the office in Woodbury 109.

### Orientation

The CU-Boulder orientation programs are designed to create a smooth transition to the university community for students and their parents. New freshman and transfer students are required to attend both steps in the orientation process.

First, students learn about the requirements and resources of their individual colleges through college orientation programs. Parents are encouraged to attend. Second, all new students are introduced to the expectations, traditions, and resources of the campus community as a whole.

A single orientation program for new spring semester students and their parents occurs during the week before classes begin in January.

All new fall students are expected to attend their college orientation program, the chancellor's convocation, and New Student Welcome prior to their first day of class. Detailed information regarding these steps of the orientation process is made available through individual colleges once students have confirmed their intent to enroll at the university.

Orientation staff coordinate orientations for the College of Arts and Sciences and consult with the Colleges of Architecture and Planning, Business and Administration, Engineering and Applied Science, and Music. The Office of the Vice Chancellor for Student Affairs coordinates New Student Welcome and the Chancellor's Convocation.

### Summer Session

Summer session at CU-Boulder, an integral part of the university's year-round program, offers students opportunities for study, individual development, and recreational activity. Summer students can choose from more than 500 courses, allowing progress toward a degree in most areas of study.

The traditional summer session lasts 10 weeks; courses meeting for shorter terms (one through four, five, or eight weeks) are scheduled within the 10-week session. A three-week intensive term, Maymester, is offered immediately after spring semester ends.

Complementing summer session offerings, a rich calendar of summer events includes performances in repertory by members of the Colorado Shakespeare Festival, musical productions presented by the CU Summer Opera company, and performances by members of the Colorado Dance Festival and the Colorado Music Festival. Organized recreational activities are offered through the Student Recreation Center.

The summer catalog is usually available by mid-February. To request a summer catalog, call **303-492-5148** (toll free **1-800-331-2801**), go to [www.colorado.edu/summersession](http://www.colorado.edu/summersession), or write to:

Summer Session  
University of Colorado at Boulder  
178 UCB  
Boulder, CO 80309-0178.

## Student Affairs

### Overview

The Division of Student Affairs focuses on creating a positive learning environment that fosters successful personal development and learning both in and outside the classroom. Student learning and success are enhanced when the learning environment and community support students' full development as people, not isolated intellects, and when students are seen as important partners in the learning experience.

### Student Learning Environment

The first priority of Student Affairs is students' development as successful, intellectually curious learners, and as healthy, competent, active citizen participants in our American democracy. The division provides, in collaboration with other members of the campus community, educational opportunities, resources, and support to facilitate each individual in attaining his or her goals. The division works to create a learning environment that eliminates barriers standing in the way of student learning, development, and success.

A spectrum of uniquely designed services and support programs is available to undergraduate and graduate students as members of the university community. These programs support student development and academic achievement, and they contribute to creating a positive learning environment. Examples include housing, recreation, health care and education, disabilities access and support, personal and career counseling, and opportunities to develop leadership skills. Academic course work and support are provided through offerings such as the Undergraduate Academy, International Education, ROTC, the Undergraduate Research Opportunities Program, and educational outreach efforts offered through the Student Academic Services Center, Herbst Academic Center for Student-Athletes, and the first year seminar called the CU Experience. Personal consultation regarding learning styles and academic performance is also available in many departments. Student Affairs works in a liaison relationship with the University of Colorado Student Union, the Greek system, and parents of students. The division takes an active leadership role in supporting diversity on campus and in building a supportive and respectful campus learning environment. The campus and Student Affairs staffs are proud of the high ratings that students give to many services. The division continues its commitment to improving service delivery in all areas. Under the administration of the vice chancellor for Student Affairs, more than 1,000 professional and highly skilled staff and faculty are responsible for the many programs and services available to every student during his or her educational career.

## Student Development

Six developmental themes are identified as significant components to becoming a successful CU-Boulder student, graduate, and citizen. Student Affairs staff expect that every CU-Boulder student will have the opportunity to learn and develop in the following six areas: intellectual development; life-long learning and career development; beliefs, values, and ethics; belonging and a sense of connectedness; multicultural awareness; and independence and interdependence. Student Affairs helps and supports students in their development as intellectually curious, creative, and knowledgeable critical thinkers and problem-solvers, and as life-long learners who can successfully apply their experiences toward personal and professional fulfillment. Student Affairs also helps students develop their own beliefs, values, ethics, and worldviews in order to participate as responsible citizens and helps them develop their sense of connection to others through a variety of meaningful, respectful, and diverse relationships. The division plays a key role in assisting students gain a greater understanding and appreciation of cultural diversity in order to challenge attitudes and promote a socially just environment for all. This includes, but is not limited to, race, ethnicity, gender, sexual orientation, ability, religion, and country of origin. Finally, Student Affairs supports students in developing a deeper understanding and appreciation for the uniqueness of who they are and how they impact and are impacted by others.

## Undergraduate Admission

The Office of Admissions welcomes inquiries from prospective students regarding undergraduate admission. Through the admission process, the university seeks to identify applicants who will successfully complete a collegiate academic program. Admission is based on many criteria, including high school GPA or GED test scores, high school rank, the quality of course work, college entrance test scores, and the extent to which the minimum academic preparation standards (MAPS) have been met.

Inquiries relating to undergraduate admission to the University of Colorado at Boulder may be addressed to:

Office of Admissions  
Regent Administrative Center 125  
University of Colorado at Boulder  
552 UCB  
Boulder, CO 80309-0552  
303-492-6301  
TTY 303-492-5998 (for hard of hearing persons)

To find admission information on the Web, go to [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

For admission requirements to graduate degree programs, see the Graduate School section and individual college and school sections.

### Visiting the Campus

Prospective students and their parents are welcome to visit the Office of Admissions in Regent Administrative Center 125 between 9:00 A.M. and 5:00 P.M. (summer hours are 8:30 A.M. to 4:30 P.M.), Monday through Friday, except on holidays. Daily information sessions, walking tours of the campus, and special all-day visit programs are offered. Although interviews are not used in the decision-making process, you are invited to visit the campus.

The best time to see the campus is when classes are in session (September through mid-December and mid-January to early May, with the exception of spring break). An Academic Calendar is printed on the inside front cover of this catalog. There are dates when information sessions, campus tours, and visit programs are not held due to holidays or university closures. It is important to check our web site for the most current information.

### *Reservations*

Reservations are required for all information sessions, tours, and visit programs. For complete visit program descriptions, dates, reservation forms, and campus maps, go to [www.colorado.edu/visit](http://www.colorado.edu/visit), or call **303-492-6301**. Visit program dates for future academic years are added to the web site as they become available (usually in August each year).

### *Daily Information Sessions and Campus Tours*

Information sessions with an admission counselor are held Monday through Friday at 9:30 A.M. and 1:30 P.M. Following the information sessions, walking tours of the campus, led by student guides, begin at 10:30 A.M. and 2:30 P.M. Combined information sessions and tours are also held at 10:30 A.M. most Saturdays.

Information sessions are offered at the University Club unless otherwise noted. Parking is available at Euclid AutoPark. Limited metered parking is also available on campus and city streets.

### *Campus Visit Programs*

An excellent way to become acquainted with the campus is to participate in one of the campus visit programs specially designed for prospective students and parents.

These programs, offered on selected Fridays and Saturdays throughout the year, offer prospective students and their parents the chance to participate in information sessions, take a campus tour, learn more about residence hall life, talk with student and parent panels, and meet with campus representatives, as well as attend classes or listen to a sample lecture. To make reservations for any or all of these visit programs, go to [www.colorado.edu/visit](http://www.colorado.edu/visit) or call the Office of Admissions at **303-492-6301**.

## General Admission Information

### *CU-Boulder's Colleges and Schools*

As undergraduates at CU-Boulder, students can choose from among the university's four colleges (architecture and planning, arts and sciences, engineering and applied science, and music) and three schools (business, education, and journalism and mass communication). Undergraduate majors offered at CU-Boulder are listed throughout this catalog.

### *Choosing a Program of Study*

When applying for admission, students need to choose a major in one of CU-Boulder's colleges or schools. Applicants who have not decided on a major can select an "open option" or "undetermined" major (depending on the college or school). This allows students to explore different options during their first and/or second years of study. After this time, they will decide on a specific major for their remaining years. Students can also change their area of study, but this can result in additional course requirements that may add to the number of semesters necessary to complete a degree.

Although applicants can apply to only one CU-Boulder college or school, after enrollment they can apply for transfer to another Boulder college or school through the Intrauniversity Transfer (IUT) process. Criteria for transferring from one college or school to another are competitive, and each college or school establishes its own standards.

### *Double Degrees, Double Majors, Minors, and Certificate Programs*

There are several programs that allow students to include additional areas of academic concentration beyond their chosen major. Two different degrees, either from the same college or school, or degrees from different colleges or schools, may be earned, providing certain conditions are met. Students are ad-

mitted to one major and degree program initially but may pursue a second degree during their first semester of enrollment. Minor programs are offered in a number of undergraduate departments and programs in the College of Arts and Sciences, the Leeds School of Business, and the College of Engineering and Applied Science. Certificate programs in arts and sciences, business, and music fields are also available.

### *Preprofessional Study*

Preprofessional advisors are available to help students interested in medicine, dentistry, physical therapy, veterinary medicine, nursing, pharmacy, dental hygiene, a physician assistant program, other allied health sciences, or law. Students interested in these fields may apply to any of the majors open to new undergraduates, including the open option major in the College of Arts and Sciences. Students interested in one of the undergraduate or graduate health sciences programs offered at the University of Colorado Health Sciences Center (UCHSC) in Denver may complete preprofessional work on the Boulder campus. Admission is competitive, but preference to all UCHSC programs is given to Colorado residents.

For more information, visit [www.colorado.edu/artsscience/aacforstudents](http://www.colorado.edu/artsscience/aacforstudents) or see Preprofessional Programs in the Other Academic Programs section.

### *Music Applicants*

Prospective music majors must submit both the Undergraduate Application for Admission to the Office of Admissions, and the audition application to the College of Music.

Live auditions, which are preferred unless travel distance is prohibitive, are scheduled for Saturdays in February. Other times throughout the year may also be arranged. Students are considered for merit-based music scholarships on the basis of their audition; no additional application is necessary. High school students and college transfer students who wish to be considered for a music scholarship for the next school year should complete their audition by the last Saturday in February. The audition committee determines admission into one of three music degree programs (bachelor of music, bachelor of music education, and/or bachelor of arts in music). Audition applications plus additional information on audition requirements, faculty, and programs in the College of Music are sent upon request. For further information, see the College of Music section or go to [www.colorado.edu/music](http://www.colorado.edu/music).

### *Teacher Education Applicants*

Through the School of Education, students interested in elementary or secondary school teaching may take programs approved for Colorado licensure in connection with Colorado Commission on Higher Education (CCHE) approved majors offered at CU-Boulder.

Elementary teacher education includes kindergarten through sixth grade. Secondary teacher education includes teaching endorsements for seventh through twelfth grades in English, French, German, Italian, Japanese, Latin, mathematics, Russian, science, social studies, and Spanish. Teacher education programs are also available in music education for grades kindergarten through 12.

Applicants to the School of Education's teacher education program who have completed a four-year undergraduate degree program should apply directly to the School of Education. Those who have not received a degree must apply to another CU-Boulder undergraduate degree program and submit their application and credentials to the Office of Admissions. Undergraduate students who plan to pursue teacher education should declare this intent to the school's Office of Student Services as soon as possible after enrolling at CU-Boulder.

Refer to the School of Education section for more information about teacher education. Interested students may also visit [www.colorado.edu/education](http://www.colorado.edu/education), e-mail [EdAdvise@colorado.edu](mailto:EdAdvise@colorado.edu), or write to the School of Education, Office of Student Services, University of Colorado at Boulder, 249 UCB, Boulder, CO 80309-0249, for application and deadline information.

### *College Readiness in English and Mathematics*

The state of Colorado mandates that all undergraduate students entering public institutions of higher education in Colorado be screened for college readiness in English and mathematics.

To pass the screening requirements for the CU-Boulder campus, students must present minimum math, English, and reading scores from the ACT exam, or minimum verbal and math scores from the SAT exam.

Minimum scores are currently being reviewed by the Colorado Commission on Higher Education (CCHHE). Go to [www.colorado.edu/prospective/afteradmission](http://www.colorado.edu/prospective/afteradmission) for complete details on requirements.

### Freshman Applicants

Students are freshman applicants if they are currently enrolled in high school, or if they have earned a high school diploma or its equivalent and have not enrolled in a college or university since graduation.

#### *Admission Criteria*

Many factors are considered in evaluating students' applications for admission to CU-Boulder. Although academic performance in high school (high school GPA and the quality of course work) is the most important indicator of success, other factors are also considered. These include students' college entrance test scores (either the SAT or ACT), the trend in their grades, and the extent to which the minimum academic preparation standards (MAPS) are met. For information on MAPS, see the chart in this section. Typically, the university has more qualified freshman applicants than there are places. Therefore, admission is competitive, and students with the highest qualifications are selected.

Applicants whose records reflect nontraditional grading systems, unusual curricula, or high school equivalency through the GED test will receive individual consideration and are urged to apply.

#### *College Entrance Tests*

Applicants should take a college entrance test late in their junior year or early in their senior year of high school. CU-Boulder requires either the SAT I or the ACT for admission consideration. The highest scores are used in the admission decision. If the same test is taken more than once, the scores are combined on each subsection to give the highest overall score. Achievement tests (or the SAT II) are not required. For more information, see the How to Apply for Undergraduate Admission section.

#### *Minimum Academic Preparation Standards (MAPS)*

Students who graduated from high school in spring 1988 or later are expected to have completed courses that meet certain minimum academic preparation standards (MAPS) before enrolling at CU-Boulder. The MAPS for specific CU-Boulder colleges and schools are listed in this section.

Students may be admitted to CU-Boulder even though they have not met all the MAPS requirements. If that is the case, they are required to complete the appropriate MAPS courses once enrolled, and the credits may be applied toward graduation. All MAPS deficiencies must be completed prior to graduation from CU-Boulder. Students may also complete missing MAPS course work in high

school, at other colleges or universities, or through approved credit-by-examination programs. MAPS deficiencies not completed in high school or college are factored into the admission decision.

#### *Policies Concerning MAPS Deficiencies*

The policies of the Boulder campus with respect to completing MAPS course work after enrollment are as follows.

1. Appropriate missing MAPS course work is included in the hours for graduation.
2. All course work toward fulfillment of the MAPS must be taken for a letter grade.
3. Students are required to enroll in and complete at least one MAPS course each term, beginning in the first term of enrollment, until such time as all MAPS are completed. This policy applies to new freshmen, transfer students, and students transferring from other academic units on the Boulder campus and from other campuses of the university. Failure to comply with this requirement may result in suspension at the end of the term in which the student ceases to complete missing MAPS units.
4. All students who first enroll in one academic unit at CU-Boulder and subsequently transfer to another unit are required to meet the MAPS specified for the new unit, irrespective of their completion of MAPS units in their previous college or school.
5. Students in double-degree programs must meet MAPS requirements of both degree-granting units.
6. Students must consult with a CU-Boulder academic advisor (or read their college or school's academic publications) to determine which specific courses may be used to meet a MAPS requirement.
7. Students who complete 50 percent or more of their secondary schooling in a non-U.S. system are exempt from MAPS.

#### *Advanced Placement*

CU-Boulder participates in the Advanced Placement program of the College Board. Over one-third of Boulder's entering freshmen submit Advanced Placement (AP) test scores each year. Official scores must be sent to the admissions office directly from the College Board. For a guide to specific equivalencies, refer to the chart in this section. For more information, write or call:

AP Exams  
P.O. Box 6671  
Princeton, NJ 08541-6671  
609-771-7300 or toll free 888-225-5427  
[www.collegeboard.com](http://www.collegeboard.com)

#### *International Baccalaureate*

The International Baccalaureate (IB) Diploma programs provide preuniversity study. IB examinations, whether leading to a full IB diploma or to an IB certificate often qualify students for advanced standing at CU-Boulder. In general, credit is granted for approved IB examinations at the higher level with a score of 4 or better.

Students admitted to the University of Colorado at Boulder after June 30, 2003, who have graduated from high school having successfully completed an International Baccalaureate Diploma program shall be granted 24 semester hours of college credit. No tuition shall be charged for these credits. These credits shall be granted, however, only if the student receives a score of 4 or better on an examination administered as part of the IB Diploma program. If the student scores less than 4 on any IB subject test, the credit hours granted shall be reduced accordingly.

## Minimum Academic Preparation Standards (MAPS)

One unit equals one year of high school study or one semester of college course work.

	College of Architecture and Planning	College of Arts and Sciences	Leeds School of Business	College of Engineering and Applied Science	College of Music
English	4	4 (includes 2 of composition)	4 (includes 2 of composition)	4	4
Mathematics	3	3 (includes 2 of algebra and 1 of geometry)	4 (includes at least 2 of algebra, 1 of geometry, and 1 of college preparatory math such as trigonometry, analytic geometry, or elementary functions)	4 (includes at least 2 of algebra, 1 of geometry, and 1 of college preparatory math such as trigonometry, analytic geometry, or elementary functions)	3
Natural science	3 (includes physics and/or biology)	3 (includes 2 of lab science, 1 of which must be either chemistry or physics)	3 (includes 2 of lab science, 1 of which must be either chemistry or physics)	3 (includes 1 of chemistry and 1 of physics)	3
Social science	3	3 (includes 1 of U.S. or world history and 1 of geography; if U.S. history is used to meet the history requirement, the geography requirement may be met with 1/2 unit of geography and 1/2 unit of world history)	3 (includes 1 of U.S. or world history and 1 of geography; if U.S. history is used to meet the history requirement, the geography requirement may be met with 1/2 unit of geography and 1/2 unit of world history)	2	2
Single foreign language	2	3	3	3	2
Academic elective	1			1	1 (in the arts)
<b>TOTAL UNITS</b>	<b>16</b>	<b>16</b>	<b>17</b>	<b>17</b>	<b>15</b>

An official copy of the diploma with test scores must be sent to the admissions office directly from the IB organization. For a guide to specific equivalencies refer to the chart in this section. For more information on test administration, write or call:

International Baccalaureate Organization  
475 Riverside Drive, 16th floor  
New York, NY 10115  
212-696-4464  
www.ibo.org

For the most current information on how CU-Boulder evaluates IB credit, visit [www.colorado.edu/prospective/freshman/requirements/ib.html](http://www.colorado.edu/prospective/freshman/requirements/ib.html).

### Guaranteed Admission for Colorado Resident Freshmen

The University of Colorado at Boulder guarantees admission to first-time Colorado resident freshmen who meet specific criteria. For a copy of the guaranteed admission guidelines, visit [www.colorado.edu/prospective/freshman/requirements/guarantee.html](http://www.colorado.edu/prospective/freshman/requirements/guarantee.html), write to Office of Admissions, University of Colorado at Boulder, 552 UCB, Boulder, CO 80309-0552, or call **303-492-6301**. Guaranteed admission information is also available in all Colorado high school guidance offices.

### Freshman Applicants Not Granted Admission

Students who are not granted admission as entering freshmen may consider transferring to CU-Boulder after successful study elsewhere. Students are encouraged to complete at least one full year of transferable college or university course work, including any courses outlined in the minimum academic preparation standards (MAPS) chart that were not met in high school.

## Transfer Applicants

Applicants are considered transfer students if they have attempted or enrolled in any college-level course work (at another college or university, or other campus of the University of Colorado), full time or part time, since graduating from high school. Applicants are not considered transfer students if the only college-level classes they have taken were while enrolled in high school. To be considered for admission, transfer students must report all previous college work and have a high school diploma or its equivalent.

### Admission Criteria

Transfer applicants are considered for admission on the basis of transfer as well as freshman criteria, including minimum academic preparation standards (MAPS). All transfer applicants who graduated from high school in spring 1988 or later are expected to have completed MAPS requirements before enrolling at CU-Boulder.

A number of factors are considered when the transfer application is evaluated. The types of courses taken are as important as the grade point average. Only courses completed at the time the application is reviewed are considered in computing the cumulative, or overall, GPA.

Since the University of Colorado at Boulder selects students on a competitive basis, not all students who meet the minimum grade point criteria are admitted. Competitive criteria may vary from term to term depending on the overall quality of the applicant group and the number of transfer spaces available for a given college or school. Successful completion of prerequisite or recommended courses is also considered in the admission decision (see specific college and school sections below). For more information on competitive transfer admission guidelines, visit [colorado.edu/prospective/transfer/requirements.html](http://colorado.edu/prospective/transfer/requirements.html).



# Advanced Placement (AP) Credit

AP Subject	Examination Title	Examination Score	CU-Boulder Course Equivalent	Semester Hours	Architecture and Planning	Arts and Sciences	Leeds School of Business	Engineering and Applied Science	Journalism and Mass Communication	Music
<b>Biology</b>	Biology	5, 4	EPOB 1210, 1220, 1230, and 1240	8	*	*	*	a	*	*
<b>Chemistry</b>	Chemistry	5, 4 3	CHEM 1111 and 1131 CHEM 1111	10 5	*	*	*	b	*	*
<b>Classics</b>	Latin—Virgil	5 4 3	CLAS 2114, 2124, 3024 CLAS 2114 and 2124 CLAS 2114	11 8 4	*	*	*	*	*	*
	Latin Literature	5 4 3	CLAS 2114, 2124, 3024 CLAS 2114 and 3024 CLAS 2114	11 7 4	*	*	*	*	*	*
<b>Computer Science</b>	Computer Science A	5 4	CSCI 1300 CSCI 1200	4 4	*	*	*	c	*	*
	Computer Science AB	5 4 3	CSCI 1300 and 2270 CSCI 1300 CSCI 1200	8 4 4	*	*	*	c, d c c, d	*	*
<b>Economics</b>	Economics: Micro	5, 4	ECON 2010	4	*	*	*	*	*	*
	Economics: Macro	5, 4	ECON 2020	4	*	*	*	*	*	*
<b>English</b>	English Literature and Composition	5, 4 3	ENGL 1500 and 2502 ENGL 1500	6 3	*	*	*	*	*	*
	English Language and Composition	5 4	WRWG 1150 and 1250 WRWG 1150	6 3	*	*	*	e e	*	*
<b>Environmental Science</b>	Environmental Science	5, 4	ENVS 1000	3	*	*	*	*	*	*
<b>Fine Arts</b>	2-D Design	5, 4	ARTS 1010	3	*	*	*	e	*	*
	3-D Design	5, 4	ARTS 1010	3	*	*	*	e	*	*
	Studio—Drawing Portfolio or Studio—General Portfolio	5, 4	ARTS 1012 and 2002	6	*	*	*	e	*	*
	Art History	5, 4	ARTH 1300 and 1400	6	*	*	*	*	*	*
<b>Foreign Language</b>	French Language	5 4 3	FREN 2110, 2120, and 2500 FREN 2110 and 2120 FREN 2110	9 6 3	*	*	*	c c c	*	*
	French Literature	5, 4 3	FREN 3110 and 3120 FREN 3120	6 3	*	*	*	c c	*	*
	German Language	5 4 3	GRMN 3010 and 3020 GRMN 2020 GRMN 2010	6 4 4	*	*	*	c c c	*	*
	Spanish Language <sup>f</sup>	5 4 3	SPAN 2110, 2120, and 3000 SPAN 2110 and 2120 SPAN 2110	11 6 3	*	*	*	c c c	*	*
	Spanish Literature <sup>f</sup>	5 4	SPAN 3700 and 3800 SPAN 3700	6 3	*	*	*	c c	*	*
<b>Geography</b>	Human Geography	5, 4, 3	GEOG 1992	3	*	*	*	*	*	*
<b>Government</b>	Comparative United States	5, 4 5, 4	PSCI 2012 PSCI 1101	3 3	*	*	*	*	*	*
<b>History</b>	U.S. History	5, 4	HIST 1015 and 1025	6	*	*	*	*	*	*
	European History	5, 4	HIST 1010 and 1020	6	*	*	*	*	*	*
	World History	5, 4	Determined by department <sup>g</sup>	3	*	*	*	*	*	*
<b>Mathematics</b>	Math—Calculus AB	5, 4	MATH 1300 or APPM 1350 (Engineering)	5 4	*	*	*	c c	*	*
	Math—Calculus BC	5, 4	MATH 1300 and 2300 or APPM 1350 and 1360 (Engineering)	10 8	*	*	*	c *	c c	c c
	Math—Calculus BC and AB subscore <sup>h</sup>	3 5, 4, 3	MATH 1300 or APPM 1350 (Engineering)	5 4	*	*	*	c *	*	*
	Math—Calculus BC and AB subscore <sup>h</sup>	2, 1 5, 4	MATH 1300 or APPM 1350 (Engineering)	5 4	*	*	*	c *	*	*
	Statistics	5, 4	MATH 2510	3	*	*	*	e	*	*
<b>Music</b>	Music Listening and Literature	5 4, 3	EMUS 1832 and 2752 EMUS 1832	6 3	*	*	*	*	*	*
	Music Theory	5 4, 3	MUSC 1101, 1111, 1121, and 1131 MUSC 1101 and 1121	6 3	*	*	*	c c	*	*
<b>Physics</b>	Physics B	5, 4	PHYS 2010	5	*	*	*	e	*	*
	Physics C—Mechanics	5, 4	PHYS 1110	4	*	*	*	*	*	*
	Physics C—Electricity and Magnetism	5, 4	PHYS 1120	4	*	*	*	*	*	*
<b>Psychology</b>	Psychology	5, 4	PSYC 1001	4	*	*	*	*	*	*

\* Credits may apply to graduation in the specific college or school.

a Does not apply. Computer science majors, bioengineering, and premedical option students check with faculty advisor.

b CHEM 1111 fulfills departmental requirements in all areas. CHEM 1131 fulfills chemical engineering and computer science requirements.

c Check with faculty advisor in major department.

d CSCI 1200 cannot be used to meet degree requirements in engineering.

e Does not apply.

f Students who want to continue taking Spanish courses beyond their AP credit level must take the departmental placement test. If the results place them below their AP

level, the department strongly recommends that they enroll at the lower of the two levels.

g One course meeting both the arts and sciences and business historical context requirement—see department.

h Students taking the Calculus BC exam automatically receive an AB subscore.

## International Baccalaureate (IB) Equivalency Chart

IB Subject Examination Title	Level of Examination	Examination Score	CU-Boulder Course Equivalent*	Semester Hours
Anthropology	Higher	4	ANTH 2100 and 3 lower-division credits meeting cultural and gender diversity core requirement	6
Art	Higher	4	Elective credits (consult faculty with portfolio for further consideration of fine arts course equivalents)	6
Biology	Higher	4	EBIO 1210, 1220, 1230, and 1240	8
Business and Management	Higher	4	BCOR 1100 BCOR 2--- (lower-division business core)	3 3
Chemistry	Higher Higher	5 4	CHEM 1111 and 1131 CHEM 1111	10 5
Computer Science	Higher	4	CSCI 1200	4
Design Technology	Higher	4	Elective credits	6
Economics	Higher	4	ECON 1000	4
English (A-1)	Higher	4	ENGL 2502 and 3 lower-division credits meeting literature and the arts core requirement	6
French (A-1)	Higher	4	FREN 3050 and 3100	6
French (A-2)	Standard	4	FREN 1010 and 1020	10
French AB Initio	Higher	4	FREN 2500, 3050, 3100	9
French (B)	Standard	4	FREN 2120 and 2500	6
	Higher	7	FREN 1050	5
	Higher	6,5	FREN 1010	5
	Higher	7,6	FREN 2110, 2120, and 3050	9
	Higher	5,4	FREN 2110 and 2120	6
	Standard	4	FREN 1010 and 1020	10
Geography	Higher	4	GEOG 1982 and 1992	6
German (B)	Higher	4	GRMN 1010 and 1020	8
	Standard	4	GRMN 1010 and 1020	8
History of Africa	Higher	4	HIST 1208	3
History of Europe	Higher	4	HIST 1010 and 1020 (meets historical context core requirement)	6
History of the Americas	Higher	4	HIST 1025 and 1038 (meets U.S. context and historical context core requirements)	6
History (other)	Higher	4	One of HIST 1038, 1208, 1308, 1408, 1608, or 1708	3
Latin	Higher	4	Waives MAPS foreign language requirement	—
Mathematics	Higher AND Further	5	MATH 1300 and 2300	10
	Higher	5	MATH 1050, 1070, 1300 and 1 general math credit	8
	Higher	4	General lower-division credits applied to quantitative reasoning and mathematical skills core requirement	3
Music	Higher	4	Elective credits	6
Philosophy	Higher	4	PHIL 1000 (meets ideals and values core requirement) and 3 lower-division credits	6
Physics	Higher	4	PHYS 2010 and 2020	10
Psychology	Higher	4	PSYC 1001 and 2 lower-division credits	6
Russian (B)	Higher	4	RUSS 2010 and 2020	8
	Standard	5	RUSS 2010 and 2020	8
Spanish (A-1)	Higher	4	SPAN 3000 and 3100	8
Spanish (A-2)	Higher	7, 6	SPAN 2110, 2120, and 3000	11
		5, 4	SPAN 2110 and 2120	6
	Standard	7, 6	SPAN 1020 and 2110	8
Spanish (B)	Higher	7, 6	SPAN 2110, 2120, and 3000	11
	Higher	5, 4	SPAN 2110 and 2120	6
	Standard	4	SPAN 1010 and 1020	10
Spanish (AB)	Standard	7, 6	SPAN 1010	5
Theatre	Higher	4	Elective credits (consult faculty for further consideration of theatre course equivalents)	6

\* There is no guarantee that all IB credit will apply to a specific degree program. The dean's office of each college or school makes the final determination on how IB credits apply toward degree requirements. *Note:* This chart was prepared based on current information and is subject to change for students entering in fall 2004.

Regent Administrative Center 125, University of Colorado at Boulder, 552 UCB, Boulder, CO 80309-0552, 303-492-6301.

For a student to be considered for admission, the Office of Admissions must receive a completed application, the application fee, and all required credentials.

Applicants who are currently attending high school should give their completed application (or high school certification form if they applied online) to their counselor. After the counselor has verified the required information and provided a transcript, all materials (including the application fee) should be mailed to the Office of Admissions in a single packet. Processing of an application will be delayed until all required information is received.

### Application Fee

The \$50 application fee (\$70 U.S. for international students) is nonrefundable. The check or money order should be made payable to the University of Colorado. **Important:** The applicant's name and date of birth must appear on the check or money order.

Some students may be faced with financial constraints in paying the application fee. Therefore, waivers are granted to those students with documented hardships who submit to the admissions office the ATP Fee-Waiver Service form available in high schools. Contact the admissions office for other documents that may be used to verify financial hardship.

Students *currently enrolled* in an undergraduate degree program at another University of Colorado campus, who are applying to an undergraduate degree program on the Boulder campus, are not required to pay the application fee.

### College of Architecture and Planning

Admission preference is given to students who have taken college-level courses in the areas of architecture, planning, or environmental studies. Completion of courses in related fields of social science, natural science, fine arts, or humanities is also considered in the admission review.

### College of Arts and Sciences

Admission preference is given to students who have taken the appropriate general education college-level courses.

### Leeds School of Business

Transfer applicants must have completed at least one semester of linear algebra, finite math, or calculus. Other preferred courses include macroeconomics, microeconomics, and business-related courses.

### School of Education

Students who have completed a bachelor's degree may apply for admission directly to the School of Education. All other undergraduate students must be admitted to another college or school before applying for a CU-Boulder teacher education program.

To be considered for admission to the teacher education program, an undergraduate must have completed a minimum of 56 semester hours of course work and have met the admission requirements outlined in the School of Education section.

### College of Engineering and Applied Science

The College of Engineering and Applied Science expects transfer applicants to have taken course work relevant to an engineering curriculum. Prospective transfer students are required to have completed at least two semesters of college-level calculus and two semesters of calculus-based physics and/or college-level chemistry before they enroll at Boulder. Chemical engineering students should have completed two semesters of college chemistry before enrolling at CU-Boulder.

### School of Journalism and Mass Communication

Applicants must have a minimum of 30 semester hours of appropriate college-level course work completed or in progress, including journalism course prerequisites (Contemporary Mass Media, and Critical Thinking and Writing at CU-Boulder, or their equivalents at another institution). Applicants with fewer than the required hours or without journalism course prerequisites should apply to the College of Arts and Sciences as prejournalism and mass communication majors. For more information, see the School of Journalism and Mass Communication section.

### College of Music

The College of Music requires an audition of all applicants. More information may be found in the General Admission Information and College of Music sections.

### College Entrance Tests

Transfer students are required to submit SAT I or ACT scores, except those who have completed 24 or more semester hours of transferable college-level work at the time they apply. *Note:* All nondegree students applying for transfer from any program offered by CU-Boulder's Division of Continuing Education must submit SAT I or ACT scores regardless of the number of semester hours of college work completed.

Students' highest scores are used in the admission decision. If the same test is taken more than once, the scores on each subsection are combined to give the highest overall score. Achievement tests (or the SAT II) are not required. For more information, see the How to Apply for Undergraduate Admission section.

### Minimum Academic Preparation Standards (MAPS)

Effective with students who graduated from high school in spring 1988 or later, CU expects all transfer students to have completed courses that meet certain minimum academic preparation standards (MAPS). The MAPS requirements for specific CU-Boulder colleges and schools are listed in this section.

MAPS requirements not met in high school may be met through equivalent college-level course work before or after transfer to CU-Boulder. A semester course completed at the college level substitutes for a year of work in high school.

### Opportunities for Colorado Transfer Students

Beginning fall 2003, a list of transferable state guaranteed general education courses was established for students pursuing arts and sciences majors. Contact your current Colorado school, the CU-Boulder Office of Admissions, or visit our web site for more information.

Course equivalency guides are available on the Web at [www.colorado.edu/prospective/transfer/requirements.html](http://www.colorado.edu/prospective/transfer/requirements.html), and also in Colorado community college advising offices. These guides provide information on CU-Boulder admission requirements, graduation requirements, and course equivalencies.

Students transferring to a program outside of the College of Arts and Sciences need to work with community college advisors and use the transfer guide to assure that appropriate courses are taken prior to transfer. Students wishing to enter the College of Architecture and Planning or the College of Engineering and Applied Science should be aware that because of the structure of the curriculum, transfer may be encouraged as early as the beginning of the sophomore year. *Academic programs vary in terms of the maximum number of hours that may be transferred from the community or junior college.*

### How to Apply for Undergraduate Admission

#### Application Deadlines and Admission Notification

Applications for degree candidates may be submitted beginning in September for the following spring, summer, and fall terms. Applicants are notified of admissions decisions on a rolling basis beginning in October. From the time the application is complete, allow a minimum of six to eight weeks for it to be reviewed.

Applications that are completed (including all required credentials) and postmarked by the deadlines listed below will be given full consideration. Applications received after these dates will be reviewed on a space-available basis.

#### Application Deadlines

	Fall and Summer	Spring
Freshmen	January 15	October 1
Transfers	April 1	October 1

Submitting applications early with complete credentials is always encouraged in order to be considered for admission before enrollment levels are reached.

The university reserves the right to deny admission to applicants whose total credentials reflect an inability to assume those obligations of performance and behavior deemed essential by the university and relevant to any of its lawful missions, processes, and functions as an educational institution.

#### Obtain and Complete an Application

Applicants may apply online or print out an application form on the Web at [www.colorado.edu/prospective](http://www.colorado.edu/prospective). An application for admission may also be obtained by submitting the electronic request form at the above web site, or requesting one from the Office of Admissions,

The application fee is returned if the application is received after the deadline *and* all places have been filled.

### Required Credentials

Credentials or information sent by fax cannot be accepted as official documentation. Do not submit samples or photographs of design or artwork. A portfolio is not used for admission purposes and cannot be returned.

### Official Transcripts

Official transcripts *must be sent directly to the Office of Admissions from the issuing institution* and must have the appropriate seals and signatures. Other transcripts are not considered official. Transcripts that are marked, for example, “student copy,” “issued to student,” or “unofficial” are not accepted as official. Unofficial transcripts cannot be used for admission or transfer credit purposes.

### High School Transcript

Students should request that their high school send an official transcript of all work completed, beginning with grade 9, directly to the Office of Admissions, regardless of the number of college hours the student has completed (if any) or the date at graduation from high school. Students who have not graduated and do not plan to graduate from high school must request an official certificate of high school equivalency and official GED scores, plus an official transcript of any high school work (grades 9–12) completed, to be sent to the Office of Admissions.

### College Transcripts

Students should request that their official transcripts from each collegiate institution attended (except any campus of the University of Colorado) be sent directly from the issuing institution to the Office of Admissions. Be sure to include all institutions, regardless of the length of attendance, whether or not courses were completed, and whether or not the record might affect admission or transfer credit. Also, include any institutions attended during summers, interim terms, and during high school. *Failure to list and submit transcripts from all institutions previously attended before enrolling at CU-Boulder is considered to be a violation of academic ethics and may result in the cancellation of admission or dismissal.*

### SAT or ACT Test Scores

Boulder requires SAT I or ACT scores for admission. Students should request that the testing agency submit scores directly to the Office of Admissions. **CU-Boulder’s code for the SAT is 4841; the code for the ACT is 0532.** Scores recorded on an official high school transcript are also acceptable. *These scores must be submitted unless 24 or more semester hours of transferable college work have been completed at the time of application.* Do not delay sending in the application and other credentials because college entrance test scores are not yet available.

Results from SAT or ACT tests taken in December or later may be received too late to be considered for summer or fall admission of the same year.

For further information, consult a high school counselor, visit the SAT web site at [www.collegeboard.com](http://www.collegeboard.com), phone **609-771-7600**, or write to the College Board (SAT), P.O. Box 6200, Princeton, NJ 08541-6200. Visit the ACT web site at [www.act.org](http://www.act.org), phone **319-337-1270**, or write to ACT Registration, P.O. Box 414, Iowa City, IA 52243-0414.

### Personal Essay

A personal essay is strongly recommended but not required. If applicants choose to submit an essay, include information such as educational aspirations, travel and work experience, creative talents, factors affecting the student’s academic record, and any other information that might be of use and interest to the admission committee. **Important:** Include the applicant’s name and date of birth at the top of each page of the essay. A typed essay of one to two pages is preferred.

### Letters of Recommendation

Students may submit letters of recommendation if they wish; however, doing so is optional.

### CU-Boulder PIN

Once the admissions office receives an application for admission, the applicant will receive a CU-Boulder personal identification number (PIN) by mail. This PIN can be used to check admission status on the CU-Boulder web site and to apply for CU-Boulder scholarships online.

### Where to Send the Application, Fee, and Credentials

Unless otherwise instructed, mail all application materials to:

Office of Admissions  
Regent Administrative Center 125  
University of Colorado at Boulder  
552 UCB  
Boulder, CO 80309-0552

### Mailing Address

Applicants must keep their mailing address current at all times. It is used for mailings until the applicant arrives on campus. Notices are also sent to this address regarding admission, registration, and orientation, as well as other information. If an address changes or is no longer valid, notify the Office of Admissions immediately at **303-492-6301**.

### Application Checklist

1. Undergraduate Application for Admission (completed and signed)
2. \$50 *nonrefundable* (\$70 U.S. for international students) application fee (check or money order made payable to the University of Colorado; print student’s name and date of birth on check)
3. Official high school transcript
4. Official college transcripts (if applicable)
5. SAT or ACT test scores (if applicable)
6. Personal essay (strongly recommended but not required)
7. Letters of recommendation (optional)

### Confirmation Procedures

All admitted students are encouraged to confirm their intent to enroll as soon as possible after receiving their admission notification and confirmation form. Admission must be confirmed by returning the completed confirmation form and the nonrefundable enrollment deposit of \$200.

Confirmation forms and deposits postmarked by the dates listed below will be accepted. After these dates, confirmations can be accepted only if space is still available.

### Confirmation Postmark Deadlines

	<i>Fall</i>	<i>Summer</i>	<i>Spring</i>
Freshmen	May 1	May 1	Dec. 15
Transfers	varies; see confirmation form		

If students register for classes and then decide not to attend, they may receive a refund or be assessed tuition depending upon the circumstances. Guidelines are given in the Withdrawal Refund or Assessment Schedule in the *Registration Handbook and Schedule of Courses* for spring and fall and the summer catalog for summer terms. Close attention must be given to statements regarding policies for new, readmitted, and transfer students.

The enrollment deposits are used as registration deposits each semester as long as registration is completed by the published deadline. Once students have attended CU-Boulder, the deposit (minus any fees or other charges owed) will be returned when they graduate or officially withdraw from the university according to established deadlines.

## Other Applicants

### International Students

The university invites applications from qualified international students. International applicants are those who already have, or will be applying for, a temporary U.S. visa. Applicants who are United States citizens or permanent residents are not considered international. These students should follow application and admission procedures for undergraduates or graduates as described elsewhere in this catalog.

Over 1,000 international students from more than 100 countries study at CU-Boulder. Applications for admission are processed by the Office of Admissions. Assistance after admission is provided by International Student and Scholar Services, located in the Office of International Education. Boulder offers a full range of services to international students, including a host family program, orientation, special programs and activities for international students, and personal attention to individual needs.

Intensive English instruction is also offered by the International English Center. For information, go to [www.colorado.edu/iec](http://www.colorado.edu/iec) or write or call the International English Center, University of Colorado at Boulder, 63 UCB, Boulder, CO 80309-0063, **303-492-5547**.

International students who wish to pursue a full-time program of study at the undergraduate or graduate level should write or call the Office of Admissions, University of Colorado at Boulder, 65 UCB, Boulder, CO 80309-0065, **303-492-6301**, to obtain an international student application form and instructions. The international student application for admission can also be obtained online at [www.colorado.edu/prospective/international](http://www.colorado.edu/prospective/international).

Prospective graduate students should go to the web site at [www.colorado.edu/prospective/graduate](http://www.colorado.edu/prospective/graduate) for information and application forms specific to the academic department in which they are interested. Prospective graduate students can also call the campus telephone operator at **303-492-1411**, and ask to have the call transferred to the department of interest or write to the specific department, University of Colorado at Boulder, Boulder, CO 80309.

### International Nondegree Students

Students who hold temporary nonimmigrant visas or temporary immigration status may gain admission as nondegree students only with the approval of an advisor in the International English Center. The University of Colorado at Boulder does not issue Forms I-20 or assume any immigration responsibility for nondegree students. Therefore, international nondegree students must maintain appropriate immigration status independent of the university. See the Nondegree Students section for more information.

International nondegree applicants should write or call the International English Center, University of Colorado at Boulder, 63 UCB, Boulder, CO 80309-0063, **303-492-5547**, to obtain an approval to register and instructions.

### Readmit Students

Former CU-Boulder degree students who are not currently enrolled on the Boulder campus must submit the Application for Readmit CU-Boulder Undergraduate Degree Students. No application fee is required. Students who have attended any college or university since their last attendance at CU-Boulder will need to submit official transcripts directly from the issuing institution(s) to the Office of Admissions.

If the student is changing from a previous college or school, the change should be noted on the application. Otherwise, it is assumed that the student is returning to the same field of study. If a college or school change is requested for which the student is not eligible, the student will need to request reconsideration for his or her previous program.

Degree students who withdraw from CU-Boulder during the fall or spring semester must reapply for admission. Degree students who withdraw from CU-Boulder during summer session need not reapply to continue into the fall semester.

### Nondegree Students

The nondegree student classification meets the needs of those students who wish to take university courses but who do not currently intend to work toward a degree at the University of Colorado. Students applying as nondegree students must do so through the Division of Continuing Education (**303-492-5148** or [www.colorado.edu/conted](http://www.colorado.edu/conted)). Nondegree students may enroll in credit classes through the ACCESS (Available Credit Courses for Eligible Special Students) program, the Boulder Evening program, CAETE (Center for Advanced Engineering and Technology Education), or Independent Learning programs. Continuing Education also offers a variety of noncredit classes.

If students have been denied admission to an undergraduate degree program, they may not enroll as nondegree students in the ACCESS program for the term for which they sought degree program admission. Nondegree student admission does not guarantee future admission to any degree program.

In the fall and spring semesters, permission to register for Boulder campus courses is contingent on availability of space.

Nondegree students may take Independent Learning course work through Continuing Education or the Colorado Consortium for Independent Study. Students register for either option through the Division of Continuing Education.

Nondegree students may also register for courses on a *pass/fail* basis. These courses are counted in the hours of *pass/fail* course work permitted according to the rules of the college or school to which students are admitted if they change to degree status.

Nondegree students who have completed at least 6 semester hours of credit must maintain a 2.00 cumulative grade point average. Failure to maintain the required grade point average will result in suspension.

High school students interested in taking courses at CU-Boulder apply as nondegree students through the High School Concurrent Program administrated by Continuing Education.

More information may be obtained by writing or calling the Division of Continuing Education, University of Colorado at Boulder, 178 UCB, Boulder, CO 80309-0178, **303-492-5148** or visiting [www.colorado.edu/conted](http://www.colorado.edu/conted).

International students who want to apply to the university as nondegree students should read the International Students section above. Students interested in teacher licensure should refer to the School of Education section.

### Nondegree Students Transferring to a Degree Program

Students who are currently enrolled or have been enrolled at any CU campus as nondegree students may apply for admission to an undergraduate degree program by submitting an undergraduate admission application to the Office of Admissions with complete credentials and the nonrefundable \$50 (\$70 U.S. for international students) application fee.

Applicants must have earned a high school diploma or its equivalent, and all previous college-level work must be reported on the application. A high school transcript, SAT I or ACT scores, and an official transcript from all colleges and schools attended (outside the University of Colorado system) must be sent directly to the Office of Admissions.

A degree-seeking applicant may transfer an unlimited number of credits taken as a nondegree student on any University of Colorado campus. However, applicability of these hours toward degree requirements is established by the colleges and schools. It is suggested that a student apply to a degree program as soon as admission requirements, including MAPS deficiencies, have been met. It is essential that former nondegree students actively seek academic advising from the appropriate dean's office once they have been accepted into a degree program. There are opportunities for advising at mandatory degree orientation programs.

Students wishing to transfer to a graduate degree program should refer to the Graduate School section and individual college and school sections.

### Second Undergraduate Degree Applicants

Students may apply for a second undergraduate degree at the University of Colorado at Boulder, but should explore the various options in graduate study available at the university before doing so. Students applying for a second undergraduate degree must follow transfer admission guidelines, and those students who are admitted must keep in mind that all college and major requirements must be met in order to complete degree programs satisfactorily. Restrictions mandated by general university policies, as well as specific college and school policies, include the following:

1. Applicants may not apply to the major in which they received their first undergraduate degree.
2. Applicants must apply to a specific major; applications for an open option or undetermined major cannot be considered.
3. Second undergraduate degree applicants in the College of Architecture and Planning are encouraged to investigate graduate programs.
4. Credit hours earned as a nondegree student at the University of Colorado may not be used toward major degree requirements for a second degree in the College of Arts and Sciences.
5. The Leeds School of Business does not consider students who have already completed an undergraduate degree. These students are strongly encouraged to investigate graduate study instead.
6. Students who already have an undergraduate degree from the College of Engineering and Applied Science and who desire a second undergraduate degree in that area are strongly encouraged to investigate graduate study instead.
7. The School of Education offers graduate and teacher education programs only.

### Students from Other CU Campuses

Students who wish to transfer to Boulder from another University of Colorado campus (Colorado Springs, Denver, or the Health Sciences Center), from CU Study Abroad, or from CU Continuing Education should refer to the Transfer Applicants section. These students must send a high school transcript, SAT I or ACT scores, and an official transcript from each college or university attended (outside the University of Colorado system) to the Office of Admissions. Currently enrolled degree students are not required to pay the application fee. Some admission preference is given to applicants transferring from degree programs at other campuses of the University of Colorado. Evaluation of transfer credit from other CU campuses is done by the dean's office of each college or school, not by the Office of Admissions.

### Transfer of College-Level Credit

The Office of Admissions performs an initial evaluation of transfer credit after applicants have been admitted and have confirmed their intent to enroll. A complete evaluation of transfer credit cannot be made until all official credentials have been received.

The evaluation is made using the official transcripts sent directly to the university from each one of the applicant's previous colleges. Official transcripts exhibit the official seal and signature of the registrar. Transcripts that are marked "student copy," "issued to student," or "unofficial" are not accepted as official.

The initial evaluation may list course work in progress at the time of confirmation as "pending." In order to complete the admission and transfer of credit process, all transcripts of attempted work must be received by the Office of Admissions as soon as possible. Transfer students should arrange to have their final official transcripts sent directly to the Office of Admissions after they complete their last term and before they enroll at CU-Boulder.

After an evaluation of transfer credit has been completed, an evaluation report is mailed to the student by the Office of Admissions.

*Note:* There is no guarantee that all transfer credit will apply to a specific degree program. The dean's office of each college or school has ultimate responsibility for supervising the student's degree program and makes the final determination on applicability of transfer credits toward degree requirements. Since graduation requirements at CU-Boulder vary from college to college, a reevaluation of transfer credit is required if a student changes colleges or schools after enrolling.

Listed below are some general guidelines for accepting transfer credit. For an early self-assessment of transfer credits, use the guidelines below and the appropriate degree requirements and course description sections.

### Time Limit on Transfer of Credit

Credit hours required for graduation that were earned no more than 10 years prior to transferring into an undergraduate degree program at the University of Colorado at Boulder shall apply to the completion of the student's graduation requirements, provided that the content of these courses meet the degree program requirements. The final determination of acceptance of credit toward the degree based on the content and the age of the credit is made in the college or school dean's office or by the student's major department.

### Number of Credit Hours Required for Graduation

Transfer students are held to the same residency and degree requirements as a student who began their undergraduate degree program on the Boulder campus. This assumes that transfer credit hours are in courses comparable in level and content to those required for graduation from an undergraduate degree

program at the Boulder campus. College or school residency requirements, meaning the number of hours required to be taken on the Boulder campus, are the same for transferring and non-transferring students.

### *Minimum Grades for Transfer*

Only courses taken at a recognized, accredited college or university with grades of C- or better are accepted for transfer. Grades of pass, satisfactory, and honors are accepted for transfer; however, each college and school at CU-Boulder may place a limitation on the number of pass hours that may be applied toward a degree.

### *Credit from Two-Year Colleges*

Each college and school at CU-Boulder determines the maximum number of semester hours that may transfer from a two-year post-secondary institution. Limits vary in each college and school.

### *Credit from Four-Year Institutions*

There is no maximum number of credit hours that may transfer from a four-year institution, but the dean's office of each college or school determines how transfer credits apply to specific degree programs.

### *Credit for Correspondence Work*

Each college and school determines the maximum number of credits taken through correspondence programs that are accepted toward a baccalaureate degree.

### *College-Level Work Taken during High School*

College-level work taken during high school is evaluated in accordance with general guidelines for transfer credit at CU-Boulder. College-level work taken concurrently with a high school program may be used to satisfy MAPS requirements. Official college transcripts of work taken must be received in order for transfer credit to be awarded.

### *Advanced Placement Examinations*

Credit for College Board Advanced Placement examinations cannot be evaluated from college or high school transcripts; score reports from the College Board must be submitted directly to the university for evaluation. For more information, and a guide to equivalencies, refer to Freshman Applicants and the chart in this section or [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

### *College-Level Examination Program*

Credit for College Board subject examinations of the College-Level Examination Program (CLEP) in general biology, general chemistry, general psychology, introductory macroeconomics, introductory microeconomics, introductory sociology, and calculus may be granted for a score at or above the 67th percentile. This credit is applied toward degree requirements at the discretion of the student's dean. Refer to the appropriate dean's office for the policy of that college or school.

Credit for CLEP subject examinations cannot be evaluated from college or high school transcripts; score reports must be submitted directly from the College Board. CLEP general examinations are not accepted for credit at CU-Boulder.

### *International Baccalaureate Examinations*

In general, credit is granted for approved IB examinations at the higher level with a score of 4 or better. An IB certificate or diploma must be submitted to the Office of Admissions for evaluation. For more information and a guide to equivalencies, refer to Freshman Applicants and the chart in this section or [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

### *Military Credit*

Credit for military schooling is evaluated upon receipt of Form DD 214, Service Separation Certificate. Only work that has received an upper-division baccalaureate recommendation by the American Council on Education (ACE) can be awarded credit. This work, however, is transferred and recorded at the lower-division level. Foreign language credit taken through the State Department, Department of Defense, or Defense Language Institute is assigned the recommended ACE credit.

### *Credit by Examination*

This option provides limited opportunities for students to take an examination and earn credit for a course without registering for or taking the course. Specific courses must be approved for credit by examination. Students may want to exercise this option if they do not receive transfer credit for a course they have taken at a previous college. Information on participating colleges and schools, requirements, and an application for credit by examination are available at the Office of the Registrar, Regent Administrative Center 105, University of Colorado at Boulder, 20 UCB, Boulder, CO 80309-0020, **303-492-6970**. Permission of the instructor, the department chair, the dean of the college or school in which the course is offered, and the student's dean (if different) is required for approval. An examination fee is charged.

### *Transfer Course Work Not Accepted by the University*

The following course work will not transfer and will not count toward a degree at Boulder:

- courses identified by CU-Boulder as remedial, i.e., necessary to correct academic deficiencies, such as remedial English, mathematics, science, and developmental reading;
- vocational-technical courses that are offered at two-year and proprietary institutions (exceptions may be granted only by the CU-Boulder dean responsible for the student's curriculum—when exceptions appear to be warranted, appropriate department heads make recommendations to their respective deans regarding credit for such courses);
- courses in religion that constitute specialized religious training or that are doctrinal in nature;
- credits earned for work experience or through a cooperative education program;
- credits earned in physical education activity courses; and
- courses or programs identified as college orientation.

### *Transfer Credit Conversion*

Many campuses operate on the quarter system, with the academic year divided into three terms. Other campuses, including CU-Boulder, operate on a two-term or semester system. Course credits from quarter system institutions must be converted from quarter hours to semester hours or credits. One quarter credit is equivalent to two-thirds of a semester credit. To convert quarter hours to semester hours, multiply the number of quarter hours by two-thirds and round off the total to the nearest tenth. For example, 4 quarter hours  $\times \frac{2}{3} = 2.67$  or 2.7 semester hours of credit, or 3 quarter hours  $\times \frac{2}{3} = 2$  semester hours of credit.

### *Intrauniversity Transfer Students*

Students wishing to change colleges or schools within the CU-Boulder campus must obtain an application from the college or school to which they wish to transfer.

For more information on recommended course work in preparation for intrauniversity transfer (IUT) and other criteria, students need to consult college and school sections of this catalog or

talk with an academic advisor in the program to which they plan to transfer. Some colleges and schools do not accept intrauniversity transfer students during the summer. It is important to note that admission to a college through the IUT process is competitive, and not all students who apply are admitted. Decisions are based on course preparation, hours completed, grade point average, and other criteria required by the specific college or school.

### Denied Admission As a Freshman

Students who were not admissible to the University of Colorado at Boulder based on high school academic records are encouraged to apply for transfer admission after at least 24 semester hours of transferable college-level course work are completed or in progress. This includes any minimum academic preparation standards (MAPS) requirements not met in high school.

### Graduate Admission

Graduate student admission is handled by individual academic departments. See the Graduate School section for more information.

### Academic Records

#### Class Level

Class level is based on the total number of semester hours passed, as follows:

Class	Semester Hours
Freshman	0–29.9
Sophomore	30–59.9
Junior	60–89.9
Senior	90–123.9
Fifth-Year Senior	124 and above

The normal course load for most undergraduates is 15 credit hours each semester.

#### Course Load

The following are the most widely used general definitions of full-time course load. For further information and guidelines, students should see specific college and school sections of this catalog. *Students who receive financial aid or veterans benefits or who live in university housing should check with the appropriate office regarding course-load requirements for eligibility purposes.*

#### Undergraduate Course Load

For financial aid purposes, full time is 12 or more semester hours for fall, spring, and summer terms. However, students only need to be half time (6 hours) in any term to qualify for loan eligibility.

For enrollment verification and academic purposes (*not related to financial aid*), 12 credit hours is considered a full-time load in the fall or spring semester, and 6 credit hours is considered full time in the summer.

#### Graduate Course Load

A full-time graduate student in the fall or spring semester is one who is enrolled for 5 semester hours of graduate course work, 8 hours combined graduate/undergraduate course work, 12 hours of undergraduate course work, or thesis hours depending upon the student's status. These hours also apply for enrollment verification purposes. Consult the Graduate School dean's office for requirements. For financial aid or program requirements for full- or part-time status, consult the Office of Financial Aid. Law students must be enrolled for a minimum of 10 credit hours to be considered full-time in the fall or spring (5 credit hours in the summer). A maximum of 15 credit hours may be applied toward a degree during the fall and spring semesters.

A full-time graduate student in the summer term is one who is enrolled for at least 3 semester hours in graduate course work, 4 hours combined graduate/undergraduate course work, 6 hours of undergraduate course work, or thesis hours depending upon the student's status. The maximum number of graduate credits that may be applied toward a degree during the summer session is 6 semester hours per five-week term and 10 semester hours per 10-week summer session, not to exceed 10 semester hours for the total summer session.

### Reasonable Academic Progress

Reasonable academic progress in most undergraduate colleges and schools requires a 2.00 grade point average (GPA). Students should consult their dean's office regarding college or school minimum GPA requirements and special policies on probation and dismissal. Students must maintain reasonable academic progress to receive financial aid.

### Grading System

The following grading system is standardized for all colleges and schools of the university. Each instructor is responsible for determining the requirements for a course and for assigning grades on the basis of those requirements.

Standard Grade	Credit Points per Each Hour of Credit
A = superior/excellent	4.0
A- =	3.7
B+ =	3.3
B = good/better than average	3.0
B- =	2.7
C+ =	2.3
C = competent/average	2.0
C- =	1.7
D+ =	1.3
D =	1.0
D- = minimum passing	0.7
F = failing	0.0

#### Grade Symbols

*IF* = incomplete; changed to *F* if not completed within one year

*IW* = incomplete; changed to *W* if not completed within one year

*IP* = in progress; thesis at the graduate level or specified graduate-level courses

*P* = passing; under the pass/fail option, grades of *D-* and above convert to a *P*. Other specified courses may also be graded on a *pass/fail* basis.

*NC* = no credit

*W* = withdrawal or drop without discredit

\*\*\* = class grades were not submitted when final grades were processed, or the student is currently enrolled in the course.

#### Explanation of *IF* and *IW*

An *IF* or *IW* is an incomplete grade. Policies with respect to *IF/IW* grades are available in individual college and school dean's offices. Use of the *IF* or *IW* is at the discretion of the course instructor and/or the academic dean's office.

Students must ask for an incomplete grade. An *IF* or *IW* is given only when students, for reasons beyond their control, have been unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given.

If an instructor grants a request for *IF* or *IW*, the instructor sets the conditions under which the course work can be completed and the time limit for its completion.

It is the instructor's and/or the student's decision whether a course should be retaken. If a course is retaken, it must be completed on the Boulder campus or in Boulder evening classes, and the student must reregister for the course and pay the appropriate tuition.



The final grade (earned by completing the course requirements or by retaking the course) does not result in deletion of the *IF* or *IW* from the transcript.

At the end of one year, *IF* and *IW* grades for courses that are not completed or repeated are automatically changed to *F* or *W*, respectively.

### Grade Point Average

The overall University of Colorado at Boulder grade point average (GPA) is computed as follows: the credit hours and credit points are totaled for all courses; then the total credit points are divided by the total credit hours. Courses with grade symbols of *P*, *NC*, *\*\*\** (*grade not yet entered*), *W*, *IP*, *IW*, and *IF* are excluded when totaling the hours, however, grades of *F* earned for courses graded on a *pass/fail* option are included in the GPA. *IFs* that are not completed within one year are calculated as *F* in the GPA at the end of the one-year grace period.

Grades Earned	Credit Points per Hour	Credit Hours	Credit Points in Course
A	4.0	x 4	= 16.0
A-	3.7	4.0	14.8
B+	3.3	4.0	13.2
P	—	3.0	(exclude) —
F	0.0	3.0	0.0
IW	—	4.0	(exclude) —
		<b>15</b>	<b>44</b>
		<b>Credit Hours</b>	<b>Points</b>
<b>TOTAL = 44/15 = 2.93 GPA</b>			

If a course is repeated, both grades earned are used in determining the university GPA. Grades received at another institution are not included in the University of Colorado at Boulder GPA, and the undergraduate GPA is calculated separately from the graduate GPA.

Students should refer to their academic dean's office for individual GPA calculations as they relate to academic progress and graduation from their college or school.

### Official Transcripts

Official transcripts include the complete undergraduate and graduate academic record of courses taken at all campus locations or divisions of the University of Colorado. Students may request a complete transcript from the registrar of any University of Colorado campus. It contains the signature of the registrar and the official seal of the university. Official transcripts are primarily used to support applications for transfer to other academic institutions and for employment purposes. Transcripts sent to students are labeled "issued to student."

Official transcripts may be ordered in one of three ways:

- signed letter request:  
Transcript Office  
University of Colorado at Boulder  
68 UCB  
Boulder, CO 80309-0068
- signed fax request: **303-492-4884**
- web via PLUS (student ID number and PIN needed):  
**www.colorado.edu/plus.**

For rush fees or additional information, please refer to the web site at [registrar.colorado.edu](http://registrar.colorado.edu).

There is no charge for official transcripts, which are prepared at the student's request. Typically, transcript requests are processed within four business days and placed in first-class mail. Transcripts can be withheld for both financial obligations to the university or disciplinary actions that are in progress.

Official transcripts that include end-of-term grades are available approximately two weeks after final examinations. Degrees are recorded approximately six weeks after graduation.

### Unofficial Transcripts

Unofficial transcripts are also a complete academic record of graduate and undergraduate courses taken at the University of Colorado. They are primarily used for advising and counseling within offices on campus and within offices at other University of Colorado campuses. Unofficial transcripts do not carry the registrar signature or seal of the university. Copies are available at the service window, first floor, Regent Administrative Center at a cost of \$1 for next-day service and \$5 for rush service. Currently enrolled students may access their unofficial transcript on PLUS at [www.colorado.edu/plus](http://www.colorado.edu/plus). Students may print this unofficial transcript on any printer. Note that the only student identification on this transcript is the appearance of the last four digits of the social security number at the top of the document.

### Credit by Examination

In limited instances, students enrolled in a degree program may earn additional credit without otherwise registering for and taking certain courses if they pass a written examination. Information on participating colleges and schools and an application for credit by examination may be obtained from the Office of the Registrar in Regent Administrative Center 105. The application specifies procedures to be followed. The following signatures are required for approval: the instructor, the department chair, the dean of the college or school in which the course is offered, and the student's dean, if different. The fee for each examination is not included in the regular tuition, but it is assessed separately at a fixed rate equivalent to the minimum resident tuition rate charged for 0–3 credit hours for the current semester. Fees are payable in advance and are nonrefundable.

### Stops

A scholastic, dean's, financial, health, or miscellaneous stop may be placed on a student's record for a number of reasons. A stop prevents a student from registering, returning to school, obtaining an official transcript, or receiving a diploma. The student should remove each stop as quickly as possible by contacting the campus office that placed it. General inquiries may be addressed to the Office of the Registrar.

### Confidentiality of Student Records

**Annual Notice to Students:** The University of Colorado complies fully with the provisions of the Family Educational Rights and Privacy Act (FERPA) of 1974. The act was designed to protect the privacy of education records, to establish the right of students to inspect and review their education records in all offices, and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the FERPA office concerning alleged failures by the institution to comply with the act.

Local guidelines explain in detail the procedures to be used by the institution for compliance with the provisions of the act. Copies of the guidelines can be found in Academic Records in the Office of the Registrar, and at [registrar.colorado.edu/FacStaff/privacy.htm](http://registrar.colorado.edu/FacStaff/privacy.htm).

Students wishing to review their education records must come to the Academic Records section of the Office of the Registrar and present proper identification. All other records inquiries must be directed to the proper office, i.e., financial aid, bursar, etc.

Students may not inspect the following, as outlined by the act: financial information submitted by their parents, confidential letters that they have waived their rights to review, or education records containing information about more than one student, in which case the institution will permit access only to that part of the record that pertains to the inquiring student. Records that may be inspected include admissions, academic, and financial aid files, and cooperative education and placement records.

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are:

1. The right to inspect and review education records within 45 days of the day the university receives their request for access.

Students should submit to the registrar, dean, head of the academic department, or other appropriate official, written requests that identify the educational record(s) they wish to inspect. The university official will make arrangements for access and notify them of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise them of the correct official to whom the request should be addressed.

2. The right to request the amendment of students' education records that they believe are inaccurate or misleading.

They may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading.

If the university decides not to amend the record as requested by the student, the university will notify the student of their right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to them when notified of the right to a hearing.

3. The right to consent for disclosures of personally identifiable information contained in their education records, except to the extent that FERPA authorizes disclosure without consent.

One exception that permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the university in an administrative, supervisory, academic, research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the university has contracted (such as an attorney, auditor, collection agent, or employment or degree verification agencies such as the National Student Clearinghouse and Credentials, Inc.); a person serving on the Board of Regents; the Alumni Association and Foundation on the Boulder campus; a student employee; or a student serving on an official committee, or one assisting another school official in performing his or her task. In addition, a student's records may be disclosed to their parent(s) upon request if their parent(s) claim them as a dependent for income tax purposes.

A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.

Upon request, the university discloses education records without consent to officials of another school in which a student seeks or intends to enroll.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the university to comply with the requirements of FERPA. The name and address of the office that administers FERPA is:

The Family Compliance Office  
U.S. Department of Education  
600 Independence Avenue, SW  
Washington, DC 20202-4605  
202-260-3887

The following items of student information have been designated by the University of Colorado at Boulder as public or "directory" information: names, mailing and permanent addresses, local telephone number, e-mail address, dates of attendance, registration status, class, previous educational institutions attended, major field of study, awards, honors, degree(s) conferred, past and present participation in officially recognized sports and activities, physical factors (height and weight) of athletes, prior schools attended, names of student tutors and teaching/research assistants, and date and place of birth. Such information may be disclosed by the institution at its discretion. Buff OneCard photos and numbers (not social security numbers) are not considered directory information, but are shared with other campus departments and associates of the Buff OneCard program.

Students have the right to withhold directory information from inquirers by selecting a "privacy" or "limited-privacy" option. The privacy option prevents all directory and enrollment information from being released to all who do not have a clear educational interest for access to this information. The limited privacy option prevents the release of directory information to those requesting mailing labels and to campus directory services, but is not as restrictive as the privacy option. Requests for either privacy or limited-privacy designation on the educational record can be made at the Office of the Registrar, Regent 105.

Students also have the option to complete a form that gives parents, as listed as mother or father only on the Student Information System, access to educational records. This form is available in the Office of the Registrar, Regent 105, or via the web at [registrar.colorado.edu](http://registrar.colorado.edu). Note that this form must be returned in person by the student.

## In-State and Out-of-State Tuition Classification

Tuition classification is governed by Colorado statutes and by judicial decisions that apply to all state-funded institutions in Colorado and is subject to change without notice.

New students are classified as in-state or out-of-state residents for tuition purposes on the basis of information provided on their application for admission and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Applicants and students who feel their classification is incorrect or who have become eligible for a change to in-state status must submit a petition with documentation in order to have their status changed. The necessary petition forms, deadlines for submission, and an explanation of the Colorado tuition classification statute are available from the Tuition Classification Officer, Regent Administrative Center 105, University of Colorado at Boulder, 68 UCB, Boulder, CO 80309-0068, **303-492-6868**, fax: **303-492-8748**, e-mail: [tuitclass@registrar.colorado.edu](mailto:tuitclass@registrar.colorado.edu).

## Basic Requirements for Establishing Colorado Residency

Colorado in-state tuition classification requires domicile (legal residence) in Colorado for 12 consecutive months. Domicile is defined as a person's true, fixed, and permanent home and place of habitation. To establish domicile, a person must reside in Colorado and demonstrate that Colorado is his or her permanent home.

In addition to establishing domicile in Colorado, a person must be either 22 years of age or older (21 years of age for stu-

## 2003-04 Tuition Rates per Semester

(for planning purposes only)

### Undergraduate Tuition

#### Resident Tuition

Credit Hours	Business	Engineering	Journ./Music	All Other
1-3	\$847	\$697	\$590	\$580
4	1,129	929	787	773
5	1,411	1,162	983	966
6	1,693	1,394	1,180	1,159
7	1,975	1,626	1,377	1,352
8	2,257	1,859	1,573	1,545
9-18	2,382	1,926	1,632	1,596
Each hour over 18	<b>\$282</b>	<b>\$232</b>	<b>\$197</b>	<b>\$193</b>

#### Nonresident Tuition

Credit Hours	Business	Engineering	Journ./Music	All Other
1-18	\$10,816	\$10,209	\$9,871	\$9,754
Each hour over 18	<b>\$1,202</b>	<b>\$1,134</b>	<b>\$1,097</b>	<b>\$1,084</b>

### Graduate Tuition

(Tuition charged depends on the degree, the number of credit hours, and the residency status of the student).

Law Student ..... *Tuition Table 1*

Master's Thesis ..... Grad Status A ..... *Tuition Table 1*

Master's Candidate Courses #6940-6949 ..... Grad Status B ..... *Tuition Table 2*  
(defending or completing thesis) .....

Beginning Doctoral Course work or ..... Grad Status C ..... *Tuition Table 1*  
thesis plus course work

Doctoral Candidate Courses #8990-8999 ..... Grad Status D ..... *Tuition Table 3*  
Passed comps, working on dissertation

Doctoral Thesis Only (Some requirements ... Grad Status E ..... *Tuition Table 3*  
not filled) not passed comps

### Graduate Fees

#### Fees:

SIS Fee .....	\$7.00
Computing Fee <sup>1</sup> .....	\$32.80-65.60
Arts and Cultural Enrichment Fee .....	\$5.00
RTD Fee .....	\$28.87

<sup>1</sup> Computing fee is \$32.80 for 6 credit hours or less and \$65.60 for 7 credit hours or more.

#### Sessions Totals:

Maymester, Term E & F .....	\$00.00
5 Week (Term A & B) & Independent Study .....	\$83.25
Eight Week (Term C) .....	\$133.20
Ten Week (Term D) .....	\$166.49
Term I .....	\$83.25

#### Additional Graduate Student Fees:

Matriculation Fee (one-time upon entering a degree program):

Graduate/transfer students .....	\$58.00
International graduate/transfer students .....	\$101.00
International Student Processing Fee (SEVIS) (international students only) .....	\$22.00

#### Tuition Table 1—Resident Tuition

Credit Hours	MBA	Business	Engineering	Law	Journ./Music	Others
1-3	\$1,009	\$ 967	\$ 821	\$ 1,132	\$ 711	\$ 711
4	1,345	1,289	1,095	1,509	947	947
5	1,681	1,612	1,368	1,886	1,184	1,184
6	2,017	1,934	1,642	2,263	1,421	1,421
7	2,353	2,256	1,916	2,640	1,658	1,658
8	2,689	2,579	2,189	3,017	1,895	1,895
9-18	3,020	2,910	2,445	3,404	2,122	2,122
Each hour over 18	<b>336</b>	<b>322</b>	<b>274</b>	<b>377</b>	<b>237</b>	<b>237</b>

#### Tuition Table 1—Nonresident Tuition

Credit Hours	MBA	Business	Engineering	Law	Journ./Music	Others
1-3	\$3,630	\$ 3,630	\$ 3,427	\$ 3,685	\$ 3,316	\$ 3,278
4	4,839	4,839	4,569	4,913	4,421	4,370
5	6,049	6,049	5,711	6,141	5,526	5,463
6	7,259	7,259	6,853	7,369	6,631	6,555
7	8,469	8,469	7,995	8,597	7,736	7,648
8	9,679	9,679	9,137	9,825	8,841	8,740
9-18	10,816	10,816	10,209	10,972	9,871	9,754
Each hour over 18	<b>1,210</b>	<b>1,210</b>	<b>1,142</b>	<b>1,228</b>	<b>1,105</b>	<b>1,093</b>

#### Tuition Table 2 (Master's Candidate)

Enrolled only in courses numbered 6940-6949 (B grad status).  
Tuition is a flat fee and not dependent on the number of credit hours.

	Resident	Nonresident
MBA	\$ 1,009	\$ 2,178
Business	\$ 967	\$ 2,178
Engineering	\$ 821	\$ 2,055
Journ./Music	\$ 711	\$ 1,989
Other	\$ 711	\$ 1,968

#### Tuition Table 3 (PhD)

Enrolled only in courses numbered 8990-8999 (E grad status) and doctoral candidate (D grad status). Multiplying by the number of credit hours determines tuition. NOTE: Contact Bursar's Office if over 18 credit hours. Resident students only—multiply dollar amount by 9 for 10-18 credit hours.

	Resident	Nonresident
MBA	\$ 336	\$ 726
Business	\$ 322	\$ 726
Engineering	\$ 274	\$ 685
Journ./Music	\$ 237	\$ 663
Other	\$ 237	\$ 656

dents who first matriculated at a Colorado college or university fall semester 1996 or earlier), be married, a graduate student, or be an emancipated minor to begin the 12-month period. Unemancipated minors qualify for in-state status if their parents have been domiciled in Colorado for one year.

#### Emancipation

To be emancipated, students cannot be supported by their parents in any way. College savings funds and other income-producing assets established by the parents prior to the 12-month period are considered to be parental support.

#### Evidence of Domicile

Evidence of Colorado domicile includes actions that would normally be expected of any permanent resident. Factors that constitute evidence of domicile are:

- Payment of Colorado state income tax
- Colorado driver's license
- Colorado vehicle registration
- Voter registration in Colorado
- Ownership and permanent occupancy of residential real property in Colorado
- Permanent employment or acceptance of future permanent employment in Colorado (Note: employment offered by the university to students is not considered permanent)
- Graduation from a Colorado high school
- Continued residence in Colorado while not enrolled as a student

No single factor constitutes conclusive proof of domicile. All factors, positive and negative, are considered. All of the listed factors are not necessary, but individuals should take actions on those factors that are appropriate in their circumstances.

#### Unemancipated Minors

Students as old as 22 (21 for students who first matriculated at a Colorado college or university fall semester 1996 or earlier) may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the students reside elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

Students lose eligibility for in-state tuition if they (or their parents, if the students are unemancipated minors) maintain domicile outside Colorado for one year or more, unless the parents have lived in Colorado at least four years and meet other requirements.

In-state classification becomes effective at the beginning of the first term after one year of legal residence in Colorado. Changes of classification never take effect midterm.

Students who give false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal action.

#### In-State Status: Other Circumstances

Residents of participating western states enrolled in graduate programs approved by the Western Regional Graduate Program are entitled to in-state tuition rates. Students should call or write the tuition classification office or their academic department for further information.

Active-duty members of the armed forces of the United States or Canada on permanent duty station in Colorado and their dependents (as defined by military regulations), and Olympic athletes in training at the United States Olympic Training Center in Colorado Springs, are eligible for in-state classification, regardless of domicile or length of residence.

Nonimmigrant aliens who have lived in Colorado for one year for purposes other than education qualify for in-state classification after one year of Colorado residence.

## Expenses

### Enrollment Deposit

All new students (both resident and nonresident students) must confirm their enrollment at the university by returning a completed confirmation form and an enrollment deposit of \$200. The deposit is nontransferable and must be paid by all students, regardless of financial aid awards. Students who have paid the deposit and who decide not to attend CU-Boulder forfeit their deposit. Deposits received after enrollment levels have been reached will be returned.

The enrollment deposit is not credited toward tuition and fees. Instead, it is refunded when a student graduates or officially withdraws from CU-Boulder within established dates and guidelines, after paying any outstanding university obligations. Students should update their permanent address online via PLUS at [www.colorado.edu/plus](http://www.colorado.edu/plus), or at the Bursar's Office before they graduate or withdraw to be sure they receive their refund.

### Estimated Expenses

Expenses for students attending the University of Colorado at Boulder vary, depending on whether they live on or off campus, their program of study, state residency (tuition classification), family size, personal needs, and individual interests.

It is difficult, therefore, to provide exact statements of total expenses. An online bill estimator, which provides a calculation of approximate costs per semester by college (such as tuition, fees, insurance, and room and board), is available at [bursar.colorado.edu](http://bursar.colorado.edu). The following approximate costs per academic year were established, using the bill estimator, for full-time undergraduate arts and sciences students living on the Boulder campus during the 2003–04 academic year. The Board of Regents reserves the right to change the costs for tuition and fees and room and board at any time, and it should be expected that costs will be higher for 2004–05.

#### 2003–04 Costs at CU-Boulder

	<i>Resident</i>	<i>Nonresident</i>
Tuition and fees	\$4,236	\$20,552
Room and board (on campus)	\$6,754	\$6,754
<b>Total</b>	<b>\$10,990</b>	<b>\$27,306</b>

The cost of attending only fall or spring semester would be half the amount shown above. Additional costs would include books, supplies, special residential academic program fees, transportation, entertainment, health insurance, and any other personal needs, interest items, or services. Some courses carry laboratory or other fees for practical activities. Consult the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu) for notation of special fees. Students planning to attend summer session should take into account estimated expenses indicated in the *Summer Session Catalog*, available from the Office of the Registrar in mid-February.

Tuition and fees for 2004–05 were not set when the catalog went to press. The tuition rates per semester for the 2003–04 school year are listed here.

Note that additional tuition is charged for each semester credit hour over 18 hours. Zero or fractional credit is regarded as 1 hour in assessing tuition and fee charges. No-credit (NC) courses are not free of charge; tuition is the same as for courses taken for credit.

Students simultaneously enrolled in programs leading to two different degrees will be assessed tuition for the college or school with the higher tuition rate.

### Housing Security Deposit

All students who live in the residence halls are required to pay a one-time security deposit of \$250. This security deposit is held by the Department of Housing and is released to the tuition and fee account within 60 days after the expiration of the housing agreement.

The security deposit required for housing is in addition to the enrollment deposit required for admission to the university.

## Fees

### Matriculation Fee

A matriculation fee is a one-time nonrefundable fee assessed at the time of initial registration for students entering a degree program. Nondegree students who are admitted to degree status are charged the matriculation fee at the time they first register. It covers expenses for registration/transcript-type services, undergraduate orientation program, Buff OneCard, immunization management, and international orientation. The fee varies depending upon degree and international status.

Undergraduate students	\$108.00
Graduate students	\$58.00
International undergraduate students	\$151.00
International graduate students	\$101.00

### Course Fees

Instructional fees are charged on an individual basis to help offset the higher costs of specialized supplies and equipment unique to these courses. Course fees for 2003–04 ranged from \$5–\$50 per credit hour and \$10–\$150 per course. Consult the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu); for more detailed information, visit the web site at [bursar.colorado.edu](http://bursar.colorado.edu). Other fees also exist in the College of Architecture and Planning. Lab courses not linked to a lecture course may also require payment of a course fee. In addition, certain colleges charge a fee for being enrolled in that college, even if the student is not currently taking courses that apply to their major.

### Late Registration Fee

A late registration fee may be charged to students who are authorized to register after their assigned registration period. The late registration fee is \$50. This fee is separate from any penalty that may be assessed for late payment of tuition and fees.

### Golden Buffalo Student Health Insurance

CU–Boulder has a mandatory policy statement requiring all students taking 1 or more credit hours to be covered by a health insurance plan. Students may have health insurance coverage from their employers, their own insurance plans, their parents' plans, or the university sponsored Golden Buffalo Student Health Insurance Plans: Buff Value or Buff Gold.

However, the university requires students to take positive action in order to waive the health insurance coverage provided by the university. Final deadline to select or waive the insurance is September 1, 2004, for fall semester 2004. The Golden Buffalo Health Insurance plan selected for fall automatically extends through spring/summer 2005, unless another plan is selected. Students are enrolled and billed each semester.

Enrollment is not automatic for spouse/domestic partner and dependents; or for Continuing Education, Semester at Sea, Study Abroad, Time Out, and evening MBA students.

The university is not responsible for a student's health care costs. If a student participates in one of the two Golden Buffalo Student Health Insurance Plans offered, Wardenburg Health Center will provide covered services as set forth within the plan selected.

For more information about the university sponsored Golden Buffalo Student Health Insurance, go to [www.colorado.edu/stuhealthinsur](http://www.colorado.edu/stuhealthinsur), call 303-492-5107 or stop by the Golden Buffalo Student Health Insurance Office located in Wardenburg Health Center 251.

### 2003–04 Mandatory Fees per Semester

<b>Student Activity Fee (assessed by UCSU)</b>	
One class of 5 or fewer credit hours	\$71.94
One class of more than 5 credit hours	\$272.15
More than one class (any amount of hours)	\$272.15
<i>Note: Graduate status of "D" fees only (with insurance)</i>	\$127.96
<b>Student Information System Fee</b>	
Mandatory for all students	\$7.00
<b>Athletic Fee</b>	
Credit hours of 3 or fewer	\$0.00
Credit hours of 4 or more	28.50
<b>Student Computing Fee</b>	
Credit hours of 6 or fewer	\$32.80
Credit hours of 7 or more	65.60
<b>RTD Fee*</b>	
All students	\$28.87
<b>Career Services Fee</b>	
All students except law and doctoral candidates	\$7.00
<b>Arts and Cultural Enrichment Fee</b>	
All students	\$5.00
<b>UGGS Grad Fee</b>	
All graduate degree seeking students	\$4.50

\* **The student RTD bus pass program fee entitles students to unlimited free rides on local, regional, and express bus routes.**

For student fee detail information, visit [bursar.colorado.edu](http://bursar.colorado.edu)

## Tuition and Fee Regulations

### Drop/Add Tuition Adjustment

Adjustment of tuition and fees is made on drop/add changes as published in the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu).

### Tuition Classification

Students are classified as in-state or out-of-state residents for tuition purposes on the basis of information provided on their application for admission and other relevant information. For more information, see Academic Records.

### Students Registered on More Than One Campus

Students registering for courses on more than one campus of the university during a single term pay tuition and fees to each campus at the rate appropriate to the number of credits for which they are registered on that campus. Boulder campus students qualified to use the concurrent registration option pay Boulder campus rates for the total hours enrolled at all campuses.

### Nondegree Students

Nondegree students enrolled in undergraduate courses are assessed tuition at the undergraduate student rate. Nondegree students enrolled in graduate courses are assessed tuition at the graduate student rate. Nondegree students enrolled in both graduate and undergraduate courses are assessed tuition at the graduate student rate. Nondegree students enrolled for credit courses may elect to purchase an optional student fee package.

### University Employees

Any permanent employee may enroll for no more than 6 free semester hours of credit (and any permanent part-time employee for a proportionate number of hours of credit) in any academic year (summer, fall, spring) on a space-available basis beginning on drop/add day. Time taken to attend classes during normal working hours shall be made up and shall be limited to one course during any term. Persons appointed for less than full time are not eligible for release time during assigned hours. For details, visit [bursar.colorado.edu](http://bursar.colorado.edu).

### Concurrent Bachelor's/Master's Degree Programs

The Graduate School, in cooperation with the other colleges and schools, has instituted a concurrent bachelor's/master's degree option.

Students will need to talk with specific departments regarding programs offered and verification of the following statements:

1. Students who complete the requirements for the concurrent bachelor's/master's degree receive both degrees simultaneously.
2. Students admitted to concurrent programs may register for graduate courses before they receive a bachelor's degree.
3. Students admitted to bachelor's/master's programs will pay tuition according to their graduate/undergraduate status throughout the five years required to complete the concurrent bachelor's/master's degrees.
4. Students admitted to these concurrent degree programs will be regarded as undergraduate students for the purposes of receiving financial aid throughout the five years of their program.

### Approved Doctoral Candidates

A student admitted as an approved doctoral candidate is registered for 7 dissertation hours. Students not making use of campus facilities may petition the Graduate School for 3-credit-hour status. Consult the Graduate School for petition deadlines. Continuous registration for dissertation hours during fall and spring semesters is required until completion of the dissertation defense.

## Payment of Tuition and Fees

### University Bills

Any student who completes registration agrees to pay the University of Colorado at Boulder according to the payment terms documented in the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu) under the tuition and fees section. The bill includes tuition, fees, university residence hall charges, financial aid awards, student loan proceeds, research and teaching assistant tuition waivers, and other credits to tuition and fees.

Payment methods include:

- E-bill and E-check (via the Internet). For more information access PLUS at [www.colorado.edu/plus](http://www.colorado.edu/plus) or CU Connect at [cuconnect.colorado.edu](http://cuconnect.colorado.edu).
- Cash
- Check (personal, certified, cashier's, traveler's, credit card checks, or money orders)

*Credit cards are not accepted.*

Payment can be delivered via the Internet, wire, overnight express, standard U.S. Postal Service, or dropped in one of two payment drop boxes located outside the north and south entrances of Regent Administrative Center.

Failure to receive an official university bill does not relieve any student of responsibility for payment by the published deadline. To avoid assessment of service charges (1 percent per month on the unpaid balance), a late fee (\$50), and possible loss of future semester classes, tuition and fees must be paid by the deadline published in the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu). Subsequent bills will reflect adjustments and additional charges made throughout the semester. Tuition and fee billing information is available at [bursar.colorado.edu](http://bursar.colorado.edu).

### Two-Payment Plan

Students may sign up for a two-payment plan online via PLUS at [www.colorado.edu/plus](http://www.colorado.edu/plus) by the tuition payment deadline each semester.

For more information about the two-payment plan, visit [bursar.colorado.edu](http://bursar.colorado.edu).

### Failure to Make Payment

Failure to make the required payment by the stated deadline will result in any or all of the following actions:

1. Registration for future terms will not be allowed. If the student is already registered for courses for a future term, those courses may be dropped.
2. No transcripts, diplomas, or certification materials are issued for the student until the bill is paid in full.
3. The student will still be responsible for full tuition and fees, as well as a service charge (1 percent per month on the unpaid balance) and a late charge according to the following schedule:

Balance Due	Late Charge
\$1.00–99.99	\$ 5.00
\$100.00–299.99	\$10.00
\$300.00–499.99	\$20.00
\$500.00–699.99	\$30.00
\$700.00–899.99	\$40.00
\$900.00 and over	\$50.00

4. All past due accounts are referred to the university's Student Debt Management department for collection, where any assessed collection charges and attorney fees must be paid.

5. Colorado law requires the university to place all delinquent accounts with a third party collection agency. If your account is referred to a collection agency, you must pay any collection costs and attorney fees allowed by the Uniform Consumer Credit Code.

### Personal Check Policy

Those who write a bad check (regardless of the amount) to the university will be subject to late charges and service charges, and a stop will be placed on their record. A \$20 returned-check charge is assessed, in addition to the amount due to the university. They may also be liable for collection costs, attorney fees, and prosecution under the Colorado Criminal Statutes. Specific inquiries concerning reporting of bad checks should be directed to the Student Debt Management department in the Bursar's Office.

## Withdrawal Policy Regarding Tuition and Fees

Students who pay their \$200 enrollment deposit and register for classes for any given semester are obligated to pay full tuition and fees for that semester, unless they officially withdraw from the university.

Tuition and fee obligations for withdrawing students are as follows (for fall and spring semesters):

1. **Continuing students:** If withdrawal is by the “deadline to withdraw and not be assessed a financial penalty,” continuing students receive a refund of the enrollment deposit less any outstanding charges.

**New and readmitted students:** New and readmitted students are not eligible for a refund.

Deadlines to withdraw with no financial penalty vary by semester but occur some time before the first day of instruction. Refer to the *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu) for specific dates.

If students withdraw on or before the third Wednesday of instruction, the full amount of their enrollment deposit (\$200) is retained by the university.

2. After the third Wednesday of instruction through the fifth Wednesday of instruction, 40 percent of full tuition and mandatory fees is charged.

3. After the fifth Wednesday of instruction through the seventh Wednesday of instruction, 60 percent of full tuition and mandatory fees is charged.

4. After the seventh Wednesday of instruction, 100 percent of full tuition and fees is charged.

To comply with federal financial aid regulations, financial aid recipients' tuition and fee assessment for withdrawals may differ.

Students should refer to the current *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu) for any changes, as the Board of Regents reserves the right to revise this schedule at any time. Refer to the *Summer Session Catalog* for information on the withdrawal policy and refund schedule for summer terms.

It is the responsibility of students to have all special services fees removed at the time of withdrawal. Otherwise, these fees become a financial obligation.

Students who do not pay the full amount due the university at the time of withdrawal must make arrangements for payment with the Student Debt Management department in the Bursar's Office. All withdrawals are handled through the Office of the Registrar, Regent Administrative Center 105.

## Auditing

Individuals who wish to attend regularly scheduled classes and who are not registered students must obtain auditor's status. Auditors, resident or nonresident, pay resident tuition for 3 semester hours per term and receive class instruction and library privileges only. An auditor's card must be presented to the instructor on the first day of class. An auditor should get permission from the instructor to audit the class prior to purchasing the audit card. Audit cards are not refundable. Cards may be obtained from the Student Billing department in the Bursar's Office in Regent Administrative Center after classes begin.

To qualify as an auditor, an individual must be 18 years of age or older. Anyone under suspension from the university is not eligible to audit courses. Auditors may attend as many courses as they wish (except those courses with laboratories or where equipment is used), provided they have permission from the instructor.

If a regular degree student wishes to participate in a class without receiving credit, the student must register for the course for no credit. Tuition for courses taken for no credit is the same as for courses taken for credit. Auditors should note that the Office of the Registrar does not keep any record of courses audited; therefore, credit for these courses cannot be established.

## Financial Aid

The Office of Financial Aid's primary goal is to ensure that students who have been admitted to the university will have access to the resources necessary to complete their education. Approximately 50 percent of CU-Boulder students receive financial aid each year from federal, state, university, and private sources. Total aid for graduates and undergraduates approximates \$124 million and is a combination of loans, work-study, grants, and scholarships.

### Applying for Financial Aid

Students apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA) or FAFSA on the Web ([www.fafsa.ed.gov](http://www.fafsa.ed.gov)). Based on a federal formula, the FAFSA determines a student's eligibility for need-based and non-need-based financial aid, as well as some scholarships. Students must reapply for financial aid every year.

For financial aid for fall 2004, spring 2005, and summer 2005, the 2004–05 FAFSA must be submitted. Students should apply as soon as possible after January 1.

Several weeks after submitting the FAFSA, applicants receive a Student Aid Report (SAR) in the mail from the federal processor. The Office of Financial Aid receives the SAR results electronically if CU-Boulder is listed on the application.

Students must be admitted to the university before their financial aid application can be considered. However, prospective students should not wait for formal acceptance to CU-Boulder before applying for financial aid or scholarships.

### Eligibility

Eligibility for financial aid is based on the cost of attending CU-Boulder and the amount students and their families are expected to contribute toward the cost of attendance. Each year the financial aid office calculates the cost of attendance using local and national cost-of-living data.

The expected family contribution (EFC) is determined by an analysis of the student's FAFSA. A student's financial need is calculated by subtracting the EFC from the cost of attendance.

The financial aid award is funded from a combination of need-based and non-need-based financial aid sources in an effort to meet each applicant's total financial eligibility. Students may need to borrow educational loans and work part-time while they are in school.

### Financial Aid Awards

Most financial aid is awarded in April, but aid is offered as long as funds are available. Freshman and transfer students applying for aid for the 2004–05 academic year are encouraged to submit their FAFSA applications by April 1 in order to receive aid information in time to make an informed admission decision. Awards available to CU-Boulder students are listed below.

### Loans

Students use the FAFSA to be considered for the following loan programs.

**Federal Perkins Loan.** The interest rate is 5 percent and students do not have to start repaying the need-based loan until nine months after they graduate or cease to be enrolled at least half time (6 semester hours).

**Federal Direct Stafford Loan.** Funds are awarded and disbursed by CU-Boulder. Students sign a promissory note for the loan, which has a variable interest rate with a cap of 8.25 percent. Annual limits depend on the year in school: freshmen can be awarded up to \$2,625; sophomores, \$3,500; juniors and seniors, \$5,500; and graduate students, \$8,500. The loan may be

need-based and subsidized (interest does not accrue while borrowers are in school) or non-need-based. The interest on this loan may be paid while in school or borrowers can choose to have it deferred until after they graduate or cease to be enrolled at least half time (6 semester hours).

**Federal PLUS (Parent) Loan.** This federal loan is available to parents of dependent students. The interest rate is variable with a cap of 9 percent, and repayment begins within 60 days of full disbursement of the loan. Typically, repayment begins in February for an academic-year loan. Parents must complete a credit check. *Note:* Borrowing a PLUS Loan will be regarded as parental support on in-state residency petitions.

**Federal Direct Stafford Loan—Additional Unsubsidized.** This federal loan program is for independent students as defined by federal guidelines. The interest on this loan may be paid while in school or borrowers can choose to have it deferred until after they graduate or cease to be enrolled at least half time (6 semester hours). The deferred interest is capitalized at the time repayment begins. Loan limits are determined by year in school: freshmen and sophomores, up to \$4,000 per year; juniors and seniors, up to \$5,000 per year; graduate students, up to \$10,000 per year.

Some of the information above may change without notice due to federal regulatory changes and fund appropriations.

### Work-Study

Students submit the FAFSA to be considered for need-based work-study. Work-study students earn their award by working for on-campus or at approved off-campus agencies. Students may apply for a variety of jobs at competitive rates. Jobs are posted outside the Student Employment Office (UMC 100) or can be found online at [www.colorado.edu/studentemployment](http://www.colorado.edu/studentemployment). Students who are not awarded work-study may call **303-492-7349** to have their name added to the work-study wait list.

### Grants

Grants are awards that do not have to be repaid. Students submit the FAFSA to be considered for federal, state, and institutional need-based grants (including Pell, LEAP, SEOG, Colorado Student Grant, etc.).

### CU-Boulder Scholarships

Students may apply for scholarships offered by the Office of Financial Aid online at [www.colorado.edu/finaid](http://www.colorado.edu/finaid). To apply for scholarships that have a financial need requirement, results of your FAFSA must be on file in the financial aid office no later than March 1. *Note: This is earlier than the financial aid priority deadline of April 1.*

Scholarships are highly competitive at CU-Boulder. The selection committee considers academic achievement, honors, leadership, school activities, and service to the community. In most cases financial need is used to make a final decision between equally qualified candidates. Students should also search for scholarship opportunities within their academic program, college, club, or campus organization.

### Private External Scholarships

Students who receive a private scholarship from an organization outside the university must notify Scholarship Services in the Office of Financial Aid. In addition, students are encouraged to write to their donors and express their gratitude.

When a scholarship donor does not specify how to disburse the funds, the financial aid office equally divides awards of \$500 or more between fall and spring semesters. Private scholarships less than \$500 are applied in full to the current semester bill.

Donors should mail their checks, payable to the University of Colorado, with a cover letter to:

Scholarship Services  
University of Colorado at Boulder  
77 UCB  
Boulder, CO 80309-00 77

If a student's scholarship check is not received by the bill payment deadline, he or she should make other arrangements to pay the bill.

## Other Conditions

### Changes in Enrollment

Most financial aid and scholarships require students to be enrolled full time (12 semester hours or more). Students who intend to enroll less than full time should notify the Office of Financial Aid to have their aid adjusted.

### Drug Conviction

In accordance with the Higher Education Act of 1998, students who have been convicted under federal or state law for possession or sale of a controlled substance will be suspended from Title IV aid eligibility, regardless of when the conviction occurred.

If a student is convicted for possession, the ineligibility period begins as of the date of the conviction and is:

- first offense = one year
- second offense = two years
- third offense = indefinite

If a student is convicted for sale of an illegal substance, the ineligibility period begins as of the date of the conviction and is:

- first offense = two years
- second offense = indefinite

A student may regain eligibility by successfully completing a drug rehabilitation program that complies with criteria established by the Department of Education. More information is available by calling the U.S. Department of Education at **1-800-433-3243**.

### Reasonable Academic Progress

Students who apply for financial aid at CU-Boulder are responsible for knowing and complying with the reasonable academic progress policy. Briefly, the policy requires students to maintain a 2.00 grade point average (GPA) and complete at least 67 percent of the hours they attempt. Students are also limited to a maximum number of credit hours (generally 180 hours for a bachelor's degree) they can attempt.

### Study Abroad

Students must be enrolled in a CU-Boulder study abroad program to be eligible for financial aid through CU-Boulder's financial aid office. Students participating in a study abroad program through another university are not eligible for financial aid from CU-Boulder.

### Withdrawing

If a student enrolls at CU-Boulder, receives financial aid, then withdraws, his or her financial aid is adjusted according to federal regulations. The student may owe a refund to the university after the financial aid is adjusted.

## Other Resources

### Student Employment

Jobs provide students with income, work experience, and the opportunity to explore career options. Research studies indicate that students who work are as successful academically as those who do not. Freshmen usually work 8–15 hours per week. The Student Employment Office posts an average of 800 part-time on-campus and off-campus jobs for students. In addition, an on-call temporary employment service allows students to regis-



ter for occasional work including one-time child-care, yard-work, and clerical jobs.

Visit the Student Employment Office in UMC 100 or call **303-492-7349** for more information. Jobs are posted in the north dining room of the UMC and may also be viewed at [www.colorado.edu/studentemployment](http://www.colorado.edu/studentemployment).

### *Student Work Assistance Program (SWAP)*

This program gives students who are living in the residence halls a credit against their housing bill in exchange for hours worked in one of the dining centers. More information is available at **303-492-6325** or by e-mail at [SWAP@housing.colorado.edu](mailto:SWAP@housing.colorado.edu).

## Housing

### Residence Halls

Living on campus in a university residence hall is considered an important part of student life. More than 6,000 students are accommodated in single rooms, double rooms, multiple occupancy rooms, and apartments in 22 residence halls. All halls are coeducational, but in most cases, specific wings and floors house occupants of the same gender.

Each fall the residence halls provide a new home for approximately 5,000 entering freshmen. Subject to the availability of space, all freshmen are required to live in a residence hall for two academic-year semesters (a summer term does not count as an academic semester), unless they are married or live with parents and have permission to commute. Requests for permission to reside off campus for other reasons are considered on their merits, taking into account individual circumstances.

The residence halls provide a range of services and programs designed to support the intellectual, social, and personal growth of single student residents. All residence halls, for example, offer tutoring services to residents at no cost. Some halls offer special facilities, such as an academic skills lab, or a music room. A variety of academic and social programs are sponsored by residence hall and other university staff.

The residence hall dining service hours are planned to be convenient for most students' schedules, and self-serve salad bars are available at noon and evening meals. Steak nights, ice cream socials, and late-night coffee and cookie breaks during exam week are among the special activities planned during the semester. The dining program permits students (regardless of hall assignment) to eat in any residence hall dining room.

For more information about university housing options and/or permission to reside off campus, prospective students may write the manager of reservations, 75 Hallett Hall, Boulder, CO 80310.

### *Residential Academic Programs*

A number of the residence halls are home to residential academic programs, whereby students live in and take special classes in their hall that meet core curriculum and/or course requirements. These special academic programs are described in the College of Arts and Sciences and Other Academic Programs sections. These programs charge additional fees. They include:

- **Baker Residential Academic Program**, designed for freshmen and sophomores interested in the natural sciences and environmental studies.

- **Chancellor's Leadership Residential Academic Program and Ethnic Living and Learning Community**, dedicated to the development of community and professional leaders among students from all schools and colleges on the Boulder campus, is housed in Williams Village. While all students are part of the Chancellor's Leadership RAP, individuals may choose to live in the

Ethnic Living and Learning area, where focus is on leadership and diversity. Some scholarships to cover the program fee are available for those in need.

- **Farrand Residential Academic Program**, a coeducational program that offers 400 freshmen and sophomores in the College of Arts and Sciences the opportunity to enjoy the benefits of a small liberal arts college while taking advantage of the resources of a large university.

- **The Hallett Diversity Program** was created to encourage students to learn about differences and to celebrate them. It provides leadership opportunities and an environment for acquiring awareness of one's own—and others'—culture and values.

- **The Kittredge Honors Program** is a residential academic program within the general Honors Program. KHP provides the flavor of a small liberal arts college within the context of the vast resources of a major university. The program is open to 125 high-ability students, who are considered integral members of the Kittredge complex.

- **Sewall Residential Program**, limited to approximately 325 freshman and sophomore students in the College of Arts and Sciences, who are interested in the American West experience.

- **Smith Hall International Program** was created to promote international understanding and the recognition of global interdependencies.

### *Engineering and Science Residential Program*

Students studying engineering and natural science who live in Aden, Brackett, Cockerell, or Crosman Halls participate in this coeducational program. Sponsored by the College of Engineering and Applied Science and the Department of Housing, and supported by the College of Arts and Sciences, this program offers residents specialized tutoring, extensive computer-system access, and professional counseling and advising. An additional fee of \$65 per semester was charged in 2003–04 to cover the support activities.

### *Other Academic Programs in the Residence Halls*

The Council on Academic Programs in the Residence Halls (CAPRH) develops academic programs in CU-Boulder's residence halls. Funded projects include a faculty luncheon program in the halls, informal activities that promote out-of-the-classroom interaction between faculty and students, and special arts and sciences core curriculum courses presented directly in the halls. All programs facilitate greater interaction between faculty and students, and foster the integration of students' academic life with their campus residence hall life. Interested students, faculty, and staff are encouraged to participate in the planning and submission of projects to the council.

### *Room and Board Rates per Semester*

Residence hall room and board rates per person, per semester, for the 2003–04 academic year were as follows:

19 meals/week and double room . . . . .	\$3,377
19 meals/week and single room . . . . .	\$3,910

Different meal plans are available. A modest rate increase should be expected for the 2004–05 year.

### *Application for Residence Hall Housing*

New freshman and transfer students receive information from the Department of Housing about applying for accommodations after they have confirmed their intent to attend the university. Housing assignments are made on a first-come, first-served basis. The earlier applications are submitted, the better chance students have of being assigned to the residence hall of their choice. (Please note that the

Department of Housing does not guarantee assignment to a particular building, type of accommodation, or a specific roommate.)

Space for the fall term can normally be assured for all freshmen who apply for housing by early May. However, due to heavy demand for limited hall space, the university cannot always guarantee that freshmen who apply for housing late (usually after early May for the fall term) will find space available in the residence halls. If this is the case, students are so advised and are given appropriate instructions regarding wait lists and/or assistance in securing off-campus housing.

*Note: Application for admission to the university and application for housing are two separate transactions. Application for housing does not guarantee admission to the university, nor does admission to the university guarantee that housing will be available. For information regarding admission notification and confirmation procedures, see the Undergraduate Admission section.*

A security deposit (\$250 in 2003–04) is required to apply for residence hall accommodations. Students should note that residence hall facilities are reserved on a first-come, first-served basis.

All housing agreements are for the full two-semester academic year or remainder thereof. An early termination of contract is subject to financial penalties as stated in the residence halls agreement.

## Family Housing

The university offers studio, one-, two-, and three-bedroom furnished and unfurnished apartments for student, staff, and faculty families. The university's Children's Center provides day care for the children of family housing residents, staff, and faculty. For information on applying to family housing, write the Family Housing Office, 1350 20th Street, University of Colorado at Boulder, Boulder, CO 80302, or call **303-492-6384**, or send e-mail to [familyhousing@housing.colorado.edu](mailto:familyhousing@housing.colorado.edu). The housing web site is [housing.colorado.edu](http://housing.colorado.edu).

## Off-Campus Student Services

Off-Campus Student Services (a service of UCSU) maintains listings of rooms, houses, and apartments for rent in the Boulder community. Currently-enrolled students may view these listings from the web site at [www.colorado.edu/OCSS/](http://www.colorado.edu/OCSS/).

To receive information via mail, a request should be sent with \$12 (within the U.S.) or \$20 (outside the U.S.). Checks should be made out to the University of Colorado. The packet will include a 30-day web access code to housing listings, an apartment complex summary, a Boulder map, the *Boulder Tenant's Guide*, and other information pertinent to living and renting in Boulder.

Office assistants are available to advise students about leases, security deposits, effective techniques for sharing a room, and ways to avoid landlord/tenant problems. Each spring the office sponsors an off-campus housing fair where landlords, property managers, and related businesses offer their services to students in a trade-show fashion.

For additional information, call **303-492-7053** or write Off-Campus Student Services, University of Colorado at Boulder, 206 UCB, Boulder, CO 80309-0206. Office hours are 9:00 A.M.–5:00 P.M., Monday–Friday. Summer hours are 7:30 A.M.–4:30 P.M.

## Registration

Students should refer to the academic calendar and each semester's *Registration Handbook and Schedule of Courses* or *Summer Session Catalog* for specific dates and deadlines that apply to the registration process. Students should also consult individual college and school sections of this catalog and their dean's office for additional information on special requirements

and procedures. The following registration policies are intended to serve as general guidelines.

Registration generally involves three steps: registering for courses, obtaining a bill before classes begin, and dropping and adding classes during drop/add periods, if needed.

Students who require accommodations because of a disability should notify the Office of the Registrar, University of Colorado at Boulder, 20 UCB, Boulder, CO, 80309-0020, or call **303-492-6970**. If deaf or hard of hearing, call **303-492-5841** (TTY).

## Enrollment Deposit

All degree students pay a one-time-only \$200 enrollment deposit that allows them to enroll without paying a registration deposit each term.

Enrollment deposits are refunded to students upon graduation or official withdrawal from CU-Boulder within established dates and guidelines. All refunds are reduced by any outstanding financial obligations. Interest earned from enrollment deposits is used for student financial aid.

The \$200 deposit is required of all degree students. New students are required to pay the deposit when they first confirm their intent to enroll at CU-Boulder and are not permitted to register until the enrollment deposit is paid.

All questions regarding the enrollment deposit policy should be directed to the Office of the Registrar, Regent Administrative Center 105, **303-492-6970**.

## Registering for Courses

All CU-Boulder students register for courses via web registration.

Registration instructions are sent to new freshmen as well as new transfer, new graduate, and readmitted students when they have confirmed their intent to enroll, with the exception of new freshmen and transfer students in arts and sciences, who receive their registration instructions at orientation. Continuing students are notified each semester of times, places, and requirements for registration.

## Bill Distribution

Bills are mailed to students before each semester begins. If you signed up for the E-bill Option, you will be notified via e-mail that an E-bill was issued. Bill distribution information is listed in each semester's *Registration Handbook and Schedule of Courses* at [registrar.colorado.edu](http://registrar.colorado.edu) or the *Summer Session Catalog*.

## Drop/Add

Students can adjust their schedules by dropping and adding classes via the Web. For fall and spring semesters, drop/add activity takes place by time assignment during the first two days of the semester. After that, the system is available to all students through the drop and add deadlines.

For more information, refer to the *Registration Handbook and Schedule of Courses* or the *Summer Session Catalog*.

## Drop/Add Deadlines

Specific drop and add deadlines for each fall and spring semester are listed in that semester's *Registration Handbook and Schedule of Courses*. Summer deadlines appear in the *Summer Session Catalog*.

1. Students are allowed to add courses through the add deadline with no authorization signatures required (second Wednesday of instruction in the fall or spring semester; the deadline varies in the summer). After the add deadline in fall and spring semesters, the instructor's approval is required to add a course through the "deadline to add a course without petitioning the dean" (third Friday of instruction), unless enrollment levels are

reached earlier. Courses cannot be added after this deadline. In summer, courses cannot be added after the add deadline.

2. Students can drop courses through the drop deadline with no authorization signatures required (third Wednesday of instruction in the fall or spring semester; the deadline varies in the summer). Tuition and fees are not assessed for courses dropped by this deadline. After the drop deadline, the instructor's signature is required to drop a course through the "deadline to drop a course without petitioning the dean." The signature indicates that the student is passing the course; students who are failing their courses are not permitted to drop. Courses dropped after the drop deadline appear on the transcript with a *W* grade and no tuition adjustment is made.

3. After the "deadline to drop a course without petitioning the dean" (six weeks after classes begin in the fall or spring semester; the deadline varies in the summer), courses may not be dropped unless there are documented circumstances clearly beyond the student's control (e.g., accident or illness). In addition to obtaining the instructor's signature, students must petition their dean's office for approval to drop the course. Petitions normally are not approved after this date.

4. Students dropping all of their courses should refer to the Withdrawal Procedures section for more information.

### Credit/No Credit

Students who wish to take course work for no credit should indicate this at the time they register for courses or during the final drop/add period; changes in credit registration are not permitted after the drop/add deadline in the summer or after the third Friday of the semester in the fall and spring. Tuition is the same whether or not credit is received in a course.

### Pass/Fail (P/F)

Students should refer to the college and school sections of this catalog to determine the number of *pass/fail* credit hours that may be taken in a given semester or credited toward a bachelor's degree. Exceptions to the *pass/fail* regulations are permitted for certain courses that are offered only on a *pass/fail* basis. Procedures for requesting *pass/fail* enrollment can be found in each semester's *Registration Handbook and Schedule of Courses* or the *Summer Session Catalog*.

Students who wish to register for a course on a *pass/fail* basis should do so when they register or before the deadline in the registrar's office. Changes to or from a *pass/fail* basis are not permitted after the the third Friday of the semester in the fall and spring or after the drop/add deadline in the summer.

All students who register on a *pass/fail* basis appear on the class roster, and a letter grade is assigned by the instructor. When grades are received in the Office of the Registrar, those courses that have a *P/F* designation are automatically converted from letter grades to *P* or *F*. Grades of *D-* and above are considered passing grades.

### Variable Credit

All independent study courses, and occasionally regular courses, are offered on a variable-credit basis. Students must designate the number of credit hours they wish to receive for the course at the time of registration. Consult the *Registration Handbook and Schedule of Courses* or the *Summer Session Catalog* for variable-credit hour ranges for particular courses. Changes can be made at the registrar's office through the deadline (the third Friday of the semester in the fall and spring or the drop/add deadline in the summer.)

### Time Out Program

The Time Out Program (TOP) is a planned-leave program for CU-Boulder students who have completed at least one semester at the university and are in good ethical and academic standing. Students on TOP may leave for one semester or one year to pursue academic or nonacademic interests, and they do not need to reapply to the university. Students may take courses at another campus of the University of Colorado or at another college or university while on TOP.

TOP guarantees participating students a place in their current college or school and in their current major when they return to the university. In addition, students may apply for transfer to a different college or school upon returning to CU-Boulder, provided they observe all policies, procedures, and deadlines. Certain restrictions do apply, however, for some colleges and schools. Students are informed of registration procedures by mail and via their CU e-mail account.

Additional information and a TOP application can be obtained from the Office of the Registrar, Regent Administrative Center 105. A nonrefundable \$40 program fee is required at the time of application to TOP. The early application deadline for TOP is the six-week drop deadline for the semester the student begins TOP. Meeting the early application deadline assures a continuing student registration time assignment for the next semester. The final TOP deadline is the last day of class for the semester the student begins TOP.

*Note:* Students registered for the semester they plan to begin TOP must formally withdraw. See the withdrawal section below. Call **303-492-8673** for more information, or visit the registrar's office web site at [registrar.colorado.edu](http://registrar.colorado.edu), or e-mail [timeout@colorado.edu](mailto:timeout@colorado.edu).

### Withdrawal Procedures

Students may withdraw from the university by filling out a withdrawal form in the Office of the Registrar, Regent Administrative Center 105, by sending a letter of withdrawal to Office of the Registrar, University of Colorado at Boulder, 20 UCB, Boulder, CO 80309-0020, by faxing a letter to **303-492-8748**, or by e-mailing [withdraw@colorado.edu](mailto:withdraw@colorado.edu) from the student's CU e-mail account.

In all terms, students are not permitted to withdraw after the last day of classes.

Failure to withdraw officially will result in a failing grade being recorded for every course taken in a term and makes a student liable for the full amount of tuition and fees for that term. For refund stipulations, see the withdrawal policy regarding tuition and fees, in this catalog.

Rules for withdrawing may vary with each college and school. Students anticipating a withdrawal should consult with their dean's office and read the *Registration Handbook and Schedule of Courses* or the *Summer Session Catalog* for specific withdrawal procedures. More information is available in the Office of the Registrar, Regent Administrative Center 105, **303-492-8673** and on the Web at [registrar.colorado.edu](http://registrar.colorado.edu), or e-mail [withdraw@colorado.edu](mailto:withdraw@colorado.edu).

Withdrawing students (including students applying for the Time Out Program) with Federal Perkins/NDSL loans must complete a loan exit interview before leaving the university. Failure to do so will result in a "stop" on your record. This stop will prevent you from receiving a diploma or an academic transcript of work at the university and from registering for future terms. In order to complete a loan exit interview, contact the university Student Loans department in the Bursar's Office at **303-492-5571**, or **1-800-925-9844**.

Students who withdraw from either a fall or spring semester and then wish to return to the university must either reapply for admission, or if eligible, go on the Time Out Program.

## Other Registrations

### Concurrent Registration

Boulder-campus students who are unable to obtain courses required for their degree program on the Boulder campus may be allowed to register for up to two courses or 6 credit hours, whichever is greater, on another University of Colorado campus. (*Note:* Application forms and registration are done by the “home” campus.)

The course work must be required for their degree program, students must have their dean’s permission, they must be enrolled for at least one course on the Boulder campus, and enrollment levels must not have been reached on the other campus.

*Note:* Graduate students should check with the Office of the Registrar for exceptions to the home-campus registration requirement and limitation on credit hours at the host campus.

Students taking required courses in the Leeds School of Business or in the Graduate School of Business Administration may only exercise the concurrent registration option if they are in their graduating semester; business students who are two semesters from graduating and who cannot obtain courses necessary to complete a prerequisite sequence may also be allowed to use this option. The courses must either be required for graduation or unavailable on the Boulder campus, or the courses must conflict with another required course in which the student is enrolled.

Boulder students exercising this option will pay tuition for their total credit hours at Boulder-campus rates. Concurrent registration forms and instructions are available at the Office of the Registrar, Regent Administrative Center 105, from 9:00 A.M. to 5:00 P.M. Registration takes place only during the designated schedule-adjustment period of the host campus.

### Registration on Another CU Campus

Boulder-campus students who wish to take course work on another campus of the University of Colorado and not through the concurrent registration program may be able to register on that campus independent of Boulder-campus registration. However, students must apply for admission to and follow the registration procedures established by the other campus. Students should check with their dean’s office for approval. Arts and sciences students may not register at the University of Colorado at Denver or the University of Colorado at Colorado Springs campuses, except in the summer.

### Late Registration

Students in certain categories may be allowed to register late for any given semester. These categories, however, cannot be designated until just before the semester begins. Late registration continues on a day-by-day basis until enrollment levels are met, or until the drop deadline, whichever comes first.

Students who fail to complete registration during their assigned registration period are assessed a \$50 late registration fee, if eligible for late registration.

Graduate students registering as candidates for degree or for thesis hours must register during the assigned registration period or be subject to the \$50 late registration fee, if late registration is held for their category. For more information, call **303-492-6970**.

### Registration for Faculty and Staff

All permanent faculty and staff are eligible to take 1–6 free credit hours each fiscal year, depending on their percentage of employment. All participants of this program must be admitted to the university as nondegree or degree-seeking students. Faculty and staff who wish to enroll in courses must submit a Faculty/Staff Tuition Waiver form to the Bursar’s Office, Regent

Administrative Center 150, 43 UCB, Boulder, CO 80309-0043. Faculty and staff who are not continuing students (i.e., enrolled in the prior semester) must also submit the appropriate application as well as the tuition waiver form. Applications and the form are available at the Bursar’s Office or at **bursar.colorado.edu**. After the forms are processed by the Bursar’s Office, the Office of the Registrar will issue registration materials.

The tuition waiver form must be submitted by the published deadline as documented in the *Registration Handbook and Schedule of Courses* or in the *Summer Session Catalog*. To take advantage of the free credit hours, faculty and staff must wait until the day before classes start to register for fall and spring semesters. For summer semester, registration starts the first day of classes for the summer term you plan to enroll. Additional classes that will be paid by the student may be registered for prior to the first day of class. Detailed information is available at **bursar.colorado.edu**.

## Commencement

Students must apply to their dean’s office for graduation at least one semester before they intend to graduate. Graduation ceremonies are held in May and December and are open to the public. No tickets are required. The May commencement is held at Folsom Stadium and the December ceremony is held in the Coors Events/Conference Center. Students receiving their degrees in August should check with their dean’s office if they wish to attend the May or December ceremony. Details concerning the ceremony are e-mailed to graduating students approximately one month before each ceremony. Students may also access the current semester’s ceremony information at **www.colorado.edu/Chancellor/Commencement**.

Only doctoral and law graduates receive their diplomas at commencement. Diplomas are mailed to all other students approximately two months after the ceremony. Students may pick up their diplomas during scheduled distribution at the Office of the Registrar approximately two months following graduation. Diplomas not picked up are mailed to students’ permanent addresses. Standard diploma size is 8 x 10 inches.

Graduating students with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so will result in a “stop” on the student’s record. This stop prevents receipt of a diploma or an academic transcript of work at the university and registration for future terms. Students can complete a loan exit interview by contacting the university Student Loans department in the Bursar’s Office at **303-492-5571**, TTY **303-492-3528**.

## Campus Facilities

### Anderson Language Technology Center

The Anderson Language Technology Center (ALTEC) is a state-of-the-art facility supporting the study of foreign languages and cultures at the university. A large library of materials offers audiotapes, videotapes, DVDs, computer programs, CD ROMs, reference books and journals, as well as foreign language magazines. The office also offers noncredit, enrichment foreign language classes for faculty and staff on the Boulder campus.

Computing facilities consist of a Macintosh classroom, a PC platform lab, and an interactive media lab for foreign language word processing, tutorial programs, and Internet access.

The multimedia library has carrels for independent study of video and audiotapes, as well as high-speed duplicators for audiotapes. In addition, there is equipment for viewing non-U.S.-standard videotapes and DVDs, a media classroom with multistandard VCR, DVD player, and large-screen video pro-

jector. The center also receives satellite programs from the International Channel and SCOLA.

Located in Hellems under the direction of the College of Arts and Sciences, ALTEC is open to the entire university community, including alumni.

### Coors Events/Conference Center

The Coors Events/Conference Center is a multipurpose facility used for events such as educational conferences, seminars and meetings, convocations, and commencement ceremonies, as well as cultural, entertainment, and athletic activities that enhance and further the objectives of the university.

The main arena of the center seats between 8,500 and 12,000, depending on event configuration. The conference level offers five air-conditioned, carpeted rooms, which can seat from 28 to 150 persons.

### Fiske Planetarium and Science Center

Fiske is considered one of the finest planetarium facilities in the world. Seating 204 people in its star theatre, it is the largest such facility between Chicago and Los Angeles. The planetarium is equipped with a Zeiss Model VI star projector and an automated projection control system that operates hundreds of projectors and has the capacity to present over a dozen prerecorded star shows at any given time. In addition to its use as a teaching facility for astronomy and other classes, the planetarium is used for star talks, star shows, laser shows, and space science presentations to school children and the general public in the Boulder–Denver area.

### Heritage Center

The CU Heritage Center, located in the oldest building on campus, is a museum that reflects the history of the University of Colorado. Exhibits tell the CU story in seven galleries, from the early history of student life (as portrayed in a complete set of *Coloradan* yearbooks) to the university's contribution to space exploration, including *Apollo 13* artifacts and a lunar sample. Other exhibits depict campus architecture, the the history of CU athletics, and photographs and accounts of distinguished CU alumni. Located on the third floor of Old Main, the Heritage Center is open Monday through Friday from 10:00 A.M. to 4:00 P.M. and on Saturdays from 10:00 A.M. to 2:00 P.M. Call **303-492-6329** for information and to schedule tours or visit [www.cualum.org/heritage](http://www.cualum.org/heritage).

### Libraries

The university libraries system is composed of Norlin Library and five branch libraries. Norlin houses book stacks, periodicals, and reference and instructional services for the general humanities and social sciences; circulation, reserve, and interlibrary loan; archives, government publications, and special collections; and East Asian, media, and science libraries. The William M. White Business Library is in the Business Building, the Jerry Crail Johnson Earth Sciences and Map Library is in the Earth Sciences Building, the Leonard H. Gemmill Engineering Library is in the Mathematics Building, the Oliver C. Lester Library of Mathematics and Physics is in Duane Physics, and the Howard B. Waltz Music Library is in the Imig Music Building. The Law Library is located in and administered by the School of Law.

This system, a constantly expanding network of resources, connects users with:

- dedicated librarians and staff who provide reference assistance, extended consultations, computer searches, and instruction;

- the largest library collection in the Rocky Mountain region—more than 11 million books, periodicals, government publications, microforms, audiovisual materials, maps, manuscripts, papers, artifacts, and computer-based resources;

- an online system, Chinook ([libraries.colorado.edu](http://libraries.colorado.edu)), that provides access from dedicated terminals in the libraries, CU-Boulder accounts, the campus ethernet or ISN, the Internet, and other information services (such as CARL and ACLIN) to the libraries catalog; national, state, and local services ranging from the Library of Congress to the University of California to the Boulder Public Library; and connections to more than 400 electronic indexes, over 5,000 full-text journals and magazines, and full-text newspapers, as well as a number of other significant research and reference tools;

- a web site at [www-libraries.colorado.edu](http://www-libraries.colorado.edu) that includes a wealth of information about the collections, services, and activities available at the university libraries with links to each department and branch in the libraries system, as well as over 35,000 external links to other important web sites, and a seamless interface with the World Wide Web version of Chinook;

- special collections and archives including English, American, and children's literature; mountaineering; photography; the book arts; medieval manuscript leaves; peace and justice; history of Colorado and the West; environmentalism; women's history; and labor; and

- a regional depository of Colorado, U.S. government, United Nations, European communities, and World Trade Organization documents, with extensive holdings for World Bank, International Monetary Fund, OECD, UNESCO, and other U.N.-affiliated organizations, as well as British documents.

For more information, call **303-492-8705** and visit [www-libraries.colorado.edu](http://www-libraries.colorado.edu).

### Macky Auditorium Concert Hall

Originally built in 1912, Macky Auditorium Concert Hall is one of Colorado's premiere concert halls. The 2,047-seat venue features classical and popular musical concerts, dance performances, lectures, and films. It is home to the Artist Series, the Boulder Philharmonic Orchestra, the Macky Auditorium Travel Film Series, and College of Music ensembles. The auditorium also houses the Andrew J. Macky Gallery, with artwork by local and national artists. For information on all events, call the box office at **303-492-6309** or visit [www.colorado.edu/macky](http://www.colorado.edu/macky).

### Museum

The University of Colorado Museum houses extensive collections in anthropology, botany, geology, and zoology. The museum is nationally recognized for its holdings of specimens from the Rocky Mountain Region and beyond, making it a primary resource for faculty and student research. A program of foreign and domestic exchange of specimens and information has given the museum an international reputation.

The museum administers an interdisciplinary master's degree in museum and field studies. A collections/field track is provided for students interested in the curatorial and research aspects of museum work, as well as an administrative/public track for students interested in the public aspects of this work.

Through internships and assistantships, the museum provides professional experience to students in the field and in the laboratory. Museum faculty members teach courses in their areas of specialty, which include Southwestern archaeology and ethnology, plant systematics, invertebrate zoology, entomology, and paleontology. Participation in museum-related research is

encouraged by financial support to selected, qualified students through the Walker Van Ripper and William Henry Burt Funds.

The exhibit halls in the Henderson building are open daily to the public. The Geology Hall exhibits fossils and focuses on local paleontology. The Biology Hall shows animals of Colorado and the Rocky Mountain region. The Anthropology Hall emphasizes the fieldwork of CU-Boulder researchers. Temporary exhibits are presented each year. In addition, the museum offers extensive outreach programs to the schools and presents a number of special events, lectures, and activities for the community.

The CU Museum is accredited by the American Association of Museums.

## Recreation Center

Funded largely by student fees, the Student Recreation Center is one of the finest facilities of its type in the country. The center includes a 25-yard swimming pool and a 14-foot diving well; a patio for sunbathing; an ice arena used for hockey, broomball, and skating; handball/racquetball, squash, and tennis courts; a multi-use gymnasium; an indoor climbing wall; dry heat saunas; a free weight room; a dance/aerobics room; three regulation-sized basketball courts with a one-tenth mile running track suspended overhead; a spinning studio; and a fitness systems room with Cybex and cardiovascular equipment.

Current fee-paying students, their guests, and other members may take advantage of the facilities by showing their student Buff OneCard or membership card. A variety of sports equipment, including volleyball sets, tents, sleeping bags, backpacks, snowshoes, and cross-country skis, can be checked out overnight for a nominal fee.

Members may also participate in a wide range of team sports including ice hockey, ultimate frisbee, rugby, swimming, diving, speed and figure skating, lacrosse, soccer, baseball, and many others through the club sports program.

The recreation center also offers many other programs geared toward specific interests and instructions. The outdoor program offers students the opportunity to learn about the outdoors through special trips featuring rock climbing, backpacking, rafting, hiking, cross-country skiing, snowshoeing, and scuba diving, in addition to educational presentations. Through the instruction program, members may participate in noncredit classes at various levels of instruction in aquatics, aerobics, skating, tennis, fitness, CPR and first aid, martial arts, lifeguard training, yoga, and dance.

The intramural program offers leagues, tournaments, and special events in basketball, soccer, broomball, tennis, racquetball, hockey, touch football, badminton, softball, and other sports. For more information, visit [www.colorado.edu/rec-center](http://www.colorado.edu/rec-center).

## Sommers-Bausch Observatory

Located on the Boulder campus, the Sommers-Bausch Observatory has 16-, 18- and 24-inch aperture Cassegrain telescopes for undergraduate and graduate astronomy classes and research. Ancillary instrumentation is available for digital CCD imaging and spectroscopy. During daylight hours a heliostat is used to view the solar photosphere and chromosphere. The observatory is also open to the public on Friday evenings for viewing of the planets, stars, and nebulae, as weather permits. Call 303-492-5002 for reservations.

## University Memorial Center

The University Memorial Center (UMC) is a focal point for campus activities, programs, and services. An official state memorial dedicated to those who died in past wars, the UMC has also been designated a multicultural center designed to promote understanding among all cultures represented in the university and the community.

The UMC completed an expansion/renovation program in August 2002. Begun in May 2000 to better serve the needs of CU students and the university community, the expansion incorporated a 51,000-square-foot addition with a 4,000-square-foot, 5-story atrium. Conferencing areas, a multipurpose room, new student offices, a computer lab, and commuter lounge were among the new features that were added to the UMC.

At the heart of the UMC are its programming facilities and services. The facility, host to over 13,000 meetings and events each year, is a forum for a variety of speakers, seminars, concerts, and special events. The UMC is the home of the University of Colorado Student Union (UCSU) and its many operations, as well as the United Government of Graduate Students (UGGS). It also provides office space for 90 student organizations. The Dennis Small Cultural Center, the Off-Campus Student Services office, the Women's Resource Center, the Environmental Center, Student Legal Services, and Night Ride/Night Walk are also located in the UMC.

The facilities include a reception desk for campus information, the CU Book Store, meeting rooms, a copy center, a pharmacy, a travel agency, banking and ATMs, a cell phone retail outlet, an art gallery, and a games area with bowling and billiards. Also located in the UMC are three dining areas with seating for up to 1,200; a cafeteria with a fast-food grill; two panini counters with vegetarian and nonvegetarian offerings; a Mexican food restaurant; fruit, salad, and soup bars; a sandwich shop; an Asian food outlet; a local tea company kiosk; a pizzeria; The Sweet Spot, a frozen yogurt/pretzel shop; food vending carts; and Baby Doe's convenience store serving coffee, bakery items, and various sundries.

## Campus Programs

### Alumni Association

The CU-Boulder Alumni Association, located on the southeast corner of University and Broadway (across the street from Starbucks), sponsors a wide range of activities to benefit students, as well as alumni. Students can join the student alumni association, the Herd, an active group that provides a community for students interested in participating in a wide range of activities, including ski trips, night hikes, movie outings, and many other events. The Herd also provides leadership opportunities for university events like Homecoming and the Teacher Recognition Awards. Student membership in the Herd is \$15 annually. Members can take advantage of free meals prior to home football games, free rides on the CU ski bus, and many other benefits.

After leaving CU-Boulder, alumni can become involved in their local alumni clubs and the Alumni Association's constituent clubs, such as the Hispanic and Black Alumni Associations.

By joining the Alumni Association or one of its geographic or constituent clubs, alumni become ambassadors for CU-Boulder in their communities. Finding and recruiting the best students and awarding scholarships to current CU students are among the valuable contributions alumni can make.

The association also encourages advocacy on behalf of the campus by keeping alumni members informed through its publication, the *Coloradan*, which is issued four times per year. News about alumni and candid coverage of CU-Boulder and the

issues affecting it help to maintain mutually supportive relationships between the campus and its alumni.

For additional information, call **303-492-8484** or **800-492-7743** or visit [www.cualum.org](http://www.cualum.org).

## Alliance for Technology, Learning, and Society

The Alliance for Technology, Learning, and Society (ATLAS) at CU-Boulder promotes excellence throughout the total learning environment by integrating information and communication technology into curricula, teaching and learning, research, and outreach activities. ATLAS is changing the campus learning culture by enabling all students, even those in traditionally nontechnical fields, to experience firsthand the role that information technology plays and can play in their disciplines.

With the ATLAS initiative, CU-Boulder is making a major campuswide commitment. Like many universities, CU-Boulder is using technology to improve teaching and to widen access to instruction. But through ATLAS, CU-Boulder also is examining the integration of technology into its curricula, conducting research that critically assesses the impacts of technology on education and on society, and interacting with the K-12 system to help effect many of the same transformations at that level. In conjunction, CU-Boulder is providing an excellent technological infrastructure for all of its students, faculty, and staff.

More information on the various initiatives of ATLAS, including a centrally located building as well as the Technology, Arts, and Media Certificate Program, can be obtained at the Alliance for Technology, Learning, and Society, University of Colorado at Boulder, 40 UCB, Boulder, CO 80309-0040, **303-492-5094**, or [www.colorado.edu/ATLAS](http://www.colorado.edu/ATLAS).

The certificate program is explained more fully in the Other Academic Programs section.

## CU Art Museum and Colorado Collection

The CU Art Museum, founded in 1978, is the fine arts museum on campus. The museum, located in the Sibell Wolle Fine Arts Building, presents an active program of exhibitions and events that emphasize the interdisciplinary significance of art. The mission is to contextualize art more broadly in people's lives; to be a lively forum for the discussion of art and related issues; and to provide access to 20th century art of the highest quality and of regional, national, and international significance, with an emphasis on diversity and work of social content.

BFA and MFA thesis shows are held in the museum, which also presents a host of educational programs and a curatorial practicum. Graduate assistants and student guards help staff the galleries and receive practical training in the field.

The CU Art Museum's permanent collection is the Colorado Collection. This wide-ranging teaching collection includes primarily works on paper, ranging from old master prints and drawings to innovative contemporary art that speaks to the issues of our times. It also includes a modest selection of 19th and 20th century photographs, as well as ceramics, sculpture, and paintings. It is used for instruction, research, and special study sessions, and is exhibited regularly in the CU Art Museum. Exhibitions drawn from the collection travel to communities across Colorado as part of a statewide outreach program.

The CU Art Museum is open six days a week and admission is free. Call **303-492-8300** for current information.

## Clubs and Organizations

Clubs and organizations of almost every description are available on the CU-Boulder campus including over 200 academic, political, social, religious, and recreational groups. The Ski Club, Interfraternity Council, United Campus Ministries, Student

Ambassadors, Black Student Alliance, Program Council, College Republicans, and the Residence Hall Representative Council are examples of student organizations that offer a variety of opportunities for students to become involved with others on campus.

All clubs and organizations provide an excellent way for students to become involved in current events, student activities, and community service. For more information, interested students may consult the University of Colorado Student Union's *Club Guide*, available in UMC 125, visit [www.ucsu.colorado.edu](http://www.ucsu.colorado.edu), talk with their associate dean's office or an academic advisor, or stop by a student organization's office in the UMC. Students interested in forming clubs and organizations on campus can contact the Student Organizations Finance Office in UMC 231 or call **303-492-6366**.

## Colorado Space Grant Consortium

The Colorado Space Grant Consortium provides undergraduate and graduate students with hands-on experience in designing, building, testing, and operating space missions, as well as in analyzing data from space engineering and science experiments. Students in a variety of disciplines are trained to carry NASA and the U.S. space program into the 21st century. Space Grant students receive actual research experience in space science and engineering. They also have a chance to apply their classroom learning to exciting mission opportunities and are recruited by prospective employers.

Students earn scholarships, research assistantships, and/or independent research credit. The Colorado Space Grant Consortium provides courses to prepare students for designing, building, operating, and analyzing data from space missions. Courses include Gateway to Space and Independent Research Studies. The third mission, called DINO (Deployment and Intelligent Nanosatellite Operations), is a small satellite designed and developed by students to demonstrate a range of technologies for use on future space missions.

### Research Opportunities

Space Grant students gain valuable hands-on experience in space science and engineering projects by participating in one of several missions.

Space Grant students, along with other students from colleges and universities throughout Colorado, are building and testing the Citizen Explorer satellite to measure the ozone in the Earth's atmosphere. The second mission, called the Three Corner Satellite, is a constellation of three nanosatellites developed by space grant students from CU-Boulder, Arizona State, and New Mexico State, that will be launched by the space shuttle. The third mission, called DINO (Deployment and Intelligent Nanosatellite Operations), is a small satellite designed and developed by students to demonstrate a range of technologies for use on future space missions.

For information, contact the Colorado Space Grant Consortium, University of Colorado at Boulder, 520 UCB, Boulder, CO 80309-0520, **303-492-3141**.

## Concerts

CU Concerts presents the Artist Series, CU Opera, Takács Encore Series, and the Holiday Festival.

The Artist Series in Macky Auditorium features a wide array of internationally renowned performing artists in classical music, jazz, dance, and world music. Wynton Marsalis and Christopher Parkening are two of the outstanding performers who have appeared recently as part of the Artist Series.

CU Opera presents the best in opera and musical performance in Macky Auditorium and the Music Theatre. Recent performances have included *La Bohème*, *Die Fledermaus*, *Don Giovanni*, *The Music Man*, and other works.

The Takács Encore Series features concerts by CU's Grammy Award winning Takács Quartet in Grusin Music Hall; and the annual Holiday Festival in Macky Auditorium features students and faculty in a celebration of seasonal music.

Students may purchase concert cards that entitle them to a 50 percent savings on tickets for Artist Series and CU Opera performances. A free brochure and concert calendar may be obtained by calling **303-492-8008**, or visiting [www.cuconcerts.org](http://www.cuconcerts.org).

## Faculty Teaching Excellence

For information on either of the programs described below, call **303-492-4985**. The FTEP web site is located at [www.colorado.edu/ftep](http://www.colorado.edu/ftep), and the PTSP is at [www.colorado.edu/ptsp](http://www.colorado.edu/ptsp).

### *Faculty Teaching Excellence Program*

The Faculty Teaching Excellence Program (FTEP) provides an array of programs for CU-Boulder faculty to critically reflect on teaching and learning environments in the disciplines. For faculty members who wish to enhance their teaching, the program offers symposia and consultations on teaching that include videotaping. The teaching portfolio consultation guides faculty in the development and selection of materials that document teaching performance. The Classroom Learning Instructional Process (CLIP) allows faculty to have confidential feedback from students at mid-semester in order to make mid-course corrections. The consultations assist faculty in designing course content to include multicultural perspectives. Publications available to all faculty are: *Memo to the Faculty*, a reprint of seminal and current research on teaching and learning; *A Compendium of Good Teaching Ideas*, a compilation of teaching tips authored by CU faculty; the brochure series *On Diversity in Teaching and Learning*; and three volumes of essays written from personal, practical, and intellectual points of view by Boulder campus faculty titled *On Teaching*.

An emphasis on how students learn, as well as how teachers teach, is incorporated within all of the program's offerings. The program addresses the question: How can research on how people learn shape university education? Faculty participants read and discuss the work of scholars whose work covers a range of disciplines and who represent different theoretical perspectives on learning and teaching. The program renews a focus on enhancing specific units of instruction by assessing learning goals for the course as a whole and for units of instruction in particular. Assessing learning goals informs pedagogy, so that students will not only be engaged but will also better develop a deeper conceptual understanding of the subject matter.

As a service of the Faculty Teaching Excellence Program, an education house has been established in collaboration with the Department of Computer Science, and offers resources and expertise to help Boulder faculty in instructional technology projects in conjunction with a sound, discipline-based pedagogy.

Additionally, 43 faculty members in their units, who serve as FTEP faculty liaisons for teaching and learning with technology, carry out projects for their departments that incorporate technology, teaching, and learning. FTEP funds these projects.

### *President's Teaching Scholars Program*

The President's Teaching Scholars Program (PTSP) aims to produce a sustaining group of teacher scholars who are advocates of and consultants for the integration of teaching and research on the university's four campuses. Faculty selected for the program design and develop projects aimed at strengthening confidence in the art and craft of teaching and thereby establish a faculty learning community of colleagues interested in specific teaching pedagogy and the scholarship of teaching. In addition,

the scholars are asked to share their teaching acumen outside the university community and to exemplify the skills, talents, and characteristics of superior teachers. The guild numbers 54 teaching scholars. Now 14 years in existence, this program is a successful four-campus initiative. The President's Teaching Scholars are chosen not only for the skill in their own classrooms, but also for their promise of improving education and enlarging its possibilities across the university.

## Fraternities and Sororities

Over 2,500 students currently participate in CU-Boulder's approximately 30 social fraternities and sororities, emphasizing service, leadership, scholarship, and involvement in campus life. Most of the organizations have houses off campus where members can live after their freshman year. The university works through the Greek Affairs Office to establish an educational, growth-oriented environment for fraternity and sorority students that integrates them fully into the campus community.

The Greek system is autonomous from the university and not subject to its direct control. Additional information may be obtained by calling the Panhellenic and Interfraternity Council in the Greek Affairs Office, **303-492-6359**. The Greek Affairs Office also connects with both the historically Black and historically Latino Greek organizations.

A hazing tippline has been established at the university. Anyone who witnesses or experiences hazing in any form should report it to **303-492-0140**.

## Honor Societies

One way in which outstanding student scholarship is recognized at the University of Colorado at Boulder is through national and local honor societies. The national honor society, Phi Beta Kappa, founded in 1776 at the College of William and Mary in Virginia, was established at CU-Boulder in 1904. Phi Beta Kappa recognizes outstanding scholastic achievement in the liberal arts and sciences. The campus also has a chapter of Sigma Xi, an honor society for scientists. Sigma Xi's goals are to advance scientific research, to encourage communication among scientists, and to promote the understanding of science.

Other national honor societies with local chapters at Boulder are Beta Gamma Sigma (business), Kappa Delta Pi (education), Tau Beta Pi (engineering), Kappa Tau Alpha (journalism), Order of the Coif (law), and Pi Kappa Lambda (music). The criteria for membership in honor societies and their activities vary.

For more information on both national and local societies, consult the individual college and school sections or associate deans' offices.

## Intercollegiate Athletics

The University of Colorado is a member of the Big 12 Conference, and sponsors teams in a variety of intercollegiate sports. Competing at the national level, the Colorado Buffaloes pride themselves on many individual and team championships.

In each of the last eight years, 10 to 13 programs were ranked in the top 25 in the nation. In fall 2001, the men's cross country team won its first national championship, one year after the women's team claimed its first NCAA crown. That year, the football team won its first Big 12 Conference title, ending the regular season with wins over Nebraska and Texas, and ranked ninth nationally. CU-Boulder won four national championships in skiing during the last decade (1991, 1995, 1998, 1999). The football team won its first national title in 1990. In the 1996-97 academic year, CU-Boulder was one of just three schools in the nation to have football and men's and women's basketball teams ranked in the top 25, a rare accomplishment.



In its 113-year athletics history, over 500 student-athletes have been named All-American, with thousands earning academic honors.

There are over 300 student-athletes involved in intercollegiate athletics annually (roughly 53 percent men and 47 percent women). The average grade point average for student-athletes was 2.79 in 2002–03, near the average for the entire Boulder campus.

Men's varsity sports include football, basketball, cross-country, track and field, skiing, golf, and tennis. Women's varsity sports include basketball, cross-country, golf, track and field, skiing, soccer, tennis, and volleyball.

Folsom Field, a 53,750-seat stadium, serves as the home of the Colorado Buffaloes football team. The basketball teams practice and compete in the Coors Events/Conference Center, a facility that seats 11,198 people. The golf and tennis teams use local clubs as their headquarters, and the CU-Boulder ski team takes advantage of Colorado's many ski resorts, including its home mountain, Eldora. The women's volleyball team uses both the Coors Events/Conference Center and Carlson Gymnasium for matches and practices. The soccer team uses the Pleasantview Soccer Complex in Boulder for its games.

Boulder's diverse terrain and a running-conscious community combine to create a vigorous atmosphere for track and cross-country training. The track teams practice and compete at Balch Fieldhouse on the Main Campus and at Potts Field on the East Campus.

## International Education

The Office of International Education (OIE) in the Division of Student Affairs houses the International Student and Scholar Services and Study Abroad Programs. OIE serves as a liaison for international activities among academic departments, administrative units, international universities and governments, and U.S. governmental agencies and foundations. This liaison stimulates and provides administrative support for students and faculty members who desire to study or conduct research overseas; for international students, faculty members, and visitors who come to the University of Colorado at Boulder; and for all members of the campus community who wish to develop an international dimension in their teaching, research, or study.

Specific functions include expediting the exchange of students and faculty, sponsoring undergraduate study abroad programs, arranging the programs of international visitors, promoting special relationships with overseas universities, and advising on international scholarships. OIE also sponsors the Smith Hall International Program (SHIP), a residential academic program for first-year students interested in adding an international focus to their studies.

### Study Abroad Programs

The Office of International Education offers study abroad programs at over 110 sites around the globe, on every continent except Antarctica. Undergraduate students are strongly encouraged to consider a study abroad program to enhance their studies and to experience a unique opportunity for intellectual and personal growth. All participants in CU-Boulder study abroad programs remain enrolled at the university and all credit earned while abroad is considered earned in residence. Financial aid from the university may be applied to program costs in most cases. Students may also apply for special study abroad scholarships.

The university's study abroad programs are of various types. Students may study abroad for a summer, the winter interim, a semester, or a year. Some programs offer students the opportunity to be fully integrated in a foreign university system where they take classes from host country faculty and study alongside host country students. This is possible in Ghana, South Africa, Egypt,

Israel, Costa Rica, Mexico, Argentina, Brazil, Chile, the Dominican Republic, Canada, Australia, Great Britain, France, Germany, India, Japan, New Zealand, the Netherlands, Norway, Sweden, and Spain. Other semester or year-long programs offer a special curriculum for foreign students that generally focuses on fields in the social sciences and humanities, although some also offer courses in the natural sciences, architecture, business, and engineering. This type of program exists at numerous sites in Africa, Latin America, Asia, Oceania, Europe, and the Middle East.

In general, summer programs focus on language learning or the study of a specific discipline. Specialized summer programs are offered in conjunction with academic departments at the university. Students may study with CU professors on programs focusing on art history in Italy, Russian language in St. Petersburg, music and dance in Ghana, primatology in Panama, or international finance in London. Other summer programs are offered in Israel, Costa Rica, Mexico, China, Japan, Thailand, Denmark, Iceland, France, Germany, Russia, and Spain.

Finally, the university participates in the Semester at Sea program. Each semester and summer, the *SS Universe Explorer*, managed by the University of Pittsburgh's Institute for Shipboard Education, voyages around the world and provides students with insights into the various societies visited and allows students to analyze and discuss their observations in formal classes on the shipboard campus.

Most programs have prerequisites and some programs have language requirements. Generally, students must have a B average in their college-level work to qualify for CU study abroad programs. Planning ahead is essential and students are encouraged to consult with their academic advisors and with study abroad advisors in order to select a program that fits their needs.

More information about study abroad is available at the Office of International Education, Environmental Design 1B01, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, **303-492-7741**, e-mail: [studyabr@colorado.edu](mailto:studyabr@colorado.edu), or visit [www.colorado.edu/oie/studyabroad](http://www.colorado.edu/oie/studyabroad).

### International Student and Scholar Services

The University of Colorado has welcomed international students and scholars for many years. Currently more than 1,100 international students and over 550 scholars and visiting faculty members from more than 95 countries are on campus. International Student and Scholar Services (ISSS), a part of the Office of International Education, provides information and assistance to international students and visiting scholars regarding university regulations and procedures, immigration requirements, liaison with sponsors and home governments, and any other matters that are of special concern to students and scholars from other countries. All international students and visiting international faculty and scholars are required to check in at ISSS upon arrival at the university and to maintain contact with the staff during their stay at the university. Federal regulations governing the stays of international visitors to the United States have changed recently, making these services even more important to students and scholars.

In addition to the services described above, International Student and Scholar Services provides a number of opportunities for students and scholars to learn more about the community around them. The office works with Boulder Friends of International Students in matching students with local community members to provide social and cultural activities to help new arrivals in adjusting to the CU and Boulder environment. A number of annual events are planned by the office in order to provide a cross-cultural learning environment. Social/cultural activities include an annual mountain retreat for new international students and an

annual International Festival that celebrates the diversity international students on the campus each spring. The office also sponsors an International Peer Mentors group that includes United States and international students who help newly arriving students learn about campus and community life. For more information about international students and scholars, call **303-492-8057** or visit [www.colorado.edu/oie/iss](http://www.colorado.edu/oie/iss).

## International English Center

The university's International English Center (IEC) provides intensive English-language instruction to students from all parts of the world. Classes are offered in eight-week sessions (with a four-week option in summer) at four levels of English-language proficiency and in all language skills. The program is designed to prepare international students for academic study at colleges and universities in Colorado and elsewhere in the United States. At advanced proficiency levels, IEC students are permitted to enroll concurrently in selected academic courses as additional preparation for a degree program.

The IEC's curriculum is particularly appropriate for University of Colorado applicants who have been informed by the Office of Admissions that they are academically qualified but cannot be granted admission because of inadequate English-language proficiency. Such students are automatically eligible for study at the IEC. For IEC students who have not applied to CU-Boulder or any college or university in the United States, the IEC provides academic placement advice.

As a unit of CU-Boulder's Division of Continuing Education, the IEC also offers non-intensive evening classes in English as a second language for non-English-speaking visitors or local residents.

Full information may be obtained from the International English Center, University of Colorado at Boulder, 63 UCB, Boulder, CO 80309-0063; in person at the IEC offices at 1030 13th Street; by telephone, **303-492-5547**; by fax, **303-492-5515**; or see [www.colorado.edu/iec](http://www.colorado.edu/iec).

## Music

With over 400 public concerts annually, the College of Music is a major musical resource in the Boulder-Denver metropolitan area. In addition to faculty and student recitals, the college features its own symphony orchestra, bands, and choirs in regular concerts. Music for many tastes is also provided through smaller performing organizations on the Boulder campus such as the Jazz Ensembles and the Early Music Ensembles.

Guest artists, speakers, and special events provide a vibrant and diverse musical atmosphere at the university. Acclaimed artists Marilyn Horne, Randy Brecker, Martin Isepp, Wynton Marsalis, James Galway, George Crumb, and alumnus David Grusin have appeared on campus. Many have presented free master classes open to students and to the public.

## Senior Auditor Program

During the fall and spring semesters, CU-Boulder offers state residents, who are 55 years of age or older, the opportunity to attend classes on a tuition-free, space-available basis. The only costs to senior auditors are books, if they wish to buy them, and a small processing fee due at registration. No record is kept of attendance; no examinations are taken for credit; and class participation is at the discretion of the instructor. Senior auditor privileges include the use of the university's libraries. For information, call **303-492-8484**.

## Service Learning Program

Service learning courses integrate academic course work with community service in a way that benefits students and faculty as well as communities. Service learning courses offer students an interesting way to apply and enhance their growing knowledge and skills, to gain work experience, to meet people in professions of interest, and to learn more about community dynamics.

Currently, over 50 faculty, 30 departments, and an average of 1,700 students at CU-Boulder annually participate in service learning courses. Linguistics students gain insights by teaching adults in literacy programs; engineering students design devices that provide greater functionality for people with disabilities; sociology students learn about community needs by working for homeless shelters; and students in scientific writing courses gain proficiency by writing proposals that bring in needed funds for K-12 science classes and scientific nonprofit organizations. Participating students gain confidence and expertise in their subject areas as they gain understanding about people and community needs.

The Service Learning Program Office works with faculty, students, community organizations, and other campus programs. To learn more about service learning opportunities at CU-Boulder, contact the Service Learning Program Office at **303-492-7718**, at [service1@colorado.edu](mailto:service1@colorado.edu), or [www.colorado.edu/servicelearning](http://www.colorado.edu/servicelearning).

## Theatre and Dance

Facilities for theatrical and dance presentations include the University Theatre Mainstage, the beautiful outdoor Mary Rippon Theatre, the Loft Theatre, and the Charlotte York Irey Dance Studio.

The Department of Theatre and Dance presents six to eight major theatre productions each academic year, as well as four to six student produced and directed workshops. The 2003-04 season included *Mother Courage and Her Children*, *The Passion of Dracula*, *Alice in Wonderland*, *To Kill a Mockingbird*, *Stage Door*, and *Nine*. The dance division presents six to eight concerts featuring student, faculty, and guest artist work.

The Colorado Shakespeare Festival (CSF) is presented each summer in the outdoor Mary Rippon Theatre. One of the few repertory groups in the nation to have completed the entire Shakespearean canon, the festival has had 46 years of distinguished history, and features the most advanced students in the CU-Boulder Theatre and Dance program as well as professional actors, directors, designers, and outstanding performers and technicians from MFA training programs throughout the country. CSF "alums" include Jimmy Smits, Annette Bening, Joe Spano, Tony Church, and Val Kilmer. Also in the summer, the department hosts the Boulder Jazz Dance Workshop and Frequent Flyers Productions' Aerial Dance Festival.

## Undergraduate Research

CU-Boulder offers several ways for undergraduate students to participate directly in research and creative work. Through such involvement, students acquire knowledge and skills seldom attained through classroom experience alone. Project results sometimes are presented at national professional meetings or published in scholarly journals.

## College of Arts and Sciences Honors Program

The Honors Program at the University of Colorado-Boulder is designed to provide special educational opportunities for highly motivated students. Honors is open to well-prepared freshmen, as well as sophomores and upper-division students from all colleges on campus. Through the Honors Program, students may ultimately graduate from the university with honors: summa cum laude, magna cum laude, or cum laude. Our requirements for

graduating with honors are among the most rigorous—and we think the most rewarding—in the country. See Honors Program in the College of Arts and Sciences section for detailed information.

### *Independent Study*

Independent study course work provides students the opportunity to become involved in projects of their own choice. Projects could include writing a play, doing laboratory research, or designing a space-shuttle experiment. The number of credit hours earned depends upon the scope of the project. In all cases, work is done under the supervision of a faculty member and should be arranged as early in the semester as possible. Departmental and faculty approval is required, and all deadlines must be met. Students should consult with their associate/assistant dean's office about any special provisions.

### *Undergraduate Research Opportunities Program*

The Undergraduate Research Opportunities Program (UROP) sponsors undergraduate students who work in partnership with a faculty member on a research or creative project. UROP involves students in all areas of research—from writing proposals, to conducting research or pursuing creative work, to analyzing data and presenting results.

Interested students must identify a project and a faculty sponsor and then submit a proposal. Projects are designed around an aspect of the faculty sponsor's research or involve research or creative work of the student's own design. Proposals are evaluated on a competitive basis. Students are awarded up to \$1,200 in stipends and/or expense allowances to support their projects. A limited number of \$2,400 summer research fellowships are offered to enable students to spend the entire summer engaged in research. For information concerning opportunities for undergraduate research, contact the UROP office in Norlin S430, **303-492-2596**.

### *United Government of Graduate Students*

The United Government of Graduate Students (UGGS) represents more than 5,000 graduate students, law students, and business students on the Boulder campus. UGGS, the graduate student link to the Graduate School and other administrative bodies, actively pursues goals intended to enrich the quality of life on campus and the quality of graduate work for the university. As such, UGGS is committed to full health and child care benefits for graduate student employees of CU, clarification of policies regarding research and teaching assistants, improved teacher training programs, and provision of a multicultural campus.

UGGS holds bimonthly meetings during the academic year and monthly meetings during the summer. Graduate students from each department choose or elect representatives for the legislative governing body; UGGS officers are elected from among the departmental representatives. All are welcome to the general meetings.

For more information on the United Government of Graduate Students, call **303-492-5068**, drop by at UMC 123, or visit the web site at [uggs.colorado.edu](http://uggs.colorado.edu).

### *University of Colorado Student Union*

Through the University of Colorado Student Union (UCSU), students make policies and control many Boulder campus facilities and programs. Based on its budget of more than \$26 million, half of which comes from student fees and the other half from self-generated revenues, UCSU is the nation's largest student government. UCSU operates facilities such as the Wardenburg Health Center, the University Memorial Center (UMC), the Student Recreation Center, and the campus radio station,

KVCU. UCSU also offers students off-campus housing assistance, legal counseling, and many other services.

UCSU is divided into executive, legislative, and judicial branches. The UCSU executives, elected each spring by fee-paying students, head the executive branch. In representing the students, the executives work with the Board of Regents and the CU-Boulder administration on university policies and decisions. Support staff includes student administrators who work in key administrative offices and serve as liaisons between the students and the administration.

The legislative branch of UCSU is composed of an 18-member Legislative Council. Nine seats are occupied by representatives of the colleges and schools; the remaining nine seats are occupied by elected representatives-at-large. The joint boards on which council members and any interested student may serve include those in the environmental, recreation, health, finance, cultural events, and UMC areas.

The Appellate Court is UCSU's judicial branch. The seven students appointed by the executives as justices to the court are responsible for interpreting the UCSU constitution and ruling on specific appeals brought before them.

For more information regarding UCSU and getting involved, call **303-492-7473** or stop by UMC 125 between 8:00 A.M. and 5:00 P.M.

## **Campus Services**

### *Career Services*

Career development should be an integral part of a student's higher education. Career Services inspires and teaches students to become active participants in their own career development through programs that help them plan careers, find internships, and secure post-graduate employment. Students are encouraged to use these services throughout their university experience. Located on the ground floor of Willard Administrative Center, Career Services is open year round and serves university alumni as well as students. Call **303-492-6541** or refer to [www.colorado.edu/careerservices](http://www.colorado.edu/careerservices) for more information.

### *Career Resource Center*

The Career Resource Center contains both print and electronic sources of information about occupations, employers, salary projections, job search skills, and other career-related topics. Several computers are set up for career exploration, test practice, and Internet research. Special resources offered include career interest surveys (both print and computer-based) and career skills workbooks (for a nominal fee).

### *Career Counseling*

Professional counselors are available to help students:

- clarify interests, values, and skills;
- choose an academic major;
- make decisions and explore potential careers;
- develop skills in job seeking and résumé preparation; and
- refine interviewing skills by conducting a video practice interview. Students receive "real" interview questions and feedback on their answers and nonverbal communication.

### *Job Search Skills Presentations*

Career Services offers free presentations to help students prepare for their job search. Topics include:

- career planning;
- job search letter writing;

- curriculum vita writing;
- how to choose a professional/graduate school;
- interviewing skills;
- job search strategies; and
- résumé writing.

Students may pick up presentation schedules in the Career Services office on the ground floor of Willard, or at [www.colorado.edu/careerservices/students/present.html](http://www.colorado.edu/careerservices/students/present.html).

### *Academic Department Liaisons*

Each Career Services counselor works closely with academic departments to gather and disseminate career information specific to each academic field. Call **303-492-6541** to learn which counselor is the designated liaison to your academic department.

### *Graduate Student Career Programs*

In partnership with the Graduate School, Career Services now has a full-time career counselor and program coordinator who focuses specifically on graduate students' career development needs and concerns. For details, see [www.colorado.edu/careerservices/grad](http://www.colorado.edu/careerservices/grad).

### *Career Program for Students with Disabilities*

CPSD assists students and recent graduates in obtaining internships. Students participate in a series of career planning and disability seminars. Internship stipends are provided.

### *Credentials*

This service is for students who wish to set up a file containing letters of recommendation in support of graduate school admissions or for educational employment. It is highly recommended that students request letters while still at CU. The Credentials Office is open afternoons, Monday through Friday. Call **303-492-4128** for information, or visit [www.colorado.edu/careerservices/students/recomm.html](http://www.colorado.edu/careerservices/students/recomm.html).

### *Employer-Student Interaction*

Career Services provides several ways for students to interact with employers offering internships and/or post-graduate career opportunities:

**BuffLINK.** Managed and facilitated by Career Services, BuffLINK is CU-Boulder students' access to the online job listing service developed by the National Association of Colleges and Employers (NACE). On BuffLINK, students may access current internship and post-graduate career vacancies, apply directly to employers, and even sign up for on-campus interviews. Students who have signed up on BuffLINK also receive weekly e-mails from Career Services informing them of upcoming events.

**Internships.** Internships help integrate students' academic studies and career interests with related work experiences. Many internship positions offer salaries and some earn academic credit; all provide valuable experiences and the opportunity to explore career directions. Students who complete internships are significantly more attractive to employers when they graduate.

**On-Campus Interviewing.** Employers from all over the nation use our facilities to interview students for both internships and post-graduate career employment. Students may sign up for interviews online, through the BuffLINK system.

**Employer Presentations.** Students may attend informal meetings hosted by employer or graduate school representatives who present information about their organizations. Over 100 meetings are scheduled annually.

**Employer Host.** Students have the opportunity to get acquainted with potential employers as they assist with presentations. Call **303-492-8519** to volunteer.

**Résumé Referral.** Students actively seeking positions may have their résumés automatically referred to employers who call daily seeking candidates for internships and career opportunities.

**Career Fairs.** Career Services coordinates six fairs each year, with over 600 employers attending:

- Multicultural Career Fair (September)
- Fall Career Fair (September)
- Non-Profit Career Fair (November)
- Career Fair for Graduating Students (January)
- Internship Fair (March)
- Greater Denver Teacher Fair (April)

For more information, see [www.colorado.edu/careerservices/specialevents/fairs.html](http://www.colorado.edu/careerservices/specialevents/fairs.html).

**Student Help Desk.** Students who have questions or need help with BuffLINK or any other employer-student interactions may contact the Help Desk at **303-492-4100** or e-mail [career@colorado.edu](mailto:career@colorado.edu).

### *Testing Services (National and Institutional Testing)*

Testing Services offers a variety of academic tests for admission and exemption purposes. Some are in computer-based format (such as GRE-General, GMAT, TOEFL, and CLEP), while others are paper-based (including Arts and Sciences Exemptions, Foreign Language Achievement Tests, GRE-Subjects, LSAT, MCAT, PRAXIS Series, and SAT). The main office is open weekday afternoons during the academic year. The Computer-Based Testing office keeps different hours, including mornings, some weeknights, and Saturdays. Both offices are in Willard Hall on the ground floor. The main office phone number is **303-492-5854**; computer-based testing can be reached directly at **303-735-2044**. For test dates, descriptions, and registration information, see [www.colorado.edu/careerservices/students/acadtest.html](http://www.colorado.edu/careerservices/students/acadtest.html).

### *Child Care*

The University of Colorado Children's Center offers toddler and preschool programs for children 12 months to five years of age. There are two locations within the university: Newton Court and Smiley Court. The Children's Center is licensed by the state of Colorado. The center serves children of university students, staff, and faculty. The center is open from 7:30 A.M. to 5:30 P.M., five days a week. For further information, call **303-492-6185**.

### *Computing and Media Resources*

#### *Information Technology Services*

Information Technology Services (ITS) supports teaching, learning, research, and administration through state-of-the-art media, computing, telephone, and networking resources.

Technology is highly used on the Boulder campus. Indeed, CU-Boulder has the highest-speed connection to the Internet in Colorado and one of the fastest in the nation. E-mail and web services are available to all campus constituents, via both Ethernet and dial-up access, with over 6,000 uses of the modem lines during peak times each day and some 17,000 computers on campus connected to the Internet. The campus servers process over one million e-mail messages each week and host approximately 1,400 e-mail discussion lists and 7,000 newsgroups. The academic use of technology is increasingly integral to a CU-Boulder education; a personal computer is strongly recommended for incoming students. Courses have a web presence and all of the residence halls provide a 100-megabit-per-second (Mbps) Ethernet jack to each student in every room.

ITS offices are located in three main areas: Folsom Stadium, the Computing Center, and the Telecommunication Center. The stadium location houses the media component of ITS, as well as faculty services and scanning; the Computing Center houses the computing and networking component of ITS, as well as scanning; and the Telecommunication Center houses ITS' frontline user services, including the IT Service Center. The main ITS number is **303-735-HELP (4357)**. The stadium location can be reached directly by calling **303-492-8282**; fax **303-492-7017**. The Computing Center is located at 3645 Marine Street; phone **303-492-8172**; fax **303-492-4198**. The Telecommunication Center is on Main Campus and can be reached by phone at **303-492-1282**, or fax at **303-735-3297**. ITS' home page is at [www.colorado.edu/its](http://www.colorado.edu/its).

### *Support Services*

ITS offers a wide variety of support services, including a walk-in help center, free computing advising, seminars, workshops, and help documents. All documentation is available online at [www.colorado.edu/its/docs](http://www.colorado.edu/its/docs). The IT Service Center offers call-in, walk-in, and e-mail help Monday through Friday, 8 A.M. to 5 P.M., with after-hours call coverage. The Telecommunication Center (two buildings east of the University Memorial Center) can be reached at **303-735-HELP**, or by e-mail at [itsc@colorado.edu](mailto:itsc@colorado.edu). Walk-in help is also provided in the two largest campus labs, Norlin N310 and Engineering ECCR 225. ITS BugBusters visit faculty and staff offices by appointment for one-on-one computer troubleshooting.

Free lunchtime seminars and other hands-on computer workshops are provided for faculty, staff, and students to facilitate the incorporation of technology in academic life. More information is available at [www.colorado.edu/its/training](http://www.colorado.edu/its/training).

ITS supports and encourages the use of video and audio tapes, slides, computer graphics, and multimedia and web-based presentations, as well as a variety of audiovisual equipment, through the following user-service facilities: WebCT (for faculty), Graphics, Faculty Services, the Video Library, and the Technology Experimentation Center (TEC). WebCT helps faculty create course-related web sites. (For help with departmental web sites, contact the office of Web Communications at **303-735-8000**.) Graphics creates a wide variety of graphics for instructional use, from book covers to lecture slides. Faculty Services offers one-on-one consultation to ensure that every faculty member has access to ITS services. The Video Library contains a collection of 3,500 instructional videotapes and films for on-campus use. The TEC advises faculty on how to use instructional technologies effectively, and allows faculty and staff to experiment with the technologies that are available at the TEC.

### *Classroom Support*

Staff members, assisted by student employees, work closely with faculty in over 90 self-service technology classrooms and 10 operator-assisted technology lecture halls. All of these rooms have Ethernet connections and most can project computer images onto large screens for full-class viewing.

### *Web Pages*

The campus provides information services through an extensive set of World Wide Web pages. The CU-Boulder web site includes calendars, directories, available courses, job listings, department and individual home pages, weather, transportation, and maps. Students can create computing accounts, check their class schedules, look up grades from previous semesters, and billing information from any of the computing labs and from more than 75 kiosks around campus.

### *Computing Labs*

ITS maintains over 60 student computing labs, which house more than 1,400 systems and their peripherals. Facilities include instructional and general-use labs equipped with Unix, Macintosh, and Windows. All are connected to the campus network. Some of the labs are focused on specific disciplines or applications, such as foreign language instruction, statistics, or graphics, but most are available for general-purpose use. The two largest labs, one in Norlin Library and one in the Engineering Center, are staffed by computing advisors. In addition to the resources that ITS provides, a large number of departments, including the Department of Housing, support their own computing facilities for administration, special research, and instruction.

### *Media Production*

ITS Media Production Services offers a wide range of support for faculty, staff, students, and departments on campus. These services include video/audio production, media digitizing and compression services, streaming media, studio and mobile video production, video and audio duplication, digital editing, cable TV programming, satellite downlink/uplink, video conferencing, video-editing and audio self-help facilities, custom graphics production, graphics design, photographic services, and media-production consultation.

### *Personal Computer Maintenance*

At PC Maintenance, certified technicians repair personal computers and peripherals, doing both warranty and nonwarranty work both on-site and in-house. PC maintenance is located in the Stadium, gate 6, room 142, and is open from 8:00 A.M. to 5:00 P.M.

### *Networks*

ITS is responsible for the major data communications networks on campus, which provide both communications within the campus and gateways to national computing networks via the Internet. These networks provide access to a host of computing resources, including the University Libraries' bibliographic and information systems; the exchange of electronic mail with other faculty, staff, and students on the campus and around the world; and access to national resources such as library catalogs, databases, and research institutes. ITS also works with campus departments in designing and developing local area networks.

### *Core Business Systems*

The applications and information systems group provides a full range of support for administrative computing at CU-Boulder, including systems development and maintenance, computing site management, and office consulting.

### *Server Support*

UnixOps provides support for servers. UnixOps offers Unix system administration and operation for campus departments.

## Counseling and Psychological Services: A Multicultural Center

Services at the center are free and available to all CU-Boulder students. The center is a safe place to talk confidentially with a professional psychologist or counselor who understands and respects individual needs.

### *Counseling Services*

- **Individual Counseling and therapy.** The center offers **free counseling** to individuals, couples, and families in order to meet personal, professional, cultural, academic, and career needs. Some concerns brought to the center include relationships,

stress management, conflicts, trauma, sexual harassment, workplace issues, cultural identity, depression, anxiety, racism, suicidal thoughts, eating disorders, coming-out issues, etc.

- Counseling in several **residence halls** is provided on a part-time basis as well. Currently these include Kittredge, Williams Village, and Sewall.
- Free **groups and workshops** are offered occasionally on subjects such as assertive communication, anxiety, women's support, surviving trauma, grief and loss, dissertation support, and adoption.
- **Interest testing** (for a nominal fee) **and counseling** are available to guide choices in field of study and life planning.
- For **faculty and staff information**, please contact the Faculty and Staff Assistance Program at **303-492-3020**.

Counselors strive to provide high-quality, multiculturally skilled, and community-focused counseling, education, research, consultation, and outreach services in order to promote student academic success, healthy student development, and to positively impact the university culture. Staff includes master's-level counselors, doctoral-level psychologists, graduate trainees, and other professionals committed to offering quality services.

Students may walk in Monday through Friday, 9–11:30 A.M. and 1–3:30 P.M. to speak with a counselor and to set up future sessions. The office is located in Willard Administrative Center 134, **303-492-6766**. Information is also available on the Web at [www.colorado.edu/sacs/counseling](http://www.colorado.edu/sacs/counseling).

## Cultural Unity Center

The Cultural Unity Center (CUC) has a long-standing commitment to diversity and multiculturalism and is staffed by a culturally-diverse team of university counselors and peers who assist students throughout their college careers. CUC is a resource and referral counseling center that works to increase the retention/persistence of all students, with a particular focus on students of color. They seek to provide a supportive family-like atmosphere in order to help students achieve their goals. They also provide a welcoming environment, specialized programming, and individual contact. Moreover, CUC complements existing campus services by striving to increase opportunities for the university community to enhance understanding of the contributions made by diverse communities. The Cultural Unity Center staff of counselors and peer counselors are concerned with students and support them in such a way that they feel their personal, as well as academic, concerns are met.

Programs offered at the Cultural Unity Center include: Diversity Education Team (workshops, discussion groups, and seminars); First Generation Scholars; Parents as Partners; peer counseling; welcome celebrations, and the White Antelope Memorial Scholarship. Contact CUC at Willard Hall 118, **303-492-5667**, or [www.colorado.edu/studentaffairs/cuc](http://www.colorado.edu/studentaffairs/cuc).

## Disability Services

Disability Services' mission is to provide students with disabilities the tools, reasonable accommodations, and support services to participate fully in the academic environment. Furthermore, their mission is to promote an accessible and culturally sensitive campus through outreach and by building partnerships within the university community and beyond.

Students with visible (deaf/hard of hearing, blind/visually impaired, mobility impaired/other physical or systemic, and others) and nonvisible (learning disabilities, ADD/ADHD, head injury, psychological/psychiatric, etc.) disabilities initiate services by con-

tacting the DS office and submitting appropriate documentation (documentation requirements are on the web site below).

Support services are provided on an individual basis and include assistance with advocacy, academic advising, strategy development, campus and community referral, use of a writing lab, and access to the Career Program for Students with Disabilities.

Reasonable accommodations, determined by DS, are based upon a disabling condition that significantly impacts a major life function. Students may qualify for services even if documentation does not support accommodations. Accommodations may include extended time on exams, interpreters, real-time captioning, note takers, materials in alternate format, assistive technology, among others.

The Assistive Technology Lab allows students with disabilities access to computer systems, information resources, and online services. The AT Lab also provides alternate writing tools, access to print materials, and technological support to students, as needed.

*Note:* For any student struggling academically or questioning the presence of a disability, DS provides screeners at no fee, and psychoeducational learning disability assessment for a \$300 fee.

Contact Disability Services, University of Colorado at Boulder, 107 UCB, Boulder, CO 80309-0107, V/TTY **303-492-8671**, fax **303-492-5601**, or [www.colorado.edu/disabilityservices](http://www.colorado.edu/disabilityservices).

## Environmental Health and Safety

The responsibility of the Department of Environmental Health and Safety (EH&S) is to provide high quality/timely human health and safety services to the Boulder campus community (students, faculty, staff, and visitors). In addition, EH&S provides leadership in environmental stewardship and regulatory compliance assistance to the campus. Effective fulfillment of this responsibility is made possible through the significant efforts of many individuals as well as partnerships with various constituents of the campus community and regulatory agencies.

Five programs within the division focus upon these goals through preventive, remedial, and emergency response measures:

The **Environmental Compliance Unit** ensures that the university is in compliance with all applicable environmental regulations through on-site inspections, training, and program review. Its staff also investigates incidents and initiates policy within fields such as indoor air quality, water quality, and health exposures.

The **Radiation Safety Unit** oversees the safe and responsible use of radioactive materials and radiation-producing machines.

The **Hazardous Materials Management Unit** educates and serves the university toward the minimization, safe-handling, and appropriate disposal of hazardous materials.

The **Asbestos and Lead Management Unit** specializes in the testing, detection, and responsible abatement and disposal of materials containing asbestos and/or lead.

The **Emergency Planning Coordinator** works collaboratively to develop business recovery plans for individual departments and contingency plans and procedures for the university as a whole.

For more information about EH&S, call **303-492-6025**, fax **303-492-2854**, e-mail [ehs@colorado.edu](mailto:ehs@colorado.edu), or visit [ehs.colorado.edu](http://ehs.colorado.edu).

## Ombuds Office

The Ombuds Office provides confidential, informal, independent, and neutral dispute resolution services for all members of the university community. The office assists students, faculty, and staff in identifying and evaluating options for resolving and managing conflicts, provides mediation services, conducts workshops on conflict management, and makes referrals to other appropriate university and community resources. The staff is familiar with the organizational structure of the univer-

sity and can provide current information about campus services, programs, policies, and procedures.

Due to its informal, confidential, and independent role outside the administrative structure of the university, notice to the Ombuds Office about a problem does not result in the generation of records, nor does it constitute legal notice to the university about the existence of a problem. For those interested in making official complaints to the university about a problem, the Ombuds Office can assist by making appropriate referrals.

For more information, contact the Ombuds Office, University of Colorado at Boulder, 112 UCB, Boulder, CO 80309-0112, **303-492-5077** or [www.colorado.edu/Ombuds](http://www.colorado.edu/Ombuds).

## Parking and Transportation Services

**Frequent Parking.** Those who park on campus frequently should consider buying a parking permit. Permits may be purchased online from late spring to midsummer ([ucbparking.colorado.edu](http://ucbparking.colorado.edu)), during the permit sale at Coors Events/Conference Center the week before classes start each semester, and in the lobby at 1050 Regent Drive any other time. Call the permit information line at **303-492-3550** for permit availability, or call Parking and Transportation Services at **303-492-7384** for general permit information.

Students buying a permit must present their photo ID and a valid state vehicle registration card at the time of purchase. Unneeded permits may be returned for a prorated refund. Permits must never be sold or transferred to another person.

**Permit Rates and Payments.** Permit rates are determined by parking location. Semester rates range from \$89.25 to \$136; academic year (August-May) rates are double the semester rate. **Fees are subject to change without notice.** VISA, MasterCard, American Express, or student bills may be charged, or permits can be purchased with cash or check. All online purchases require charges to a credit card or student bill. Permit rates are lower during summer sessions. Charges cannot be made to student bills for summer-session permits.

**Visitor Parking.** The Euclid Avenue AutoPark, located just east of the UMC, provides visitor parking at an hourly rate. Visitors may also park at the parking meters and the three pay-on-foot stations on campus. Meters require payment seven days a week between 7:30 A.M. and 5:00 P.M. Temporary parking permits are available for occasional needs. Call the business office at **303-492-7384** for more specific information. Visitor parking locations are highlighted on the campus parking map, which can be obtained at Parking and Transportation Services, 1050 Regent Drive.

**Bicycle Program.** Bicycles parked on campus must be registered with Parking and Transportation Services at a cost of \$10 for the life of the bike. Bicycles bearing valid registrations from other jurisdictions may be registered on campus at no charge. Unregistered bicycles parked on campus may be impounded. Bikes can be registered at the Coors Events/Conference Center during the week before fall semester begins and at the bike station between the University Memorial Center and Euclid AutoPark during the semester. Call **303-735-2705** for bicycle parking and registration information.

**Parking and Traffic Regulations.** Complete parking and traffic regulations can be obtained at the Parking and Transportation Services office, 1050 Regent Drive, Boulder, CO 80309-0502. Call **303-492-7384** with any questions. Campus parking regulations are strictly enforced.

## Photo ID/Campus Card Program

The Buff OneCard is the official CU-Boulder student ID to be used during a student's career at CU-Boulder. The card is required as verification of eligibility for many student privileges, including access to the Student Recreation Center, all campus li-

braries, Wardenburg Health Center, housing dining centers, athletics events, and local and regional RTD buses.

The Buff OneCard also offers a number of convenient, optional programs such as the Buff Gold program that turns the card into an ATM/debit card that accesses accounts set up with the U of C Federal Credit Union, and the Munch money program that allows students to make purchases at a number of housing dining areas. For more information about these and other programs, call the Campus Card office at **303-492-0355** or visit [buffonecard.colorado.edu](http://buffonecard.colorado.edu).

Lost or stolen cards must be reported immediately by calling **303-492-1212** to have the card deactivated, or via the Web at [buffonecard.colorado.edu](http://buffonecard.colorado.edu). Both methods are available 24 hours a day. A replacement Buff OneCard may be purchased for \$20 at the Campus Card office.

The Campus Card office is located in the Department of Housing, Hallett 66 and is open 8:00 A.M.–5:30 P.M., Monday–Friday. Office hours and card fees and prices are subject to change.

## Planning, Budget, and Analysis

The Office of Planning, Budget, and Analysis is responsible for directing and supporting campus budgeting, planning, and management through oversight of budget services, institutional research, and planning processes; providing institutional analyses, assessments, and information for decision support; supporting the development of operating budget requests; maintaining a balanced and fiscally healthy annual budget; providing assistance to campus units on the use or development of management information and technology; and serving as the liaison with the system office and the Colorado Commission on Higher Education (CCHE) on planning issues and requirements. The office also administers the faculty course questionnaires (FCQs), which give students the opportunity to evaluate their courses and instructors. For more information, call **303-492-8631**.

## Speech, Language, and Hearing Center

The Speech, Language, and Hearing Center provides a complete range of speech, language, and hearing services to students, faculty, staff, and members of the community. Services include evaluation and treatment programs for hearing, articulation, voice, stuttering, language, and learning problems. Programs for children and adults with communication problems related to learning disabilities, strokes, head injury, developmental delays, and other concerns are available on an individual and group basis. A group for individuals who stutter and voice treatment for persons with Parkinson's Disease are two examples of services offered. The center dispenses and services hearing aids and offers instruction on using aids. The center also houses the Child Learning Center, with an inclusive preschool program for children ages two to five and parent education and support groups. For more information about the center's programs and services, call **303-492-5375**.

## Student Academic Services Center

The Student Academic Services Center (SASC) offers academic support services to help students improve their learning potential.

### *Academic Excellence Program*

The Academic Excellence Program offers academic, logistic, and counseling assistance to qualified students wishing to improve their academic success. Program activities include individual sessions, tutor-supervised study halls, and workshops on such topics as note taking, reading strategies, test preparation, career exploration, and time management. Undergraduate students who are the first generation in their family to receive a

four-year college degree, are low income, and/or have a physical or learning disability may be eligible to participate.

### *Ronald E. McNair Postbaccalaureate Achievement Program*

The McNair Scholars Program prepares CU students for doctoral study. Students who are U.S. citizens or legal residents and qualify by federal guidelines as low income and first generation, or as members of populations underrepresented in graduate school may apply. Twenty students are selected each year to participate in both academic year and summer activities. Benefits include: a stipend up to \$2,800 for completing a nine-month research project; summer expense support; faculty and graduate student mentoring; journal publication and national conference research presentation; intensive GRE prep sessions; academic skills training; credit-bearing seminars; positioning for graduation with honors; graduate school application assistance; and preferred status to obtain McNair-specific application fee waivers and fellowships from more than 150 graduate schools nationwide.

Visit the office located in Willard 400 or call **303-492-5660** for program information. An online application is available at [www.colorado.edu/sasc/mcnair.html](http://www.colorado.edu/sasc/mcnair.html).

### *McNeill Academic Program*

The McNeill Academic Program offers small classes, workshops, extracurricular activities, personal contact with university staff and faculty, and membership in a community of motivated students. Participation continues throughout a student's enrollment at CU-Boulder. The program accepts students who participated in the University of Colorado's Pre-Collegiate Development Programs, as well as other students identified by the admissions office who would benefit from participation in an academic program with high expectations and a supportive professional staff.

### *Support Services*

SASC provides a range of services tailored to meet the specific academic and personal needs of eligible students. These include alternative core curriculum courses in math and writing, tutorial support and academic skills development in key subject areas, and tutorial referral in a wide range of subjects. Academic specialists provide guidance and assistance in meeting students' academic goals. Assistance is also available in other areas such as counseling, financial aid, academic advising, and career exploration.

Students interested in these services can come to Willard 386 or call **303-492-1416**. The e-mail address is [SASC@colorado.edu](mailto:SASC@colorado.edu) and the web site is [www.colorado.edu/sasc](http://www.colorado.edu/sasc).

## Veterans Services

The Veterans Services Office is part of the Office of Financial Aid and helps eligible students apply to the Department of Veterans Affairs for educational benefits. As a condition of receiving benefits, prospective students must be accepted to a degree program at CU-Boulder or acceptance must be imminent.

A certified copy of Copy 4 of the DD-214 may be required in order to apply for educational benefits as a veteran; this form can be certified by local county clerk and recorders' offices without charge. The certified copy must have the seal of the county clerk. If the veteran has used educational benefits any time since discharge from active duty, a certified copy of Copy 4 of the DD-214 is not necessary. Persons on active duty who wish to take advantage of their educational benefits under any of these programs should contact their base education officer for eligibility requirements.

CU-Boulder students receive VA educational benefits under the following programs.

**Veterans Educational Assistance Program (VEAP), Chapter 32.** Students must have entered active duty on or after January 1, 1977, and before July 1, 1985, and have participated in this program while in the service.

**Chapter 30, Montgomery GI Bill, Active Duty.** Students must have entered active duty on or after July 1, 1985, and participated in the program while in the service by contributing \$1,200. Also eligible are those veterans who entered active duty before January 1, 1977, and who served continuously on active duty through June 30, 1988 (or June 30, 1987, with at least a four-year obligation to the Selected Reserve).

**Dependents' Educational Assistance Act, Chapter 35.** Students between the ages of 18 and 26 who feel they are eligible to receive educational benefits due to the death of a parent in active military service or a parent's service-connected disability should establish their eligibility with the local Department of Veterans Affairs regional office.

Children and spouses of 100-percent-disabled veterans may also qualify. Applicants must provide the VA file number and a certified copy of their birth certificate to the Veterans Services Office in order to initiate the educational benefits. Those students eligible for social security benefits under the Restored Entitlement Program for Survivors (REPS) should contact the Veterans Services Office or the local Department of Veterans Affairs regional office.

**Chapter 1606, Montgomery GI Bill, Selected Reserve.** Students may be eligible if they enlisted, reenlisted, or extended an enlistment in the Selected Reserve or National Guard for a period of six years beginning on or after July 1, 1985. Each student must provide the Veterans Services Office with a Notice of Basic Eligibility, DD-2384, from the reserve or guard unit.

**Disabled Veterans, Chapter 31.** Veterans may be entitled to vocational rehabilitation benefits of tuition, fees, books, and a monthly stipend if they meet the following conditions: they were discharged from the service under other-than-dishonorable conditions; they have a service-connected disability for which they are receiving or could elect to receive VA compensation; and the Department of Veterans Affairs determines they need rehabilitation services and assistance to overcome an employment handicap or to improve their capacity for independent living in their family and community. Interested persons should contact the Department of Veterans Services Vocational Rehabilitation at **303-914-5550**.

**Payment.** Students may request advance payment by completing the proper forms at the Veterans Services Office at least 56 days before the start of a term (they must not have used the benefits in the 56 days preceding the term). The advance paycheck for the first month (or partial month) and the succeeding month is delivered to the Veterans Services Office. The next educational benefit check and subsequent checks are sent to the student's address for that enrollment period.

The office has a counselor on staff to assist students with planning academic schedules in relation to VA regulations. Financial aid counseling is also available. The office is located in the Office of Financial Aid, Regent Administrative Center 175. For information, call **303-492-7322**.

## Wardenburg Health Center

Wardenburg Health Center provides a wide range of services including medical, women's health, dental, mental health, sports medicine, and health education. Charges and fees are associated with most medical services. Many health education and outreach programs are provided free of charge. The physicians at the health center are board-certified, and Wardenburg Health Center is accredited by the Joint Commission on Accreditation of Healthcare Organization (JCAHO).



Wardenburg Health Center is located at the corner of 18th Street and Wardenburg Drive on campus. The mailing address is Wardenburg Health Center, University of Colorado at Boulder, 119 UCB, Boulder, CO 80309-0119.

For more information, go to [www.colorado.edu/healthcenter](http://www.colorado.edu/healthcenter), or call **303-492-5101**. Wardenburg Health Center is a service of UCSU.

### Who Can Use the Health Center

- All CU-Boulder students who pay student fees or the health center student affiliate fee;
- Spouses/domestic partners and children of CU-Boulder students who have paid student fees or the health center student affiliate fee;
- CU-Boulder students, faculty, and staff in need of workers' compensation/occupational health benefits; and
- All CU-Boulder employee, faculty, staff, active or retired retiree, or family member of these groups (spouse/domestic partner and dependents).

### Fees for Services

Charges and fees are associated with most medical services such as medical clinic, women's health clinic, psychological health and psychiatry, dental, and sports medicine. For services where costs are incurred, students are asked to pay at the end of each visit by cash, check, or credit card (VISA or MasterCard); or billed to the Golden Buffalo Student Health Insurance plans.

### Services Offered for Free

Student fees support the Community Health Education department and other free health education services such as bipolar support groups; cold kits; cold-care services; diabetes support group; HIV testing; interactive theater; musculoskeletal injury clinic; sexual health, wellness, rape and gender education programs; stop smoking classes; and peer education programs.

### How to Access Wardenburg Health Center

Appointment times are available for medical, mental health, women's health services, and HIV testing. However, urgent medical or mental health services are available for those who cannot wait for an appointment due to the nature of the illness, injury, or personal crisis.

Walk-in clients are accepted during business hours for Cold Care services, Musculoskeletal Injury Clinic, Student Resource Center, and the Community Health Education programs such as peer education, wellness, sexual health, rape and gender information, interactive theater, and consultations.

### Hours of Operation

#### Fall and Spring Semesters

Monday–Thursday	8:00 a.m.–6:00 p.m.
Friday	8:00 a.m.–5:00 p.m.
Saturday	11:00 a.m.–4:00 p.m.
Sunday	Closed

#### Summer Session

Monday–Friday	8:00 a.m.–5:00 p.m.
Saturday	10:00 a.m.–2:00 p.m.

\* Hours change during holidays and breaks.

### Emergencies

When Wardenburg is closed, the nearest 24-hour emergency service is Boulder Community Hospital Emergency Room (**303-440-2273**), on the corner of North Broadway and Balsam. Payment for such services is the student's responsibility.

### Health Records

A confidential health record is created for students after their first visit to the health center. This health information cannot be released without written consent unless mandated by law. (For students under 18 years of age, parents(s) or legal guardian(s) must sign a "Consent for Treatment" form which is kept in the health record file.) Medical and mental health records are not included in the general university record system. Health records are maintained in compliance with federal and Colorado laws and are destroyed in a confidential manner after 10 years. For more information, call **303-494-2068**.

### State/CU-Boulder Requirements for Immunizations

**Tuberculosis (TB) Testing for New International Students**—The university requires incoming (new) international students from countries where the incidence of TB is high to be tested for TB. The state of Colorado Certificate of Immunization for College Students form must be completed and provided to the Immunization Office at Wardenburg Health Center by October 7, 2004. The health center provides TB testing at minimal cost. If your test results are positive and treatment is needed, care is available through the Colorado Department of Health. The immunization form may be faxed to **303-492-1014**, mailed, or delivered in person to the Immunization Office, located in the Wardenburg Health Center. To download the Certificate of Immunization for College Students form or for more information, see [www.colorado.edu/healthcenter/immunizations](http://www.colorado.edu/healthcenter/immunizations) or call **303-492-2005** or **303-492-8217**.

**Measles, Mumps, and Rubella Immunization Requirements**—All degree-seeking students (including transfer and graduate students) born on or after January 1, 1957, must provide immunization documentation for two rubeola (measles), two rubella (German measles), and two mumps immunizations. The completed state of Colorado Certificate of Immunization for College Students form must be turned in to the Immunization Office at Wardenburg Health Center by October 7, 2004. If the form is not turned in by then, the university will place a "hold" on the following semester's registration, and a fee of \$50 will be assessed. A signed/stamped copy of the student's immunizations may be obtained from the student's physician, high school, previous university records, or military records. Immunizations are available at cost through Wardenburg on a walk-in basis. Medical, religious, and personal exemptions are allowed by law. The immunization form may be faxed to **303-492-1014**, mailed, or delivered in person to the Immunization Office, located in Wardenburg Health Center. To download the Certificate of Immunization for College Students form or for more information, see [www.colorado.edu/healthcenter/immunizations](http://www.colorado.edu/healthcenter/immunizations) or call **303-492-2005** or **303-492-8217**.

## Campus Policies

### Academic Integrity

A university's intellectual reputation depends on maintaining the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student, faculty, and staff member on the University of Colorado at Boulder campus.

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### Honor Code

A student-run Honor Code was instituted on the Boulder Campus in 2002. The intent of the Honor Code is to establish a community of trust where students do not plagiarize, cheat, or obtain unauthorized academic materials. An honor code coun-

cil collaborates with the colleges and schools in addressing allegations and instances of academic dishonesty and in assisting to educate all members of the university community on academic integrity issues.

Breaches of academic honesty include cheating, plagiarism, and the unauthorized possession of examinations, papers, computer programs, as well as other class materials specifically released by the faculty.

A student accused of academic dishonesty will either accept the accusation made by a faculty member or request a hearing before a student panel, who will make a decision on the accusation of academic dishonesty. In addition to academic sanctions imposed by the faculty, students found guilty of academic dishonesty also face consequences from the honor code council ranging from probation, including attending a mandatory class in ethics to expulsion from the campus. More information about CU-Boulder's Honor Code may be found at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

The following terms are clarified for the benefit of all members of the university community.

### *Cheating*

Cheating is defined as using unauthorized materials or receiving unauthorized assistance during an examination or other academic exercise. Examples of cheating include: copying the work of another student during an examination or other academic exercise (includes computer programming), or permitting another student to copy one's work; taking an examination for another student or allowing another student to take one's examination; possessing unauthorized notes, study sheets, examinations, or other materials during an examination or other academic exercise; collaborating with another student during an academic exercise without the instructor's consent; and/or falsifying examination results.

### *Plagiarism*

Plagiarism is defined as the use of another's ideas or words without appropriate acknowledgment. Examples of plagiarism include: failing to use quotation marks when directly quoting from a source; failing to document distinctive ideas from a source; fabricating or inventing sources; and copying information from computer-based sources, i.e., the Internet.

### *Unauthorized Possession or Disposition of Academic Materials*

Unauthorized possession or disposition of academic materials may include: selling or purchasing examinations, papers, reports or other academic work; taking another student's academic work without permission; possessing examinations, papers, reports, or other assignments not released by an instructor; and/or submitting the same paper for multiple classes without advance instructor authorization and approval.

### Academic Program Discontinuance

In the event a degree program is discontinued, students currently enrolled in the program have a four-year period in which to complete their degree requirements. This four-year period starts with the date of the Colorado Commission on Higher Education (CCHE) action to discontinue the program. No new or returning students will be admitted into a discontinued degree program. Students not completing the degree requirements in the four-year period are not permitted to receive the discontinued degree. In such cases, credits accumulated may be applied to the overall number of credits required toward graduation, but the student must seek the advice of their college or school to determine how these credits might apply to a new degree program.

### Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado-Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

The university complies with all federal, state, and local laws concerning alcohol and illegal drugs. CU-Boulder students are responsible for acquainting themselves with the laws and university policies regarding alcohol and illegal drugs. University policies regarding alcohol consumption and illegal drug use are described in several publications: *Students' Rights and Responsibilities Regarding Standards of Conduct and Alcohol and Drug Policy*, available in the Office of Judicial Affairs; *A Guide to Residence Hall Living*, available at the Department of Housing; and *Ralphie's Guide to Student Life*, distributed to new and continuing students. In addition, Wardenburg Health Center provides individual and group counseling for students with substance abuse problems.

For more information on campus policies, call the Office of Judicial Affairs, **303-492-5550**; for policies within campus housing, call the Department of Housing, **303-492-6580**; for information on campus substance abuse programs, call Wardenburg Health Center, **303-492-5654**.

### Final Examination Policy

It is the policy of the University of Colorado at Boulder to adhere to the final examination schedule as published in the *Registration Handbook and Schedule of Courses* each semester. While it may be appropriate not to give a final in some cases, such as laboratory courses, seminars, and colloquia, final examinations are integral parts of the instructional program and should be given in all other undergraduate courses. Unless notified otherwise in writing during the first week of classes, students should assume that an examination will be given.

In addition to the principles stated above, the following guidelines should be followed by all faculty members and administrators in order to assure fairness and the best possible educational experience for students.

1. The final examination in a course must be given as scheduled and not at other times, even if the faculty member and all students in a course agree to such a change.
2. The week of classes preceding the scheduled final examination period should be used primarily for continued instruction and may include the introduction of new material. No hourly examinations are to be given during the seven days preceding the start of the final examination period. However, lab practicums and seminar presentations may be scheduled during this week.
3. Individual students may be granted a variance from these policies, provided the instructor is satisfied that the exception is based on good and sufficient reasons, and that such an exception for an early or late examination will not prejudice the interests of other students in the course.
4. When students have three or more final examinations on the same day, they are entitled to arrange an alternative examination time for the last exam scheduled on that day. Such arrangements must be made no later than the end of the sixth week of the semester. Students are expected to provide evidence that they have three or more examinations to qualify for exceptions.
5. This policy applies to all undergraduate students, including seniors. Graduating seniors are not exempted from final examinations. Such exemptions are inappropriate on both procedural and academic grounds.

## Personal Safety on Campus

While the University of Colorado at Boulder is a relatively safe place to be, the campus is not a haven from community problems. The Committee on Personal Safety (COPS), composed of students and representatives from across campus, is taking steps to promote safety issues on campus and striving to make the campus a safe and pleasant place.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs, and special prevention programs, such as the Night Ride/Night Walk escort services. Emergency telephones are located on campus to provide direct access to the police dispatcher. See the university's parking and traffic map in the Parking Services Office or *Ralphie's Guide to Student Life* for exact locations of these phones.

In compliance with the Federal Crime Awareness and Campus Security Act of 1990 and the Higher Education Amendments of 1992 and 1998, students and employees receive (at the start of the fall semester) information on campus security policies and programs, including crime rate information.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the administrator closest to the situation and/or the University Police at **303-492-6666**. Other resources include the Office of Judicial Affairs at **303-492-5550** and the Ombuds Office at **303-492-5077**.

Additional safety information can be found at [www.colorado.edu/police](http://www.colorado.edu/police).

## Sexual Harassment

The University of Colorado at Boulder is committed to fostering a collegial academic community whose mission requires a positive learning, working, and living environment free of sexual harassment for students, faculty, staff, and administrators. Sexual harassment is prohibited on campus and in university programs. The university is committed to taking appropriate action against those who violate the university's policy prohibiting sexual harassment.

No retaliation of any kind shall be taken against any individual for complaining about sexual harassment or for participating in any procedure to redress a complaint of sexual harassment. However, the university policy does not preclude disciplinary actions against individuals who are found to have made intentionally false and malicious complaints of sexual harassment.

Sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when 1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment, living conditions, and/or educational evaluation; 2) submission to or rejection of such conduct by an individual is used as the basis for tangible employment or educational decisions affecting that individual; or 3) such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or educational environment.

Sexual harassment may occur between persons of the same gender or of different genders.

For information or a copy of the University of Colorado Administrative Statement on Sexual Harassment Policy and Procedures, call **303-492-2127** or visit the Office of Sexual Harassment web site at [www.colorado.edu/sexualharassment](http://www.colorado.edu/sexualharassment).

## Smoking Policies

Campuswide smoking regulations are not intended to deny smokers their prerogatives, but rather to limit the potential adverse effects of smoking on others.

The Boulder campus smoking policy states:

- There will be no smoking or sale of tobacco products in any Boulder campus-owned or leased building, except as provided below. This includes hallways, classrooms, offices, restrooms, meeting rooms, lobbies, elevators, shops, cafeterias, snack bars, waiting rooms, indoor or open-air athletics facilities and performance halls, and all other spaces in university-owned or leased buildings. There also will be no smoking in campus-owned or leased vehicles.

- Smoking may be permitted in accordance with the policies of Boulder Campus Housing Administration in buildings providing overnight accommodations. Boulder Campus Housing Administration will provide information regarding its policies to all housing residents and guests.

- Smoking is not permitted in the seating areas of Folsom Stadium and the Mary Rippon Theatre and their contiguous buildings. Designated smoking zones have been created in well-ventilated areas outside the seating areas.

- Smoking and the sale of tobacco products may be permitted in designated food service areas and lounges in accordance with the policies of that facility. Designated smoking areas must be well posted and have adequate ventilation and separation for nonsmokers. Designated smoking areas must be reviewed and approved by the Department of Environmental Health and Safety (EH&S). Any disputes regarding the recommendations of EH&S will be referred to the vice chancellor for administration for resolution.

- Smoking may be permitted in laboratories conducting sponsored research on the effects of smoking. Designated laboratories must be well posted and have adequate ventilation and separation for nonsmokers. Designated labs must be reviewed and approved by the Department of Environmental Health and Safety. Any disputes regarding the recommendations of EH&S will be referred to the vice chancellor for administration for resolution.

- Smoking areas are permitted outside of university facilities provided that these areas are located far enough away from doorways, windows, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. Check with Environmental Health and Safety for details.

- Signs posted at all building entrances shall state that smoking is prohibited in the building.

- Smokers and nonsmokers need to remain courteous to each other. Since smokers can no longer smoke while working, they may want to take "smoke breaks." As long as their absences from their work fall within applicable work-break policies, accommodations should be made by supervisors and colleagues. Smokers are reminded that a wish to smoke is not a sufficient reason to be gone from their workplace in excess of the standard work-break policies.

- All members of the university community are responsible for compliance with this policy. Violations of this policy by university employees will be referred first to the violator then, if agreement cannot be reached, the violation should be reported to the appropriate appointing or supervisory authority for resolution.

Those employees who wish to stop smoking may call the Employee Assistance Program (**303-492-6766**) for information on available programs. For more information on the campus smoking policy, contact the office of the vice chancellor for administration.

## Student E-mail Policy

All CU students receive an e-mail account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU e-mail address. The official e-mail address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official e-mail addresses to contact students and provide important information. Students are responsible for frequently checking their official CU e-mail address, which is listed in PLUS, or they may redirect their official e-mail address to another account. Using PLUS, students can activate their e-mail accounts, change their passwords, and redirect their mail; see [www.colorado.edu/plus](http://www.colorado.edu/plus). For more information on the student e-mail policy, visit [www.colorado.edu/its/officialemail](http://www.colorado.edu/its/officialemail) or call the ITS Service Center at 303-735-HELP or e-mail them at [itsc@colorado.edu](mailto:itsc@colorado.edu) or contact the Office of Academic and Campus Technology at 303-492-5094.

## University Student Code of Conduct

### *Philosophy*

The Office of Judicial Affairs views the conduct process as a learning experience that helps students to understand their responsibility to both themselves and their living and learning community. Individuals strive to learn from one another in an educational community that holds mutual respect for individuals and community in high regard, as well as self-responsibility for behaviors. Behavior that conflicts with established standards, policies, and guidelines of the University of Colorado will be referred for campus conduct proceedings.

Every member of this living and learning community must assume responsibility for becoming educated about the various university standards, policies, and guidelines. Each individual community member who works, lives, studies, teaches, does research, conducts business, or is involved in the living and learning community is a part of that community by choice. By making that choice, each community member agrees to contribute to an educationally purposeful community. It is against the basic nature of this community for anyone to demean or discriminate against another human being. A caring, educational community does not tolerate physical or psychological threats, harassment, intimidation, or violence directed against a person. Such behavior is subject to the university's conduct processes.

### *Standards of Conduct*

The University of Colorado at Boulder has Standards of Conduct for students based on maintaining the general welfare of the university community. The university strives to make the campus community a place of study, work, and residence where people are treated with respect and courtesy.

The operation of the Office of Judicial Affairs adheres to the Boulder campus policy on matters of discrimination. That policy is straightforward: The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities.

Admission to the university carries with it the expectation that the student will be a responsible member of the campus community. A student at the university assumes the obligation to comply with the Standards of Conduct.

Students must accept responsibility for maintaining an atmosphere conducive to education and scholarship by respecting the personal safety and individual rights of all in the university community, by conducting himself/herself in accordance with accepted

standards of social behavior, and by abiding by the regulations of the university and the laws of the city, state, and nation.

The Standards of Conduct state the university's expectations for student behavior. Students are expected to become familiar with the standards to fully understand their responsibilities as a university community member and to avoid jeopardizing their relationship with the university. They are also expected to participate in conduct proceedings if asked to do so by a university official.

To review the Standards of Conduct, visit [www.colorado.edu/studentaffairs/judicialaffairs](http://www.colorado.edu/studentaffairs/judicialaffairs).

### *Authority*

The Office of Judicial Affairs receives its authority from the Laws of the Regents as provided for in the Colorado Revised Statutes. The Laws of the Regents state that, "By enrolling as a student in the university, a person shall assume obligations of performances and behavior established by the university relevant to its lawful missions, processes, and functions. For allegations of student misconduct, the chancellor or designee shall prescribe procedures for the determination of facts, findings, and assessment of remedies. These procedures shall contain the basic elements of procedural due process."

Any questions regarding interpretation of the Standards of Conduct or any of its provisions should be directed to the vice chancellor for student affairs or his/her designee (the director of judicial affairs) for final determination.

### *Jurisdiction*

The information contained in the Standards of Conduct applies to all students at the University of Colorado at Boulder, regardless of designation or program.

These regulations apply primarily to acts of misconduct occurring on university premises. However, violations of these standards that occur off campus and which adversely affect the interests of the university community fall within the jurisdiction of the Office of Judicial Affairs.

Students may be held accountable to both civil and criminal authorities as well as to the university by breaking a law that also violates the Standards of Conduct. Conduct proceedings by the university will not be subject to challenge or postponement on the grounds that criminal or civil charges involving the same incident have been dismissed, reduced, or are pending in court. In addition, the university can move forward with the conduct process if a student violates a standard of conduct and withdraws from the university.

### *Colorado Law on Student Riots, C.R.S. 23-5-124*

For your information, Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction. In 2002, the Colorado General Assembly enacted the following statute:

1. No person who is convicted of a riot offense shall be enrolled in a state-supported institution of higher education for a period of 12 months following the date of conviction.
2. A student who is enrolled in a state-supported institution of higher education and who is convicted of a riot offense shall be immediately suspended from the institution upon the institution's notification of such conviction for a period of 12 months following the date of conviction: except that a student has been suspended prior to the date of conviction by the state-supported institution of higher education for the same riot activity, the 12-month

suspension shall run from the start of the suspension imposed by the institution.

3. Nothing in this section shall be construed to prohibit a state-supported institution of higher education from implementing its own policies and procedures or disciplinary actions, in addition to the suspension in subsection (2) of this section, regarding students involved in riots.
4. (a) The court in each judicial district shall report to the Colorado Commission on Higher Education (CCHE) the name of any person who is convicted in the judicial district of a riot offense.
- (b) The Colorado Commission on Higher Education shall make the convictions reports received pursuant to paragraph (a) of this subsection (4) available to all state-supported institutions of higher education with the notification that the persons included in the conviction reports are subject to the provisions of this section and that the state-supported institution of higher education in which any of such persons are enrolled shall consider appropriate disciplinary action against the student.
5. Each state-supported institution of higher education shall notify its students and prospective students of the requirements of this section. The governing board of each state-supported institution of higher education shall prescribe the manner in which this information shall be disseminated.
6. For purposes of this section, unless the context otherwise requires:
  - (a) “Convicted” means having received a verdict of guilty, pleaded guilty or nolo contendere, or having received a deferred judgment and sentence.
  - (b) “Riot offense” means:
    - (I) Inciting riot, as described in section 18-9-102, C.R.S.;
    - (II) Arming rioters, as described in section 18-9-103, C.R.S.;
    - (III) Engaging in a riot, as described in section 18-9-104, C.R.S.



# CU Changes Lives

## CU CHANGES LIVES

The fact is, CU is still changing my life.

First, the environmental setting is beyond compare—the Flatirons never leave you; they are a constant reminder there is so much more to life than what exists in front of our eyes.

Second, each time I visit Boulder, I get to fall in love all over again. There is no place I have visited where I can enjoy a sense of peace, hope, and joy like I do each and every time I come to Boulder.

Third, CU helped me learn who I am, or at least, who I want to be. Because CU is tolerant and accepting of any number of differing ideas and opinions, I was exposed to a tremendous number of popular (and unpopular) groups and individuals. This helped me to challenge what was important to me, and why, and helped to shape who I am today. Further, I have tried to instill the same sense of openness and tolerance I experienced at CU in my children.

Fourth, CU helped me grow intellectually. Without question, CU helped me learn how to think. This was both a result of the classes and professors, but probably more a result of challenging conversations with students and others in the dorms, the UMC, the Rec Center, or at the many gathering places in and around campus.

Finally, without CU, I would not have met my wonderful wife, who agreed to marry me the week after I graduated in 1981. I am forever indebted to CU for facilitating our union.

—Michael R. Eckel (BS/BA, Business with an emphasis in Finance, 1981),  
vice president, Strategic Solutions, McKesson Corporation, Columbus, Ohio

CU changed my life in that I made friendships and fostered mentorships that will last a lifetime. My years in Boulder opened my mind to social issues that are as layered and perplexing as they are diverse and exhilarating. CU made me want to achieve through giving.

—Curtis Esquibel (BS, Journalism, 1999), teacher and guidance counselor,  
Jemez Pueblo, New Mexico

My experience at CU was very special. I still get goose bumps every time I drive over the ridge on I-36 that overlooks Boulder. I certainly learned much in the classroom, but what I feel distinguishes CU from other schools is the total learning experience, inside as well as outside the classroom. The social atmosphere—meeting, learning, and developing friendships with people and cultures from all over the United States and the world—is a key component. Boulder's outdoor culture also instilled a sense of appreciation for our environment and how to care for as well as take advantage of everything it has to offer. I have participated in over 50 marathons, triathlons, and foot races as a result of my Boulder experience. Ultimately, CU has broadened me mentally and physically in way no other school could.

—Paul Best (BA, Political Science, 1985), marketing manager,  
General Binding Corporation, Lake Forest, Illinois

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# College of Architecture and Planning

*Mark Gelernter, dean*

314 UCB • phone: 303-492-7711 • fax: 303-492-6163  
college web site: [www.cudenver.edu/CAP](http://www.cudenver.edu/CAP)

**T**HE COLLEGE OF ARCHITECTURE AND PLANNING at the University of Colorado (at both the Boulder and Denver campuses) prepares students for careers in architecture, planning, landscape architecture, urban design, and other design and planning-related fields. The college offers the only undergraduate and graduate education in these fields in the state of Colorado. Students intending to enter these design and planning professions normally first complete the college's undergraduate degree at CU-Boulder as preparation for entry into the college's graduate-level professional programs at CU-Denver. Graduate programs are also available for those who already hold an undergraduate degree in a field unrelated to design and planning.

The College of Architecture and Planning is unique in that it offers its 1,200 students exceptional educational experiences in two distinctive and different locations. The college's undergraduate program is offered on the Boulder campus in an environment ideally suited to the needs of undergraduate students, and the graduate programs in architecture, landscape architecture, urban design, and urban and regional planning are taught on the Denver campus in the heart of a vital downtown. With a diverse faculty committed to excellence in teaching, research, scholarship, and professional work, the college provides students with a broad range of learning opportunities. For detailed information on the college's graduate programs, see the *University of Colorado at Denver Catalog* or [www.cudenver.edu/Academics/Colleges/ArchitecturePlanning](http://www.cudenver.edu/Academics/Colleges/ArchitecturePlanning).

## Undergraduate Programs

Study at the undergraduate level leads to the bachelor of environmental design (BEnvd) degree as preparation for entry into graduate and professional degree programs.

At the undergraduate level, the college takes a broad and integrated view of the design professions. In recent years the problems and opportunities facing the design professions have changed dramatically. These changing conditions demand a broader educational experience than the individual professions traditionally have supplied.

To prepare students for these conditions, the college expects students to take a wide range of courses in the humanities, the arts, and the sciences, in order to examine the world and contemporary society from a variety of viewpoints.

Unlike undergraduate education in many fields, architecture and planning students receive practical experience under the direct supervision of the college's professors and outside professional designers. From the first day of the freshman year, students actively integrate and synthesize knowledge gained in lectures and related course activities.



The college provides required core courses throughout the curriculum in which students from all design disciplines study shared problems together. Architects, interior designers, landscape architects, urban and regional planners, building technologists, and engineers need to understand each other's perspectives and increasingly work together on the complex issues facing the design of the built environment.

## Graduate Programs

Master's-level professional programs in architecture, landscape architecture, and urban and regional planning are offered by the college at its Denver site. The college also offers post-professional master's degrees in the areas of architecture, landscape architecture, and urban design.

Additionally, the college's degree offerings include a doctoral program with opportunities for research and study with faculty on both the Boulder and Denver campuses. The three areas of specialization within the college's PhD program in design and planning are land use and environmental planning and design; design and planning processes and practices; and history, theory, and criticism of the built environment.

Detailed information about graduate admission, degree requirements, and college policies are outlined in the *University of Colorado at Denver Catalog* and online at [www.cudenver.edu/Academics/Colleges/ArchitecturePlanning](http://www.cudenver.edu/Academics/Colleges/ArchitecturePlanning). Additional information about PhD opportunities may be obtained by contacting the college's PhD offices, 303-492-1319, or online at [www.cudenver.edu/Academics/Colleges/ArchitecturePlanning/Degree+Programs/PhD](http://www.cudenver.edu/Academics/Colleges/ArchitecturePlanning/Degree+Programs/PhD).

## Facilities

Facilities for the college's programs in Boulder are provided in the Environmental Design building. On its lower floors are administrative and faculty offices, lecture rooms, and exhibit space.

A media center, photographic laboratory, slide library, and a model shop (shared with and located in the Department of Art and Art History) supplement design studios, which are available throughout the building. Studio space is provided for all students for academic use during the entire semester and is available throughout the day and evening.

Beginning and advanced computer facilities, including graphic capabilities, are also available to students. An urban simulation lab provides students with a facility for testing possible patterns of growth and development in the urban environment.



## Career Opportunities

### *Architecture*

According to the National Architectural Accrediting Board, which is responsible for accreditation of all architecture programs in the United States, “Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board: the bachelor of architecture, which requires a minimum of five years of study; and the master of architecture, which requires a minimum of three years of study following an unrelated bachelor’s degree or two years following a related preprofessional bachelor’s degree. These professional degrees are structured to educate those who aspire to registration and licensure to practice as architects. The four-year preprofessional degree, where offered, is not accredited by NAAB. The preprofessional degree is useful to those wishing a foundation in the field of architecture, as preparation for either continued education in a professional degree program or for employment options in fields related to architecture.”

The College of Architecture and Planning at the University of Colorado offers the four-year preprofessional bachelor of environmental design (BEnvd) degree at its Boulder site and the NAAB-accredited master of architecture (MArch) at its Denver site.

The BEnvd alone is not accepted as sufficient education to become a licensed architect in most states. However, the BEnvd in architecture is endorsed by the NAAB as part of a six-year plan of study in conjunction with the college’s accredited MArch. In pursuing this six-year program of study, students completing the BEnvd on the Boulder campus complete a minimum of four semesters of additional course work (63 hours of credit) on the Denver campus of the University of Colorado after entry into the MArch program. For further details on the MArch, and for descriptions of the fifth- and sixth-year professional courses outlined in the architecture degree requirements, please see the *University of Colorado at Denver Catalog*.

A student seeking licensure as an architect also must complete a number of years after graduation in a paid internship. In Colorado and most states, documentation of work experience in each of 16 areas of practice must be provided to become eligible to enroll for the architectural registration examination.

### *Planning*

While the practice of planning is not currently licensed in most states, in areas of high growth like New York, California, and Florida, the need for licensing to regulate practice is becoming more apparent. Professional regulation and certification is currently overseen by the American Planning Association (APA) and the American Institute of Certified Planners (AICP). Degrees in the field are accredited by the Planning Accreditation Board (PAB) of the Association of Collegiate Schools of Planning.

Although students interested in entry-level positions in planning may find the BEnvd degree adequate, an advanced degree (master’s or PhD) is highly desirable and advisable. Students primarily interested in professional practice should obtain a master’s degree in urban planning, in urban and regional planning, or in urban planning and community development. Students interested in teaching or research in planning should complete a PhD.

**Graduate Study in Denver.** Students from the undergraduate program who continue their studies in the graduate professional planning program in Denver are given advanced standing when accepted into the program. Copies of the policies relating to advanced standing are available in the college office. Though the amount of advanced standing received is directly related to the specific course work completed in the undergraduate program,

undergraduate planning students who continue in the graduate planning program typically receive between 9 and 15 semester hours of credit, and complete masters-level graduate studies in two or three semesters.

### *Design Studies*

Students who do not wish to complete an emphasis in either architecture or planning, but who are nonetheless interested in issues concerning the built environment, may pursue the design studies emphasis. Students may use this emphasis to broaden their undergraduate program, integrating several related disciplines. There is an increasing demand in the design, construction, and management industries for people who combine an understanding of design with a specialized understanding of related fields like computing, management, finance, or marketing. Some students may use it as general preparation for graduate study in any number of academic fields that also are concerned with the design and planning of the built environment, including anthropology, geography, sociology, psychology, historic preservation, and architectural history. Other students may use this emphasis to prepare for further graduate study in a professional field related to architecture and planning, including business, law, journalism, public administration, or landscape architecture.

As the design studies curriculum is individually tailored to each student, students in this emphasis must outline and receive approval of their individual course plan by a faculty sponsor and the college dean’s office before entering the design studies emphasis. Participants in this emphasis are expected to attain a competent level of understanding and skill in either architecture or planning. Additionally, they are expected to attain a high level of understanding and skill in one specialized aspect of these fields. Such specializations might include computer applications, resource management, housing policy, environmental psychology, history of architecture, or building systems analysis. In support of their specialization, students are further expected to attain a competent level of understanding of a relevant cognate field outside the college (e.g., anthropology, civil engineering, business, or fine arts).

Students in the design studies emphasis take core courses within the college and general requirements outside the college in parallel with the architecture and planning emphases. Additionally, design studies students must complete foreign language courses through level three (third-year level in high school, or third semester at the college level). With approval of their faculty sponsor, students may substitute computer programming languages for the foreign language requirement. A minimum of 30 hours of course work must be completed after official approval of entry into the design studies emphasis, and the 30-hour residency requirement in this emphasis is not waived under any circumstances.

### *Landscape Architecture*

Though the College of Architecture and Planning does not offer a separate emphasis in landscape architecture at the undergraduate level, a graduate professional degree (the master of landscape architecture or MLA) is offered by the college on the Denver campus of the University of Colorado. Undergraduates may complete one of the undergraduate emphases in architecture, planning, or design studies as preparation for entry into the Denver campus MLA program or other graduate-level landscape architecture programs offered elsewhere.

## Study Abroad

The College of Architecture and Planning and the Office of International Education urge design students to participate in one of the various study abroad programs offered for university credit.

Each summer, faculty of the college offer course work abroad through the University of Colorado at Denver campus. In recent years, sites have included Prague, Rome, Helsinki, Paris, Beijing, and Madrid. These studio-based courses offer students an opportunity to study the process of design in another culture and to examine their own perceptions and attitudes toward design.

The college offers a unique semester abroad program in Florence and Madrid each fall and spring term. This immersion semester is offered to upper-division undergraduate students. The program provides a challenging architectural academic experience with extensive overseas support. Semester in Florence or Madrid participants live in student apartments while attending architecture, history, and language classes with local faculty. In addition, the program organizes a cultural activities series, offers optional social activities, and provides support and guidance to students studying abroad.

The University of Colorado at Boulder is also a coordinating institution for DIS, Denmark's international study program at the University of Copenhagen. DIS offers semester and year-long programs in architecture and design. Taught in English, the DIS program offers advanced design studio and related courses in addition to guided travel and study opportunities in other European nations, including the former Soviet Union. For more information about the DIS program, contact the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO, 80309-0123, 303-492-6016, or [www.colorado.edu/oie](http://www.colorado.edu/oie).

## College Lecture Series

The college's lecture series enables students and faculty to meet people whose work significantly contributes to the design and planning fields. All students registered in the College of Architecture and Planning may be required to attend convocations and special lectures throughout the year. In addition, the graduate programs in Denver sponsor a year-long series of lectures, and AIA (American Institute of Architects) Denver and AIA Colorado present a lecture series in Denver that is open to the public. The college also cosponsors the annual National Natural Hazards Information and Applications Conference held in July, the National Pedestrian Conference held in September, and the annual World Affairs Conference held in April.

## Academic Excellence

### Recognition of Scholarship

As a professionally oriented school, the College of Architecture and Planning provides an atmosphere for study and creative investigation in which the attainment of quality is held in the highest esteem. In recognition of high scholarship and professional attainment, the college grants honors at graduation in two categories: honors and special honors. Scholarships, prizes, and awards are given to outstanding students and faculty on an annual basis.

### Honors at Graduation

Students achieving a grade point average of 3.50 to 3.74 (honors) and 3.75 to 4.00 (special honors) are recognized at commencement. Honors are based on course work completed at the University of Colorado.

## Scholarships, Loans, Awards, and Prizes

Several scholarships are awarded to undergraduates upon recommendation of the faculty of the college. The application deadline for all scholarships and awards, unless otherwise noted below, is March 1.

Several of the scholarships awarded by the college are sponsored and funded by the Educational Fund of AIA Colorado, incorporated in 1961. The purpose of this fund is to advance education in architecture by granting scholarships, prizes, and financial aid to deserving students in architecture and to architects interested in research programs directly related and of value to the architectural profession.

The original Educational Fund was founded in January 1934 by William E. Fisher, FAIA; George H. Williamson, FAIA; Fred E. Mountjoy, AIA; William H. Bowman, AIA; and Robert K. Fuller, FAIA. Kenneth R. Fuller, son of the founder, now serves as secretary of the fund, and acting with the president and vice president of AIA Colorado, forms the board of directors of the fund. This board has granted scholarships annually to students and alumni of the College of Architecture and Planning.

**AIA Educational Fund** awards include the Anniversary Scholarship, the Centennial Scholarship, Arthur A. and Florence G. Fisher Travelling Scholarships, Robert K. Fuller Scholarship for Graduate Study, the James M. Hunter Scholarship for Graduate Study or Travel, the C. Gordon Sweet Scholarship for disadvantaged students, and the Producers Council Scholarship for Graduate Study. College of Architecture and Planning students may obtain applications for these awards in the college offices at the beginning of spring semester.

**The Douglas Darden Memorial Scholarship.** On an annual basis, two undergraduate scholarships are awarded to full-time undergraduates in the College of Architecture and Planning. These awards are offered to Colorado residents, based upon combined qualifications of merit and financial need.

**The Hunter Douglas Scholarship.** Through the generosity and support of Hunter Douglas, Inc., an award is given to an outstanding third- or fourth-year student in the undergraduate design program with a demonstrated interest in interior design or space planning.

**The Charles Haertling Architecture Scholarship.** In honor and living tribute to one of Boulder's most distinguished architects, an award is given in alternating years to an undergraduate student intending to pursue the profession of architecture. Architecture and planning students may apply for the 2002 and 2004 awards. The award is given to music students in the alternating years.

**The Martin Luther King Jr. Housing Prize.** A memorial award intended to encourage the design of housing that improves the quality of living environments for low- and moderate-income groups. Award amounts and award period vary annually.

**The Gary G. Landin Scholarship** is awarded annually to a third-year undergraduate who will be continuing study in architecture the next year. The \$1,500 award is based on academic performance and merit, though financial need may also be considered.

**The Marcia Miller Memorial Scholarship** is awarded on an annual basis to a full-time, married undergraduate with documented financial need. The amount of award varies.

**The Dana Soper Memorial Scholarship.** This \$2,000 grant, started in 1973, is awarded to a second-year student in environmental design based upon proven academic performance, personality and character, contribution to the college, and professional potential.

Design certificates also are presented to the outstanding design students at each year level.

**Dean's Scholar Awards.** Monies are made available by the Colorado State Legislature and are awarded automatically (no application necessary) each semester to Colorado residents with the highest grade-point average and who have completed at least 24 hours of credit.

In addition, interested students may participate in faculty-student research projects funded by the Undergraduate Research Opportunities Program (UROP) for a maximum of \$1,000 per award.

## Academic Standards

### Student Rights and Responsibilities

The College of Architecture and Planning is part of an academic community whose mission requires an open learning and working environment for students, faculty, staff, and administrators. An open learning and working environment values and protects individual dignity and the integrity of human relationships, and is based upon mutual trust, freedom of inquiry, freedom of expression, and the absence of intimidation and exploitation. Any infringement upon these freedoms and rights may be cause for review by the college or by other university offices. Students in both graduate and undergraduate programs of the College of Architecture and Planning are subject to the policies and procedures governing student rights and responsibilities on the CU-Denver campus. Please refer to the CU-Denver catalog for explicit policies governing issues of sexual harassment and for the full code of student conduct.

### Ethics and Academic Dishonesty

Students in the College of Architecture and Planning are subject to the Boulder campus Honor Code and are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Any act of academic dishonesty may receive sanctions from individual faculty and will also be reported to the Honor Code Office. For a full description of Honor Code expectations and policies please refer to the Honor Code section of this catalog or online at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

### Grade Point Average Requirements and Scholastic Suspension

A student must achieve a grade of C- or better in all courses applied toward graduation requirements, excluding general electives. General electives that receive a minimum grade of D- may be credited toward the degree if the student has maintained a minimum cumulative grade point average of 2.00.

As a general rule, students who fail to meet the minimum cumulative grade point requirement (2.00) are permitted to continue their studies on a probationary basis during the following semester. Scholastic records of students are reviewed as soon as possible after the close of the probationary semester, and students are informed in writing if they are to be suspended.

When a student is suspended, the reasons for the suspension are recorded and placed in the student's file. The student is asked to define the problems and draft a plan for dealing with them in consultation with the college academic advisor. It is the responsibility of the academic advisor to monitor the student's progress.

Students on suspension are not allowed to register on any campus of the University of Colorado while on suspension, except continuing education or regular campus summer sessions.

Suspended students are readmitted on a case-by-case basis by review of the college.

Students suspended a second time are reinstated only under special circumstances. Students who believe that their situations warrant a departure from these normal stipulations may petition for reinstatement. The college looks with favor on such petitions only if the student has shown marked improvement in academic work or if there are unusual circumstances that have contributed to the student's academic difficulties.

## Admission and Enrollment Policies

### Requirements for Admission

Candidates for regular admission to the College of Architecture and Planning are expected to meet the general requirements for admission to the university. Please see Undergraduate Admission in the General Information section for specific requirements.

### Transfer Students

Qualified students transferring from other institutions are accepted into the College of Architecture and Planning. Former students who have attended another college or university for one semester (12 hours or more) are considered transfer students. Since the College of Architecture and Planning has a limited enrollment, all qualified students are not guaranteed admission. All course work except the last term, if in progress, must be completed and must be listed on the official transcript sent for admission consideration. Transfer students should apply to the Office of Admissions.

Normally, students should transfer by the beginning of the second year of college-level work, as the College of Architecture and Planning requires approximately three years of design and/or planning related course work. All transfer students are required to take a minimum of 30 semester hours in the College of Architecture and Planning. Transfer students are admitted for the fall, spring, and summer terms each year.

If a student chooses to provide letters of intent and recommendation, they must accompany the application. It is the responsibility of the student to be sure transcripts and other application materials are complete. Only complete application files are considered for admission.

A maximum of 60 semester hours taken at a two-year college may be applied toward the baccalaureate degree. In general, credits in vocational-technical courses are not accepted for transfer by the college. Transfer agreements between the University of Colorado and all Colorado community colleges outline approximately one year of prescribed general education courses that may be completed as preparation for transfer into the College of Architecture and Planning. As noted above, students should plan to transfer to the University of Colorado by the beginning of their sophomore year. See Undergraduate Admission under General Information for admission standards for transfer students.

### Intrauniversity Transfer

University of Colorado students in good standing who are interested in pursuing a design education may apply for transfer into the college. IUT applications, distributed at meetings held for interested students several times each term, are reviewed twice a semester—immediately prior to registration and at the end of each term. Students should contact the college offices for the dates of meetings and deadlines for application review for specific semesters. Because of the competitive nature of application and the limited number of spaces available, grade point average plays a significant role in the application process but is not a sole determinant.

## Attendance

Students are expected to attend classes regularly and to comply with the attendance regulations specified by their instructors. At the beginning of each semester, instructors inform students of policies governing grading policies and attendance in each class. Students who miss a final examination for illness or other good reason must notify the instructor or the college office no later than the end of the day on which the examination is given.

## Credit Policies

### *Advanced Placement*

Advanced placement and college credit may be granted on the basis of the College Board's Advanced Placement tests. For students who have taken advanced placement course work in high school and receive scores meeting university standards in the advanced placement examination, advanced placement as well as college credit is granted. Granted college credit is treated as transfer credit without a grade, but counts toward graduation and meets other specific requirements for which it is appropriate.

### *Denver Campus Credits*

Students in residence on the Boulder campus in the College of Architecture and Planning may take classes on the Denver campus on a space-available basis with the dean's approval.

### *Incomplete Grades*

The college's faculty set their own policies for grading and for granting incompletes. Special conditions may be noted on class syllabi. In all cases, students must present evidence of circumstances beyond their control that prevent them from completing the class. The student and faculty member must complete a written agreement (form available in college offices) outlining the terms of course completion and submit this agreement to the dean's office.

### *Independent Study*

Ordinarily, only students at the 3000- or 4000-level of studio are permitted to obtain independent study credit. Independent study credit may not be used to substitute for any required design studio course.

A complete prospectus of the work expected, how it shall be carried out, and what the end product might be must be submitted to the supervising faculty member no later than five days after the official beginning of a semester. Approval of the prospectus must be granted by the faculty member and the department chair before permission is granted for enrollment in the course. Students should make arrangements for the independent study course details during registration or well before the semester begins.

Only students who have at least a 3.00 GPA are permitted to register for independent study. Additional requirements could be established depending on the proposed topic. Not more than 3 hours of independent study credit during one semester and not more than a total of 6 are given for the entire time the student is enrolled, unless exception is granted by the dean.

### *Other Credits*

Credits for teaching assistantships, research assistantships, and internships are all guided by the same standards as those for independent study. Credits earned as a teaching assistant, research assistant, or intern are not subject to the 6 credit-hour limitation on independent study credit. Teaching assistantships and internships are offered on a *pass/fail* basis only.

## Pass/Fail Credits

A student may elect to take up to 6 semester hours toward the BEnvd degree on a *pass/fail* basis, but these credits must fall in the category of general electives and may not include course work taught within the College of Architecture and Planning.

## Repeated Courses

Students should confer with the college's academic advisor regarding specific academic standards for repeating laboratory, studio, and other undergraduate courses. Credits for repeated courses are not counted toward the 120 semester hours needed for graduation.

## ROTC Credit

Students matriculating in the College of Architecture and Planning are eligible to participate in the ROTC programs on the Boulder campus.

Students interested in such programs should contact the professor in charge of the ROTC program of their choice (Army, Navy, Air Force) and also the academic advisor for the college for information on residence and curriculum requirements for graduation. Credit for ROTC courses may be given upon faculty recommendation to a maximum of 8 hours.

## Transfer Credit

Credits transferred from other institutions are limited to the number of credit hours given for similar work in regular offerings at the University of Colorado. Exceptions to this regulation may be made by the dean upon written petition.

In general, the college does not accept vocational/technical course work in design, graphics, or construction as meeting specific course requirements of the program; nor does it consider such course work acceptable toward the college's elective requirements. Only in exceptional circumstances may a student petition the dean of the college to request a transfer of such credits. A student may, however, ask that vocational/technical course work be considered as a basis for waiving a specific course in a required sequence.

A grade of C- or better is required in any course for which credit is granted in transfer from another institution to the university. Grades earned in other institutions (excluding other campuses of the University of Colorado) are not computed with the student's CU grade point average.

For more information on transfer credit policies, see Transfer of College-Level Credit in the Admissions section.

## Residence Requirement

A student must complete a minimum of 30 course credits within the College of Architecture and Planning. Students also must complete their last semester in residence as full-time students.

## Retention of Student Work

The College of Architecture and Planning reserves the right to retain any student project submitted in fulfillment of class requirements for whatever period of time it deems necessary. This retained work is used to provide accrediting agencies with tangible evidence of performance, to serve as additional visual aid material in presentations to other students, and to contribute to possible educational exhibits requested by the university community and the general public.

## Undergraduate Degree Requirements

### General Education in Architecture and Planning

The undergraduate programs in architecture and planning emphasize knowledge and awareness of:

- the role of the built environment in human affairs and knowledge of people-environment relations;
- the major theoretical perspectives of design and planning, including those of the related professional fields and community planning;
- information gathering, analysis, design, and decision-making methods utilized in the planning, design, and management of built environments;
- the physical properties of built environments and the natural and man-made physical factors that condition their realization;
- historical design and planning processes and products in their related social, cultural, and geographic contexts; and
- professional norms, roles, and institutions related to the analysis, planning, design, and management of the built environment in the broader context of social, political, and economic processes.

In addition, students completing the BEnvd degree are expected to acquire the ability and skills to:

- effectively and creatively organize built environments, integrating and utilizing appropriate substantive and procedural knowledge;
- define built environmental requirements for various human populations;
- effectively and creatively utilize appropriate physical technologies in the planning, design, and/or management of built environments; and
- effectively use verbal, graphic, and written communication skills required to function as architecture and planning professionals.

### Advising

Academic advising for students presently enrolled or anticipating enrollment in the college's undergraduate program is provided in a variety of forms. High school students or prospective transfer students from other universities are encouraged to participate in the "Be a CU Student for a Day" or other visitation programs co-sponsored by the college and the CU-Boulder Office of Admissions. Information on campus visitation programs may be obtained by contacting the Office of Admissions at **303-492-6301**, or [www.colorado.edu/prospective/freshman/visit.html](http://www.colorado.edu/prospective/freshman/visit.html).

Students already enrolled in Boulder campus programs who are interested in intra-university transfer (IUT) into the College of Architecture and Planning should contact the college office at **303-492-7711** for group meeting times focusing on the IUT transfer process.

Students enrolled in the college's undergraduate programs receive academic advising from faculty or professional staff in the college. Information on appointments and open office hours for advising is available at the college office, ENVD 168, or by calling **303-492-7711**.

### Orientation

In order to receive an overview of educational opportunities and the philosophy of the college and meet other new students and the faculty of the college, incoming freshman and transfer

students are required to attend an orientation approximately one week prior to the beginning of the fall semester.

### Curriculum

By the end of their second year, students in the College of Architecture and Planning must choose to emphasize in either architecture, planning, or design studies. Each emphasis is designed to prepare students for graduate studies.

All students in the college must take certain core courses common to architecture, planning, and design studies. These include an introductory survey/studio, a graphics course, and introductions to social and ecological factors in design. The various design professions are increasingly collaborating on complex design and planning issues related to the built environment, and the college core courses reflect this interdisciplinary, interprofessional focus.

### General Degree Requirements

Students must complete a minimum of 120 semester hours, subject to the maximum outlined in this document, and maintain a GPA of 2.00 or better. Students must complete one course from each subject area.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Writing

WRTG 1150 or ARSC 1150 .....	3
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Students also must demonstrate advanced-level writing skills. If they cannot, they may be required to complete additional course work.

#### Social Science

ANTH 1030, 1040, 2100, 2200; BLST 2437; CHST 2537; ECON 1000, 2010, 2020; GEOG 1982, 1992; HIST 1010, 1015, 1020, 1025, 1035, 1038, 1040, 1045, 1051, 1061, 2103, 2117, 2123, 2180, 2437, 2537, 2717; IAFS 1000; PSCI 1101, 2012, 2101; PSYC 1001; SOCY 1001, 1002, 1031, 2011, 2041; WMST 2000 .....	3
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#### Humanities

CHST 1031; ENGL 1200, 1260, 1300, 1400, 1500, 1600, 2602, 2612; ARTH 1300, 1400, 2409; HUMN 1010, 1020; PHIL 1000, 1100, 1200, 1400, 1440, 1600, 1700, 1750; WMST 1260 .....	3
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### Architecture Emphasis

#### Undergraduate Sequence

<i>Required Courses</i>	<i>Semester Hours</i>
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#### First Year

##### Fall Semester

ENVD 1004 Introduction to Environmental Design (Note 1) .....	6
ENVD 2003 Ecology and Design (Note 1) .....	3
WRTG 1150 (Note 2) .....	3
Non-ENVD elective .....	3

##### Spring Semester

ENVD 2002 Environmental Design Media (Note 1) .....	3
ENVD 2001 Social Factors in Design (Note 1) .....	3
Social science (see list of options under general degree requirements) (Note 2) .....	3
Humanities (see list of options under general degree requirements) (Note 2) .....	3
Non-ENVD elective .....	3

#### Second Year

##### Fall Semester

ENVD 2110 Architecture Studio 1 .....	6
ARCH 3114 History and Theories of Architecture 1 .....	3
MATH 1300 Analytical Geometry and Calculus 1 .....	5
Non-ENVD elective .....	2

##### Spring Semester

ENVD 3001 Environment and Behavior (Note 1) .....	3
ARCH 3214 History and Theories of Architecture 2 .....	3
PHYS 2010 (includes lab) .....	5
Non-ENVD elective .....	3

Note: Students must complete all first and second year courses listed above before advancing to studio ENVD 3210 or AREN 4035-Structures 1. Additionally, students entering ENVD 3210 Architectural Studio II must have the permission of the program chair.

### Third Year

#### Fall Semester

ENVD 3210 Architecture Studio 2	6
ENVD 3352 Architectural Computer Media	3
AREN 4035 Structures 1	3
ENVD elective ending in '4'	3

#### Spring Semester

AREN 4045 Structures 2	3
ENVD elective ending in '5'	3
ENVD electives	6
Non-ENVD elective	3

### Fourth Year

#### Fall Semester

ENVD 4310 Architecture Studio 3	6
ENVD 3115 Introduction to Building Materials and Systems	3
AREN 3050 Environmental Systems 1	3
ENVD elective ending in '2'	3

#### Spring Semester

ENVD 4410 Architecture Studio 4	6
ENVD 4314 Architectural Theory	3
AREN 3060 Environmental Systems 2	3
ENVD elective	3

### Graduate Sequence

Includes two years at CU-Denver with approximately 30 credits each year. (For course descriptions, please refer to the *University of Colorado at Denver Catalog* or visit [www.cudenver.edu/Academics/Course+Catalog](http://www.cudenver.edu/Academics/Course+Catalog).)

*Required Courses* *Semester Hours*

#### Fifth Year

##### Fall Semester

ARCH 6150 Advanced Design Studio	4
ARCH 6151 Advanced Design Seminar	2
LA 6632 Site Planning	3
Electives (Note 3)	6

##### Spring Semester

ARCH 6150 Advanced Design Studio	4
ARCH 6151 Advanced Design Seminar	2
Electives (Note 3)	9

#### Sixth Year

##### Fall Semester

ARCH 5410 Professional Practice	3
ARCH 6150 Advanced Design Studio	4
ARCH 6151 Advanced Design Seminar	2
Electives (Note 3)	6

##### Spring Semester

Electives (Note 3)	15
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#### Curriculum Notes

1. Curriculum core course that must be taken by all students in the College of Architecture and Planning, regardless of emphasis area. Must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).
2. These requirements must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).
3. Students entering the MArch degree program at the University of Colorado at Denver beginning fall 1998 must take 9 credits in both cultural studies and professional studies, and 6 credits in technology studies. The remaining 6 credits may be taken in any architecturally related electives on campus.

### Planning Emphasis

The planning emphasis is intended for those students who wish to pursue careers in community, urban, and/or regional planning. It is expected that most students continue on for a master's degree in planning, urban design, landscape architecture, geography, law, or public administration.

Within the undergraduate planning emphasis, students may choose a general planning emphasis or elect to complete a concentration in the areas of sustainable environments, real estate, or landscape planning.

*Required Courses* *Semester Hours*

**General Education Requirements** ..... 9  
(see Writing, Social Science, and Humanities under the general degree requirements section.)

#### Math (complete one of the following)

BCOR 2010; ECON 3818; GEOG 3023; MATH 2510; PSYC 2101; SOCY 2061 3 . 4

#### Natural Science (complete one of the following)

CHEM 1111; EBIO 1030 and 1050; EBIO 1210 and 1230; PHYS 2010 . . . . . 4-5

*Required Courses* *Semester Hours*

### First Year

#### Fall Semester

ENVD 1004 Introduction to Environmental Design (Note 1)	6
ENVD 2003 Ecology and Design (Note 1)	3
WRTG 1150 (Note 2)	3
Non-ENVD elective	3

#### Spring Semester

ENVD 2002 Environmental Design Media (Note 1)	3
ENVD 2001 Social Factors in Design (Note 1)	3
Social science (see list of options under general degree requirements) (Note 2)	3
Humanities (see list of options under general degree requirements) (Note 2)	3
Non-ENVD elective	3

### Second Year

#### Fall Semester

ENVD 2052 Computers in Architecture and Planning	3
ENVD 3001 Environment and Behavior (Note 1)	3
Statistics course from the above list (Note 2)	3
Planning option course	3
Elective (ENVD or non-ENVD)	3

#### Spring Semester

ENVD 2120 Planning Studio 1	6
ENVD 2152 GIS for Planners	3
ENVD 3124 Issues in Planning	3
Natural science, including lab (see above list for options) (Note 2)	4

### Third Year

#### Fall Semester

ENVD 3220 Planning Studio 2	6
ENVD 3122 Research Issues and Methods for Planning	3
Planning option course	3
ENVD elective	3

#### Spring Semester

Planning option courses	6
ENVD elective	3
Electives (ENVD or non-ENVD)	6

### Fourth Year

#### Fall Semester

ENVD 3320 Planning Practicum (internship)	2
ENVD 4023 Environmental Impact Assessment	3
ENVD 4794 History of Urban Design and Planning	3
Planning option course	3
Elective (ENVD or non-ENVD)	3

#### Spring Semester

ENVD 4320 Planning Studio 3	6
ENVD 4420 Senior Planning Seminar	3
ENVD 4311 Housing Policies and Practices	3
ENVD elective	3

### Planning Option Courses

Complete one of the following planning options:

**General Planning option:**

Complete three upper-division courses from any of the following arts and sciences areas: economics, human and cultural geography, sociology, and political science .....9  
 Complete two upper-division courses in civil engineering, physical geography, or geographic technique .....6

**Sustainable Environments option:**

Complete elective course work from a specified range (see department) ...15

**Real Estate option:**

Complete a specified range of relevant courses (see department) .....15

**Landscape Planning option:**

Complete a specified range of relevant courses (see department) ...14-15

**Curriculum Notes**

1. Curriculum core course that must be taken by all students in the College of Architecture and Planning, regardless of emphasis area. Must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).
2. These requirements must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).

**Design Studies Emphasis**

The design studies emphasis is intended for those students who do not wish to pursue a professional career in architecture or planning, but who are interested in issues concerning the built environment. Students in this emphasis are expected to attain a moderate level of understanding and skill in either the architecture or planning field. In addition, they are expected to attain a high level of understanding and skill in one specialized aspect of these fields, and a moderate level of understanding in a cognate discipline outside the college.

A minimum of 30 semester credit hours must be completed after official approval of entry into the design studies emphasis.

**Required Courses** Semester Hours

**General Education Requirements (Note 1)** .....9  
 (see Writing, Social Science, and Humanities under the general degree requirements section.)

**Foreign Language**

Complete any level three course in a foreign language (Note 2) .....0-15  
 (Hours may be applied to required electives outside the college, as noted below.)

**Math (complete one of the following) (Note 1)**

BCOR 2010; ECON 3818; GEOG 3023; MATH 1300; MATH 2510; PSYC 2101; SOCY 2061 .....3-5

**Natural Science (complete one of the following) (Note 1)**

CHEM 1111; EBIO 1030 and 1050; EBIO 1210 and 1230; PHYS 2010 .....4-5

**Studios**

Complete one of the following pairs:

ENVD 2110 and 3210 Architectural Studio 1 and 2 *or* .....12  
 ENVD 2120 and 3220 Planning Studio 1 and 2 .....12

**Methods**

ENVD 2002 Environmental Design Media (Note 3) .....3  
 ENVD 3002 Design Theory and Methods .....3

**History and Theory**

ENVD 1004 Introduction to Environmental Design (Note 3) .....6

One of the following:

ENVD 4794 History of Urban Design and Planning *or* .....3  
 ARCH 3114 and 3124 History and Theories of Architecture 1 and 2 .....6

**Social Factors**

ENVD 2001 Introduction to Social Factors in Environmental Design (Note 3) .....3  
 ENVD 3001 Environment and Behavior (Note 3) .....3

**Physical Factors**

ENVD 2003 Ecology and Design (Note 3) .....3

Electives .....62-68

Electives must be approved by both the student's faculty sponsor and the college dean's office. At least 24 credits must be taken within the College of Architecture and Planning, of which at least three courses must be chosen from separate categories (i.e., design, methods, history, social

factors, physical factors, and technology). At least 30 credits (inclusive of hours meeting the foreign language requirement) must be taken from outside the College of Architecture and Planning. Elective hours beyond these specified 54 may be taken either within or outside the college.

**Curriculum Notes**

1. These requirements must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).
2. Completion of three years in a single foreign language in high school will meet this requirement. Alternatively, with approval of the student's faculty sponsor, students may substitute course work in computer programming languages.
3. Curriculum core course that must be taken by all students in the College of Architecture and Planning, regardless of emphasis area. Must be completed within the first four semesters of study (prior to the completion of 60 hours of credit).

**Double-Degree Programs**

In addition to the bachelor of environmental design degree, students may pursue a degree in another college at CU-Boulder. Past students have received the BEnvd degree concurrently with undergraduate degrees in business, engineering, and various programs offered by the College of Arts and Sciences. Typically, specific course requirements do not change in either program of a double degree; however, additional hours (varying by college) may be required. All undergraduate students must complete the general education requirements and the requirements for their specific emphasis area within the College of Architecture and Planning in addition to the other college's requirements. Students considering a double-degree program are encouraged to speak with advisors in both colleges to determine requirements and procedures for application.

**Faculty—College of Architecture and Planning**

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UIS SUMMERS, professor of architecture and civil, environmental, and architectural engineering. BArch, MS, PhD, Notre Dame.

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WILLEM K. T. VAN VLIET, professor of planning and design. Doctorandus, Free University of Amsterdam; PhD, University of Toronto.

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PING XU, associate professor of architecture. BA, MA, Tsinghua University (PRC); MLA, University of Pennsylvania; DD, Harvard.



# College of Arts and Sciences

*Todd Gleeson, dean*

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college web site: [www.colorado.edu/artssciences](http://www.colorado.edu/artssciences)

**T**HE COLLEGE OF ARTS AND SCIENCES is the liberal arts college at CU-Boulder. Its mission is to provide an outstanding liberal arts education for its undergraduates, cutting-edge graduate education, and world-class research, scholarship, and creative work. In addition to gaining the knowledge and skills of their areas of study, students learn how new information is acquired, and they can participate in original research and creative work with individual faculty members.

The college offers a wide variety of fields of study, with nearly 50 undergraduate majors. The environment and advantages of a small liberal arts college are created through “academic neighborhoods” in which students can meet and interact with other students and faculty in small group settings. In addition, over 60 percent of undergraduate classes are small, with 25 or fewer students.

As the liberal arts college of CU-Boulder, the College of Arts and Sciences has several goals in the education of its students:

- Educate students for careers and a productive life. Arts and sciences students gain the most current knowledge and skills in their major fields of study. In addition, they learn how to acquire new skills and contend with—and lead—the changes that will occur in the decades to come. Education for a productive life also means that students learn how to analyze situations, solve problems, and speak and write effectively.
- Provide students with a well-rounded education. Arts and sciences students acquire a broad knowledge and an integrated understanding of art and music, great literary works, philosophy, history and politics, the social world, science, and technology. They learn how to critically evaluate and think about morals, ethics, and values. The core curriculum and breadth requirements give students a broad, liberal-arts education that develops the whole person, not just the specialist.
- Educate citizens who can think for themselves, understand the rapidly changing world, and make wise choices within a democratic system.
- Impart a love of learning so that students can continue to grow throughout life.
- Teach ways of thinking about and approaching new problems. For some students, this will enable them to further advance knowledge and scholarship in the academy. For all students, this is important for enriching their lives.
- Prepare students to help enrich the lives of others. Arts and sciences graduates become lifelong resources for their families, neighbors, friends, and co-workers.

The college also is dedicated to outstanding graduate education. Advanced degrees are offered by nearly every academic department in the college, and the PhD is offered in approximately 30 different disciplines. In addition, an increasing number of departments offer combined bachelor’s/master’s degrees that



can be earned in five years. Graduate training focuses on teaching and research careers as well as on professional careers in the public and private sector.

The strength of the College of Arts and Sciences comes from its outstanding faculty. In addition to being dedicated teachers, they are active scholars in disciplines throughout the arts and humanities, social and behavioral sciences, biological sciences, and physical and mathematical sciences. They are the recipients of numerous national awards and honors for their research, scholarship, and creative work. Faculty and staff of the College of Arts and Sciences join together to create an intellectual community of students and scholars to discover, critically examine, integrate, preserve, and transmit knowledge, wisdom, and values.

## Programs of Special Interest

### Honors Program

The Honors Program is designed to provide special educational opportunities for highly motivated students. It is open to well-prepared freshmen, as well as sophomores and upper-division students. The Honors Program offers thoughtful advising, close contact with faculty and other honors students, and an opportunity to write an honors thesis. Each year over 50 honors courses are offered in a wide variety of areas; with one or two exceptions, each course is limited to an enrollment of approximately 15 students.

Faculty members teaching honors seminars are carefully selected for special interests and enthusiasm, for teaching excellence in small discussion classes, and for insistence on high academic standards. Honors seminars are designed for the student who welcomes challenge, knows that the mind expands only with effort, and actively seeks academic and intellectual challenges. Honors courses encourage students to combine and synthesize concepts and methodologies from other courses and disciplines. Many honors courses are consciously interdisciplinary, but all encourage students to read widely and think critically.

The honors council, consisting of faculty from all participating academic departments, is responsible for deciding which students merit the award of the bachelor’s degree with honors: cum laude, magna cum laude, and summa cum laude. These awards are made on the basis of special honors work and not simply on the basis of grades earned in courses.

Students may graduate with departmental honors or general honors, or both. Departmental honors may require a junior or senior honors seminar, an independent research project, and/or directed readings. All departments require an honors thesis. Each department has information pertaining to its own particular program. Students who pursue general honors must have a cumulative GPA of 3.50 or higher, have completed 12 credit

hours of required honors courses, and have written a thesis on an interdisciplinary topic.

Kittredge Honors Program (KHP) is the optional residential component of the program. KHP, open to a limited number of qualified entering first-year students, consists of small classes offered in the Kittredge residence hall as well as opportunities to participate in extracurricular activities. There is an additional charge for the Kittredge Honors Program. See below for more information.

Detailed information concerning the Honors Program may be obtained in the honors office in Norlin Library. Qualified students may register for courses in the Honors Program at the honors office.

Freshmen are invited to join the Honors Program based on their high school GPA and test scores. Transfer students must have a 3.30 GPA from their previous school. Students currently enrolled are accepted on the basis of academic achievement at CU-Boulder. While honors students are expected to have a GPA of at least 3.30, it should be emphasized that no student who shows ability and promise is excluded from consideration. This is a program of excellence and commitment in which the best teaching faculty is committed to serve the most highly motivated students for the benefit of those students and the larger society.

### Minority Arts and Sciences Program

The Minority Arts and Sciences Program (MASP) is an academic excellence community dedicated to assisting underrepresented scholars in their successful matriculation in and retention and graduation from the College of Arts and Sciences at CU-Boulder. For students interested in science and mathematics, MASP emphasizes study leading to the BA degree in selected fields, including biology, chemistry/biochemistry, kinesiology, mathematics, physics, and applied mathematics. In the fall of 1999 MASP expanded to support underrepresented students interested in pursuing humanities and social sciences degrees, including history, theatre, fine arts, and other disciplines within the College of Arts and Sciences.

MASP facilitates the often-difficult transition from high school to the college learning environment. It provides a personally supportive community and intense academic instruction, and helps develop a strong sense of group cohesiveness and spirit.

MASP provides scholarships to promising students from underrepresented groups. Grade point average (GPA) and other academic indicators assist in determining scholarship amounts. MASP also provides academic advising and clustering, academic excellence workshops, the PEAC (pronounced "peak") Program for new freshman students, self-management and leadership workshops, and a MASP networking and study center.

For more information, call the MASP office at **303-492-8229**.

### Norlin Scholars Program

The Norlin Scholars Program is a special academic and scholarship program designed for students with a strong love of learning. It is open to students in all majors and all colleges and schools. Special courses have been created exclusively for Norlin Scholars; they are broadly synthetic to be appropriate for any student in any major. Special mentoring, residential academic program spaces, and opportunities for original research receive emphasis. The program is highly competitive and carries a \$2,000/year scholarship. Students may enter as first-year students or as rising juniors. More information and application forms are available at [www.colorado.edu/norlinscholars](http://www.colorado.edu/norlinscholars), or Norlin Scholars Program, University of Colorado at Boulder, 365 UCB, Boulder, CO 80309-0365, or at **303-735-6677**.

## Residential Academic Programs

### Baker Residential Academic Program

The Baker Hall Residential Academic Program (RAP) is designed primarily for 400 freshman and sophomore students who are interested in the natural sciences and environmental studies. The program provides an array of courses that satisfy various core curriculum requirements in the College of Arts and Sciences and in majors such as environmental, population and organismic biology; geography; geology; chemistry; and the interdisciplinary major in environmental studies. Courses are typically limited to 25 students and are taught in classrooms located in Baker Hall. Baker RAP offers access to academic advising, career counseling, student internships, guest speakers, field trips, and close faculty contact. The combination of small classes, a group of students who take many of the same classes together, and frequent field trips and special lectures creates a small-college atmosphere while offering the advantages of studying at a major research university.

Baker RAP provides introductory courses in biology, geology, physics, chemistry, geography, mathematics, economics, history, political science, philosophy, anthropology, and expository writing. The curriculum is designed to maximize the opportunities for students to satisfy core curriculum requirements in the College of Arts and Sciences. Upper-division courses are presented in geography and environmental studies. Upper-division credit also is available through independent study and research. Students usually take one of the above courses each semester. Baker RAP also reserves seats for its students in certain high-demand courses taught outside the program, including introductory biology and chemistry laboratories.

Some of the geology and geography courses offered by Baker RAP emphasize research techniques and are affiliated with the Summer Undergraduate Research Experiences (SURE) program and the Undergraduate Research Opportunities Program (UROP). These courses offer students access to research opportunities during the summer and academic year.

Baker RAP cocurricular activities offer social and educational opportunities for students in the program. These activities include a kick-off barbeque at the beginning of the school year, local hikes, a day of cross-country skiing, and a spring-time service-oriented activity emphasizing environmental conservation. Guest lecturers are invited to speak about scientific or environmental themes.

There is a fee for participation in Baker RAP in addition to regular tuition, fees, and room and board. A limited number of merit-based scholarships are available. Students eligible for financial aid may request that their budget be adjusted to include the program fee. Their eligibility for aid will then be increased by an amount equal to the Baker RAP fee. Students interested in the program should write to the Baker Hall Residential Academic Program, University of Colorado at Boulder, 176 UCB, Boulder, CO 80309-0176, or call **303-492-3188**.

### Chancellor's Leadership Residential Academic Program and Ethnic Living and Learning Community

This residential academic program is located in Williams Village and is dedicated to developing community, civic, and business leaders for a culturally diverse and democratic society. When a student enrolls in the Chancellor's Leadership Residential Academic Program (CLR) they will select one of two academic tracks available. The Service Learning Initiative (SLI) offers leadership development with an emphasis on civic responsibility and community service. SLI students live on CLR designated floors, which is conducive to continuing class discussions,

sharing information about their service projects, and building relationships. The Ethnic Living and Learning Community (ELLC) is centered around civic and community leadership development. This focus is layered with the rich cultural histories, traditions, and contemporary experiences of this country's diverse citizenry. ELLC students also reside on a common community floor, which provides them an opportunity of creating and living in an intentional multicultural neighborhood and forming lifelong friendships.

Leadership courses offered each semester meet core requirements in the College of Arts and Sciences and may be applied toward graduation as well as a leadership certificate. The program also offers courses in writing and rhetoric, history, math, political science, and integrative physiology. Students from all schools and colleges on the Boulder campus are eligible to participate.

As with all residential academic programs, there is an annual program participation fee of \$725; some scholarships to cover the fees are available for those in need. Information is available by writing Academic Director, Chancellor's Leadership RAP, University of Colorado at Boulder, 452 UCB, Boulder, CO 80309-0452; calling **303-735-1987**; e-mailing [CLR@colorado.edu](mailto:CLR@colorado.edu); or visiting [www.colorado.edu/Chancellor/chancellorrap](http://www.colorado.edu/Chancellor/chancellorrap).

For additional information on this program, see the Other Academic Programs section.

## Farrand Residential Academic Program

The Farrand Residential Academic Program combines the advantages of a small liberal arts college with the benefits of a major research university for its 400 first-year and sophomore residents. Assets such as small classes offered in the residence hall, informal contact with award-winning faculty, extensive academic advising, participation in community service, and special programs generated from student interests make Farrand an intellectual as well as a residential community.

Each semester, every Farrand student takes a Farrand course that provides a shared academic experience. Because helping others contributes to the learning experience as well as to the whole community, Farrand offers several service-learning classes each semester. Service learning gives students the chance to apply what they study in their classes to real-life situations, such as a homeless shelter, a humane society, or a tutoring program. These classes include Gandhian Philosophy; Nutrition, Health, and Performance; Global Women Writers; and Biology: A Human Approach. The Farrand curriculum also offers a wide range of popular core curriculum classes taught by faculty known for their teaching skills. Introduction to the Humanities, an integrated survey of Western art and culture; Deviance; Calculus; and Introduction to Environmental Studies are just a few examples.

Farrand courses constitute about one-third of a student's course work during the first two years. The remaining two-thirds is composed of courses selected from regular on-campus offerings.

The program is sponsored jointly by the College of Arts and Sciences and the Department of Housing and is designed primarily for students in the College of Arts and Sciences. Interested students in other colleges should contact the Farrand program for special admission procedures. It is administered by academic directors selected from the faculty and a hall director experienced in the operation of a large residence hall. There is a charge for the program in addition to regular tuition, fees, and room and board.

Inquiries concerning any aspect of the academic program may be directed to the Farrand Residential Academic Program, University of Colorado at Boulder, 180 UCB, Boulder, CO 80309-0180, **303-492-8848**.

## Kittredge Honors Program

The Kittredge community is home to the Kittredge Honors Program (KHP). This residential academic honors program is open to 125 high-ability students, who are considered integral members of the Kittredge complex. Members of KHP live in Buckingham Hall.

The Kittredge Honors Program seeks to build a program based both on academics and community. Each semester KHP offers a selection of honors courses in the residence hall that satisfy arts and sciences core curriculum requirements. Students are required to take at least one of these courses each semester. Honors courses are limited to 15 students, and faculty pursue a discussion- and writing-based approach to teaching.

KHP strives to combine the academic and social aspects of the college experience. KHP sponsors evening activities once a week to meet this goal. A monthly lecture series provides students with an opportunity to gain exposure to some of the great teachers and researchers in the university community. Social events are sponsored in order to create community.

The program is sponsored by the College of Arts and Sciences, the Honors Program, and the Department of Housing. Students in KHP may draw on the resources of the Honors Program for advising and information. The director of KHP is available in the KHP office in Buckingham Hall for academic advising and as a liaison to the rest of the campus. There is a fee to participate in the program in addition to regular tuition, fees, and room and board.

Students who are invited into the Arts and Sciences Honors Program may choose this residential component on a space-available basis. The Honors Program invites students to participate in honors based on high school GPA and test scores. To remain eligible for honors courses (including those in KHP), students must maintain a University of Colorado GPA of 3.30 or above.

Initial invitations are issued beginning in mid-February. Students who have questions about the program should address them to the Kittredge Honors Program, University of Colorado at Boulder, 184 UCB, Boulder, CO 80309-0184, **303-492-3695** or visit [www.colorado.edu/honors/khp.html](http://www.colorado.edu/honors/khp.html).

## Sewall Residential Academic Program

The Sewall Residential Academic Program on the American West provides first- and second-year students in the College of Arts and Sciences with the opportunity to participate in a unique living and learning experience. Limited to 330 students, this coeducational program combines many of the advantages of a small liberal arts college with the vast resources of the university.

Students who live in Sewall Hall are required to take at least one class in the hall each semester. First-year students are required to take a course on the American West (CAMW) or its equivalent. As part of these courses, students are automatically enrolled in a section of Conversations on the American West. This one-credit course provides students with an opportunity to participate in special field trips and to interact with well-known scholars and public figures from on and off campus. Finally, students will take the lower-division writing course (WRTG 1150) in Sewall in either the fall or spring semester.

The program also offers a wide range of seminar-style classes that satisfy core curriculum requirements in the College of Arts and Sciences. Classes are usually limited to 20 students, carry 3 credit hours, and count toward a degree.

The director and associate director of the Sewall Residential Academic Program, who are members of the university faculty, provide academic assistance to students in planning individual programs, choosing courses, and making contact with major

departments. The director and associate director also offer personal counseling and guide students to find the proper university resources.

Participants in the Sewall program are fully involved in regular campus life, take the majority of their classes with the rest of the university, and are encouraged to join in all university activities. Faculty, administrators, and staff enjoy close working relationships with the Sewall residents.

Interested first- and second-year students who are admitted into the College of Arts and Sciences should indicate Sewall Hall as their first choice on the housing application form and return it to the Housing Reservation Center as early as possible. Students are admitted on a first-come, first-served basis, determined by date of receipt of the housing application form. Students with a serious interest in the American West and who want a liberal arts education are encouraged to apply. There is an extra charge for participating in the program in addition to regular tuition, fees, and room and board. Some scholarships are available; please contact the academic program office for details.

Students who have questions about the program should address them to the Academic Director, Sewall Residential Academic Program, University of Colorado at Boulder, 353 UCB, Boulder, CO 80309-0353, visit the program online at [www.colorado.edu/Sewall](http://www.colorado.edu/Sewall), or call the academic program office at 303-492-6004.

### Smith Hall International Program

The Smith Hall International Program (SHIP) promotes the recognition of global interdependence, exposes first-year students to the many cultures of the world, encourages the study of foreign languages and international affairs, and emphasizes the value of international education. Like all the other Residential Academic Programs, SHIP provides its students with a small community of similarly interested students, which eases the transition to the university.

A diverse group of students who have similar interests and goals participate in programs designed to promote understanding of the global community. SHIP students are required to take one designated course in the fall semester with an international focus. A biweekly, cocurricular program introduces students to faculty who work internationally and bring that experience back to their teaching on campus. SHIP takes advantage of many internationally focused events on and off campus, such as the Conference on World Affairs, the International Film Festival, and exhibits at the Denver Art Museum and the Denver Museum of Nature and Science. Throughout the year, students receive guidance on academic and career options, course selection and college requirements, and study abroad opportunities.

SHIP is open to all entering first-year students. Participants live together in one wing of Smith Hall in the Kittredge Complex—a collection of residence halls providing a unique community experience.

In addition to benefitting students interested in studying abroad or those whose majors have an international component, SHIP enhances many of the majors offered at CU-Boulder.

A fee is charged for participation in SHIP. For more information, contact the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, call 303-492-6016, or check [www.colorado.edu/oie/ship](http://www.colorado.edu/oie/ship).

## Academic Excellence

### Dean's List

Students in the College of Arts and Sciences who have completed at least 12 credit hours of CU-Boulder course work for a letter grade in any single semester with a term GPA of 3.75 or better are included on the dean's list and receive a notation on their transcript and a letter from the dean.

### Graduation with Honors

The award of honors at graduation—*cum laude*, *magna cum laude*, or *summa cum laude*—is determined by the Honors Program of the college and is based on several criteria, including the quality of original scholarly work. Honors are not conferred on a graduate simply by virtue of high grades. Interested students should consult the Honors Program listing in this catalog or contact the Honors Program in Norlin Library.

### Graduation with Distinction

Students will graduate “With Distinction” if they have at least 30 credit hours completed at the University of Colorado at Boulder, have a grade point average of 3.75 or higher for all course work completed at the University of Colorado, and have a cumulative grade point average of 3.75 or higher for all collegiate course work completed at all institutions attended. The average includes all grades except *P*.

### Phi Beta Kappa

Phi Beta Kappa is the nation's oldest and most prestigious honor society. The CU-Boulder chapter was established in 1904. Upper-division students whose undergraduate academic records fulfill certain requirements are eligible for election to membership in recognition of outstanding scholastic achievement in the liberal arts and sciences. Students are notified by mail of their nomination; students do not apply for Phi Beta Kappa membership.

## Academic Standards

### Good Academic Standing

Good academic standing in the college requires a cumulative grade point average of 2.00 (*C*) or above in all University of Colorado work. Grades earned at another institution are not used in calculating the grade point average at the University of Colorado (this includes courses taken at Metropolitan State College on the Denver campus). However, grades earned in another school or college within the University of Colorado system are used in determining a student's scholastic standing and progress toward the degree in the College of Arts and Sciences.

### Probation

Students whose cumulative grade point average falls below 2.00 are placed on probation. Those students who enroll in any term in the calendar year, excluding summers, after being placed on probation are expected to raise their grade point to a 2.00 or above overall by the end of that term. Neither CU-Boulder's summer session (including Maymester) nor enrollment through Boulder evening courses counts as a probationary semester. Students are not dismissed at the end of the summer term.

Students placed on academic probation who elect to remain out of school for a full calendar year can return to the university with a two-semester window to achieve the required cumulative GPA of 2.00 or above. Students on probation who return after a hiatus of one year are placed on a second probation at the end

of the semester in which they return if their cumulative grade-point average remains below 2.00 and are dismissed from the university if they do not achieve a minimum 2.00 cumulative grade-point average by the end of the semester following the imposition of the second probation.

## Scholastic Dismissal

Students who still have a cumulative average below 2.00 after their semester of probation will be dismissed and will not be able to register for University of Colorado daytime courses on any campus during any academic year, August to May. Students dismissed from the college are eligible for readmission when they have achieved a cumulative 2.00 average by virtue of work done during the University of Colorado's summer term (any of the three campuses) and/or through the Division of Continuing Education (Boulder evening or correspondence courses). They also may return as transfer students when they have overcome their deficiencies by enrolling at another institution (i.e., by achieving an overall 2.00 average in the University of Colorado work plus all work taken elsewhere since dismissal). These transfer grades are used only for the purpose of readmission and do not remain in the University of Colorado cumulative grade-point average). Dismissed students pursuing this latter option have two semesters after readmission to bring their University of Colorado grade point average up to 2.00 or they are dismissed again.

## Academic Ethics

A university's intellectual reputation depends on the maintenance of the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student and faculty member at the University of Colorado. Cheating; plagiarism; illegal possession and distribution of examinations or answers to specific questions; alterations, forgery, or falsification of official records; presenting someone else's work as one's own; or performing work or taking an examination for another student are examples of acts that may lead to suspension or expulsion. Reported acts of academic dishonesty must be referred to the Honor Council. The policies and procedures governing acts of academic dishonesty can be found on the Web at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

## Appeals and Petitions

The College of Arts and Sciences does not waive degree requirements or excuse students from completing degree requirements. Petitions for exceptions to the academic policies stated here may be submitted to the Appeals Committee on Academic Rules and Policies. Such petitions will be considered only if they meet all three of the following conditions:

1. The student must document that she/he has made every effort to fulfill the policy or requirement as defined and must demonstrate that no other options exist for fulfilling the requirement as defined in this catalog.
2. The student must document that she/he is prevented from fulfilling the policy or meeting the requirement as defined here for compelling reasons beyond their control.
3. The student must demonstrate to the satisfaction of the faculty committee that she/he has fulfilled or will fulfill the intent of the policy or the requirement through an appropriate alternative.

Students who believe that their circumstances meet the conditions to submit a petition must first consult with their academic advisor. If the advisor offers options for meeting the requirement or policy as defined here, the student must pursue those options and should not submit a petition.

The Appeals Committee on Academic Rules and Policies is located in the Academic Advising Center.

## General Credit and Enrollment Policies

Students are required to follow the graduation requirements listed in the catalog at the time of their initial entry into the College of Arts and Sciences.

### Attendance

Successful work in the College of Arts and Sciences is dependent upon regular attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Failure to attend regularly may result in receipt of an *F* in a course. Students who, for illness or other legitimate reason, miss a final examination must notify the instructor or the Academic Advising Center no later than the end of the day on which the examination is given. Failure to do so may result in receipt of an *F* in the course.

### Credit Policies

#### *Advanced Placement Program*

See Undergraduate Admission in the General Information section.

#### *International Baccalaureate*

In general, college credit is granted for International Baccalaureate examinations at the higher level with a score of 4 or better. For specific equivalencies, contact the Office of Admissions at **303-492-6665**.

#### *College-Level Examination Program (CLEP)*

The College of Arts and Sciences accepts a limited number of hours of CLEP credit from subject (not general) examinations toward its bachelor's degree programs (see Undergraduate Admission for subjects accepted). In addition, certain CLEP examinations may be used to meet the minimum academic preparation standards (MAPS) for admission to the university. No more than 30 total credit hours of CLEP will apply, nor may CLEP credit be used in the final 30 credit hours presented for a degree.

CLEP tests are administered through Career Services, **303-492-5854**.

#### *Cooperative Education/Internships*

Students in the College of Arts and Sciences may receive up to 6 credit hours for a department-sponsored cooperative education program or internship. Each internship project must be approved by the chair or associate chair of the department awarding the credit before the student enrolls in the course in order for the student to receive credit. Students are encouraged to contact their major department office or Career Services for information regarding the possibility of enrolling in a cooperative education program in their major. Many internships are graded on a *pass/fail* basis only. Participation in an internship with mandatory *pass/fail* grading does not affect the total credit hours of *pass/fail* a student may apply toward a degree. Some departments further restrict the use of internship credit toward meeting major requirements.

#### *Correspondence Study*

A maximum of 30 credit hours of correspondence work may count toward the degree. Arts and sciences courses offered by the CU-Boulder Division of Continuing Education carry resident credit.

#### *Credit/No Credit*

Credit/no credit changes must occur during the schedule adjustment periods.

### *Credit Taken as a Nondegree Student*

Once a student has been admitted to a degree program, credits from the Division of Continuing Education such as ACCESS, Boulder evening credit courses, and CU-Boulder correspondence classes may be eligible to be applied toward the degree. Students will receive initial advising during orientation once they have been accepted to a degree program in the College of Arts and Sciences.

### *Credit Taken Outside the College of Arts and Sciences*

Students may apply a total of 30 credit hours from the other colleges and schools at CU-Boulder as well as specified ROTC and President's Leadership Class courses toward the fulfillment of requirements for the BA and BFA degrees. Within these 30 total hours, up to 8 credit hours in activities courses (applied music and ensembles) may be used. Transferred courses that were taught by departments considered to be outside the College of Arts and Sciences are counted as part of the allowed 30 hours. If a course has been approved to meet a core curriculum requirement and the course is taught outside the College of Arts and Sciences, the credit for this course will not be included as part of the 30 semester hour limitation.

### *Cross-Listed Courses*

Courses that are cross-listed in two or more departments are credited in the department in which the student has the most semester hours, irrespective of the department in which the student formally enrolled for the course.

### *Foreign Language Courses*

Students must receive a grade of C- or better to enroll in the next level of a language sequence. Students will not receive credit for a lower level course after credit has been given for a higher level course in the same sequence. For example, students who have passed a 2000-level class will not receive credit for a 1000-level class. Read the course descriptions carefully for restrictions, requirements, and prerequisites. This rule applies to the following languages: American Sign Language, Arabic, Chinese, German, French, Greek, Hebrew, Italian, Japanese, Korean, Latin, Norwegian, Polish, Portuguese, Russian, Spanish, and Swedish. Consult each department for specific restrictions, requirements, and prerequisites.

Some classes offered by foreign language departments are taught in English and require no knowledge of foreign language. Read specific course descriptions and check with the departments.

### *Independent Study*

With departmental approval, students may register for independent study during the normal registration periods for each semester. Students may not register for more than 6 credit hours of independent study credit during any term. No more than 8 credit hours of independent study taken in a single department or program can be applied toward the total hours needed for graduation. A maximum of 16 hours of independent study may count toward the degree. The minimum expectation for each semester hour of credit is 25 hours of work.

A student may not use independent study projects to fulfill the college's general education requirements. Some departments further restrict the use of independent study hours toward meeting major requirements.

### *Required Hours Outside the Major*

To complete the BA degree, students are required to complete a minimum of 75 credit hours outside their major department. Exceptions are:

- Students who complete designated departmental honors courses in their major and/or in honors thesis credit can reduce

the 75 credit hours required outside the major department by a corresponding number of credits, up to a maximum of 6.

- Students completing the bachelor of fine arts degree must complete a minimum of 53 credit hours outside of their major department.

### *Pass/Fail*

Students in the College of Arts and Sciences may not use the *pass/fail* option for courses taken to fulfill general education requirements, courses used to satisfy the foreign language requirement, courses used to fulfill the Minimum Academic Preparation Standards (MAPS), or courses used to complete the minimum requirements for the major.

Students may take elective courses *pass/fail*, to a maximum of 6 credit hours. Courses offered only on a mandatory *pass/fail* basis are excluded from the maximum allowed. The *pass/fail* option may be used only for elective credit.

### *Repetition of Courses*

If a student takes a course for credit more than once, all grades are calculated into the grade point average. However, the course is only counted toward graduation once, unless a course description specifically states that it can be taken more than once for credit.

The Boulder campus is conducting a pilot course forgiveness program. For an undergraduate student receiving a grade of D+ or lower or a graduate student receiving a grade of C+ or lower in a course, there may be an option to repeat that course under the pilot course forgiveness program. For additional information about the program including deadlines and limitations, go to the web site [registrar.colorado.edu/Support/courseforgiveness.htm](http://registrar.colorado.edu/Support/courseforgiveness.htm).

### *ROTC Credit*

The ROTC courses listed below have been certified as acceptable college-level course work by the faculty of the College of Arts and Sciences or by other colleges and schools on the Boulder campus. These courses are counted as elective credit toward the degree, subject to the 30-semester-hour limitation on course work taken outside the college for students in the BA and BFA programs. Courses not included on this list do not count toward any degree requirements. Transfer ROTC course work must be evaluated as equivalent to course work on this list to count toward degree requirements.

AIRR 3010 and 3020  
 AIRR 4010 and 4020  
 MILR 1011 and 1021  
 MILR 2031 and 2041 (students may not receive credit for either course if they have credit in OPMG 3000)  
 MILR 4072 and 4082  
 NAVR 2020  
 NAVR 3030  
 NAVR 3040  
 NAVR 3101  
 NAVR 4010 and 4020  
 NAVR 4030  
 NAVR 4101.

### *Transfer Credit*

Work from another accredited institution of higher education that has been completed with a grade of C- (1.70) or better may be transferred to the University of Colorado. Categories of transfer course work not accepted by the university are outlined in the Transfer Course Work Not Accepted by the University section under General Information.

All courses transferred from junior and community colleges carry lower-division credit. Courses transferred from four-year institutions carry credits at the level at which they were taught at the previous institution.

### *Statewide Guaranteed Transfer of General Education Courses*

Beginning in fall 2003, the two-year and four-year transfer articulation agreements among Colorado institutions of higher education was replaced by a statewide guaranteed transfer of approved general education courses taken at any Colorado public institution of higher education. Under the statewide guaranteed transfer program, up to 35–37 credits of successfully (C- or better) completed course work will automatically transfer and apply towards graduation requirements at the receiving institution. The course work must be drawn from the list of approved guaranteed transfer courses and must meet the distribution requirements of the guaranteed transfer program. Further information about the statewide transfer program, including the list of approved courses and distribution requirements, can be found at the web site of the Colorado Commission on Higher Education, [www.state.co.us/cche\\_dir/heccche.html](http://www.state.co.us/cche_dir/heccche.html) under **gtPATHWAYS**.

Students who began their collegiate course work in fall 2003 or later at any Colorado public institution of higher education are subject to the statewide guaranteed transfer of approved general education courses. Students who began their collegiate course work prior to fall 2003 have the option of following the two-year and four-year articulation agreements in effect at the time of the student's initial matriculation at a Colorado public institution of higher education or following the conditions of the statewide guaranteed transfer program. Students who began their collegiate course work prior to fall 2003 must complete all lower-division core requirements by summer 2005 in order to remain eligible for the two-year and four-year core completion agreement.

Additional information on the evaluation of transfer credit of Colorado community college course work and its application in select arts and sciences major programs can also be found at [www.colorado.edu/artsscience/prospective/transfer.html](http://www.colorado.edu/artsscience/prospective/transfer.html).

### **Withdrawal**

See the General Information section for specific withdrawal procedures and universitywide policies.

Students in the College of Arts and Sciences who withdraw two semesters in a row will have a dean's stop placed on their registration. Summer session is not counted as a regular semester. They will not be permitted to return to CU-Boulder before one full academic year has elapsed (not including their semester of withdrawal). Students may never withdraw after the last day of classes.

These policies also apply to arts and sciences students who are enrolled in continuing education courses.

### **Undergraduate Degree Requirements**

Students are subject to the general degree requirements in effect at the time they first enter the College of Arts and Sciences and are subject to the major requirements in force at the time they declare a major. Arts and sciences students have 10 years to complete the requirements for a declared major. If the 10-year limit is exceeded, the student may be required to satisfy current major requirements. Students pursuing a major degree program subject to discontinuation by decision of the Board of Regents and the Colorado Commission on Higher Education have four years to complete the degree program and graduate. The requirements, rules, and policies stated here apply to all students first entering the College of Arts and Sciences during the 2004–05 academic year.

### **Academic Advising and Orientation**

Students in the college are expected to assume responsibility for planning their academic program in conjunction with their academic advisor and in accordance with college rules and policies and with departmental major requirements. Any questions concerning these provisions are to be directed to the student's academic advisor or to the Academic Advising Center.

The college cannot assume responsibility for problems resulting from students failing to follow the policies stated in the catalog or from incorrect advice given by someone other than an appropriate staff member of the college.

All new students are required to attend a special orientation, advising, and registration program on campus before enrolling.

#### **Advising**

Academic advising is an integral part of undergraduate education. The goal of all academic advising is to help students make responsible decisions as they develop educational plans compatible with their potential and with their career and life goals. Advising is more than the sharing of information about academic courses and programs; it includes encouraging students to formulate important questions about the nature and direction of their education and working with them to find answers to those questions. Advisors confer with students about alternative course schedules and other educational experiences, but students themselves are responsible for selecting the content of their academic program and making progress toward an academic degree.

As students progress through their academic program, their questions and concerns change. CU-Boulder offers a system of faculty and professional academic advisors to address these ongoing and multifaceted concerns.

Students are ultimately responsible for choosing appropriate courses, for registering accurately, and for meeting all degree requirements. Academic advisors assist students in clarifying their interests, values, and goals and help students relate these to academic programs and educational opportunities. As students work with their advisors, the advisors help students develop a coherent and balanced program of study that fulfills graduation requirements and assist students in identifying and integrating into their programs educational experiences outside the classroom that enhance their personal, intellectual, and professional development. Academic advisors also assist students in understanding academic policies, requirements, procedures, and deadlines.

Through the Open Option program, the Academic Advising Center provides comprehensive advising services to students who are undecided about their major or who are thinking of changing their major to another CU-Boulder college or school. Open option majors are assigned primary advisors in the advising center who are familiar with the courses and degree requirements for all majors offered at CU-Boulder and who assist students in exploring all of the degree programs related to the students' interests. While students are exploring majors, open option advisors assist students in designing programs of study that meet graduation requirements while providing them with the academic flexibility to pursue whichever degree program they ultimately choose.

The advising center also provides preprofessional advising for all students who are preparing to pursue the study of medicine, law, or other professional fields.

Students should refer to college, school, and departmental advising materials for specific details on their advising programs.

#### **Responsibilities of Students and Advisors**

Within the advising system on the Boulder campus, both students and advisors have responsibilities.

Students are responsible for:

- knowing the requirements of their particular academic program, selecting courses that meet those requirements in an appropriate time frame, registering accurately, and monitoring their progress toward graduation;

- consulting with their academic advisor several times every term;

- scheduling and keeping academic advising appointments in a timely manner throughout their academic career, so as to avoid seeking advising only during busy registration periods; and

- being prepared for advising sessions (for example, by bringing in a list of questions or concerns, having a tentative schedule in mind, and/or being prepared to discuss interests and goals with their advisor).

Advisors are responsible for:

- helping students clarify their values, goals, and abilities;
- helping students understand the nature and purpose of a college education;

- providing accurate information about educational options, requirements, policies, and procedures;

- helping students plan educational programs consistent with the requirements of their degree program and with their goals, interests, and abilities;

- assisting students in the continual monitoring and evaluation of their educational progress; and

- helping students locate and integrate the many resources of the university to meet their unique educational needs and aspirations.

## Four-Year Graduation

The College of Arts and Sciences has adopted a set of guidelines to define the conditions under which a student should expect to graduate in four years. More information is available through the Academic Advising Center and major program and departmental offices.

The University of Colorado at Boulder guarantees that if the scheduling of essential courses is found to have prevented a student in the College of Arts and Sciences from completing all course work necessary for a BA or BFA degree from the university by the end of the student's eighth consecutive fall and spring semester, the college will provide tuition plus any course fees for all courses required for completion of the degree requirements. Students must satisfy all the conditions described below to be eligible for this guarantee.

This guarantee extends to all students who enrolled the summer of 1994 or after into the College of Arts and Sciences as first-semester freshmen without MAPS deficiencies and who satisfy all the requirements described below. This guarantee cannot be extended to include completion of a second major, a double degree, a minor, a teaching certificate, or other certificate program. Some CU-Boulder study abroad programs may not provide a sufficient range of courses to allow students to meet the requirements and thus students who participate in study abroad are not included in this guarantee.

### *Four-Year Guarantee Requirements*

1. Students should enroll in University of Colorado at Boulder course work for eight consecutive fall and spring semesters.

2. No fewer than 60 credit hours of applicable course work should be completed with passing grades by the end of the second year (24 calendar months), 90 hours by the end of the third year (36 calendar months), and 120 hours by the end of

the fourth year. Students should enroll in and pass an average of 15 credit hours each semester.

3. A minimum of 30 credit hours of college core-curriculum courses should be completed by the end of the second year, including college core-curriculum courses that also meet major requirements. All remaining college core-curriculum requirements must be fulfilled by the end of the eighth semester.

4. Students should complete 45 upper-division hours by the end of the eighth semester of study.

5. A GPA of at least 2.00 must be earned each semester.

6. Grades of C- or better in all course work required for the major should be earned, and students should have a cumulative GPA of 2.00 in all major course work attempted.

7. A recommended plan of study must be started toward the major no later than the start of the second semester of study (see note below for exceptions) and thereafter students must make adequate progress toward completing the major (defined by each major). A statement of adequate progress is available from the major or departmental office at the time the major is declared.

8. The major must be declared no later than the start of the second semester of study (see note below for exceptions), and students must remain in that major until graduation.

9. Students should meet with their assigned primary advisor for the major during the fifth and seventh semesters of study.

10. Students must register each semester within one week of the assigned registration time.

11. Students should avoid taking courses that are in conflict with the written advice of their assigned primary advisor.

12. Students should adhere to the General Credit and Enrollment Policies and Minimum Major Requirements listed in the Arts and Sciences section.

13. Courses in conflict with major or college core curriculum requirements should be avoided.

14. The college should be notified in writing of the student's intent to graduate no later than the beginning of the seventh semester of study, and a graduation packet should be filed no later than the deadline for the appropriate graduation date (see Graduation Deadlines section).

15. Documentation should be kept proving that these requirements were satisfied (e.g., records of advising meetings attended, advising records and instructions, etc.).

The recommended plan of study for the following majors must be started in the first semester of study to be eligible for this guarantee: BA in biochemistry; chemistry; environmental, population, and organismic biology; Japanese; kinesiology; molecular, cellular, and developmental biology; geology; physics; and all majors that require foreign language course work when student proficiency falls below the entry-level language course of that major. Students seeking a BFA in dance or theatre must start the recommended plan of study for the corresponding BA program in the first semester of study and qualify for admission into the BFA program by the end of the third semester. Students seeking a BFA in film studies or fine arts must start the recommended plan of study for the corresponding BA program in the first semester of study and qualify for admission into the BFA program by the end of the fourth semester. If a student changes majors, the primary major advisor, in consultation with the College of Arts and Sciences assistant dean's office, will review the courses taken to date to determine whether the college will continue to extend the four-year guarantee.



## General Graduation Requirements

Arts and sciences students must fulfill the following requirements for graduation:

1. Pass a total of 120 hours.
2. Maintain a 2.00 (C) grade point average in all University of Colorado work and a 2.00 (C) in all major course work attempted. (Some majors may require a higher minimum grade point average.)
3. Pass 45 credit hours of upper-division work (courses numbered in the 3000s and 4000s).
4. Arts and sciences students must complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credits, a minimum of 30 credits must be in arts and sciences upper-division credit hours completed as a matriculated student in the College of Arts and Sciences at the University of Colorado at Boulder and at least 12 of these upper-division hours must be in the major. A maximum of 6 credit hours taken at other University of Colorado campuses (CU-Denver and CU-Colorado Springs) can be counted toward the minimum 45 credits required on the Boulder campus. Courses taken while on CU-Boulder study abroad programs, through CU-Boulder continuing education, or CU-Boulder correspondence courses are considered to be in residence.
5. For the bachelor of arts degree, students must complete a minimum of 75 hours outside their major department. Students who complete designated departmental honors courses in their major department and/or in honors thesis credit can reduce the 75 hours required outside the major department by a corresponding number of credits, up to a maximum of 6.
6. For the bachelor of fine arts degree, students must complete a minimum of 53 credit hours outside of their major.
7. Complete a major. Students are subject to the major requirements in force when they declare the major. See the sections Majors and Other Areas of Interest and Minimum Major Requirements in this chapter.
8. Complete the general education (college core curriculum) and MAPS requirements with the following limitations:

- a. Although a single course may be listed in more than one core area, a student may use it to meet only one area requirement.
- b. Neither independent study nor *pass/fail* courses may be used to meet MAPS deficiencies, core requirements, or the minimum major requirements.
- c. A single course may be used to meet both MAPS and core requirements as long as the course is applicable to both requirements. For example, a student admitted with a MAPS deficiency in English composition may take WRTG 1150, First-Year Writing and Rhetoric, to satisfy both the MAPS requirement and the core curriculum lower-division written communication requirement.

This policy only applies to college level course work (University of Colorado or accepted transfer credit). If a student is exempt from a given core area, this does not exempt the student from fulfilling a MAPS deficiency in that area.

*Note:* A description of the College of Arts and Sciences MAPS requirements can be found in the General Information section.

## Core Curriculum

The mainstay of the general education requirements is the College of Arts and Sciences core curriculum. The core curriculum requirements are divided into two parts: skills acquisition and content areas of study. The following sections provide descriptions of

the individual requirement areas, their underlying educational philosophies and goals, and the list of approved courses. The updated list of approved core courses is printed in each semester's *Registration Handbook and Schedule of Courses*.

### Exemptions

Selected majors and the EBIO minor are exempt from portions of the core curriculum, as core course work is considered equivalent to course work in the major. Students who graduate with more than one exempt major may apply their exemptions cumulatively.

### Skills Acquisition

These requirements are designed to assure that each student has attained a minimum level of competency in each of the areas listed: foreign language, quantitative reasoning and mathematical skills, written communication, and critical thinking.

**1. Foreign Language.** All students are required to demonstrate, while in high school, third-level proficiency in a single modern or classical foreign language. Students who have not met this requirement at the time of matriculation will have a MAPS deficiency. They may make up the deficiency only by passing an appropriate third-semester college course or by passing a CU-Boulder approved proficiency examination.

Students who are under the core curriculum, but not subject to MAPS, must complete the foreign language requirement to meet degree requirements.

Questions about placement should be referred to the appropriate foreign language department.

The goal of the language requirement is to encourage students to confront the structure, formal and semantic, of another language, significant and difficult works in that language, and one or more aspects of the culture lived in that language. This enables students to understand their own language and culture better, analyze texts more clearly and effectively, and appreciate more vividly the dangers and limitations of using a translated document. The language requirement is a general education requirement and so concentrates on reading. In some languages other abilities may be emphasized as well. Understanding what it means to read a significant text in its original language is essential for general education according to the standards of this university.

Courses offered at CU-Boulder that satisfy this requirement include the following:

- ASIA 2010-3 Intermediate Vietnamese
- ASIA 2410-3 Intermediate Hindi
- CHIN 2110-5 Intermediate Chinese 1
- CHIN 2150-5 Intensive Second-Year Chinese
- CLAS 2114-4 Intermediate Latin 1
- CLAS 3113-3 Intermediate Classical Greek 1
- FREN 2110-3 Second-Year French Grammar Review and Reading 1
- GRMN 2010-4 Intermediate German 1
- ITAL 2110-3 Intermediate Italian Reading, Grammar, and Composition 1
- JPNS 2110-5 Intermediate Japanese 1
- KREN 2110-5 Second-Year Intermediate Korean 1
- NORW 2110-4 Second-Year Norwegian Reading and Conversation 1
- PORT 2110-3 Second-Year Portuguese 1
- PORT 2150-5 Intensive Second-Year Portuguese
- RUSS 2010-4 Second-Year Russian 1
- SLHS 2325-4 American Sign Language 3
- SPAN 2110-3 Second-Year Spanish 1
- SPAN 2150-5 Intensive Second-Year Spanish
- SWED 2110-4 Second-Year Swedish Reading and Conversation 1

**2. Quantitative Reasoning and Mathematical Skills (QRMS) (3-6 semester hours).** Liberally educated people should be able to think at a certain level of abstraction and to manipulate symbols. This requirement has two principal objectives. The first is to provide students with the analytical tools used in core

curriculum courses and in their major areas of study. The second is to help students acquire the reasoning skills necessary to assess adequately the data that will confront them in their daily lives. Students completing this requirement should be able to: construct a logical argument based on the rules of inference; analyze, present, and interpret numerical data; estimate orders of magnitude as well as obtain exact results when appropriate; and apply mathematical methods to solve problems in their university work and in their daily lives.

Students can fulfill the requirement by passing one of the courses or sequences of courses listed below or by passing the CU-Boulder QRMS proficiency exam.

ECEN 1200-3 Telecommunications 1  
 ECON 1078-3 Mathematical Tools for Economists 1  
 GEOL/PHYS 1600-4 Order, Chaos, and Complexity  
 HONR 2810-3 Practical Statistics for the Social and Natural Sciences  
 MATH 1001-3 College Algebra  
 MATH 1012/QRMS 1010-3 Quantitative Reasoning and Mathematical Skills  
 MATH 1110-3 and 1120-3 The Spirit and Uses of Mathematics 1 and 2  
 MATH/QRMS 1130-3 Mathematics from the Visual Arts  
 MATH 1150-4 Precalculus Mathematics  
 MATH 1410-3 Mathematics for Secondary Educators  
 MATH/QRMS 2380-3 Mathematics for the Environment  
 PHYS 1010-3 Physics of Everyday Life 1  
 PHYS 1020-4 Physics of Everyday Life 2  
 PSCI 2074-3 Quantitative Research Methods  
 Any 3-credit math module: MATH 1011-3, MATH 1071-3, or MATH 1081-3.  
 Any three 1-credit math modules: MATH 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, or 1100. It is recommended that students register for clusters of three modules, for example, MATH 1000-1020, 1020-1040, 1050-1070, or 1080-1100.  
 Any 3 credits of mathematics courses numbered MATH 1300 and above or applied mathematics courses numbered APPM 1350 and above.

**3. Written Communication (3 lower-division and 3 upper-division semester hours).** Writing is a skill fundamental to all intellectual endeavors. While some college courses require more writing than others, good writing is recognized as a necessary means of communication in every scholarly discipline. The core curriculum promotes the principle that ideas do not exist apart from language, and thus content cannot be isolated from style. For ideas to flourish, they must be expressed clearly and gracefully, so that readers take pleasure while taking instruction. Students may meet the lower-division component of this requirement by first passing one of the approved lower-division courses or by receiving a score of 3, 4, or 5 on the English Language and Composition Advanced Placement exam. The lower-division requirement may be waived if a student scores appropriately on the SAT verbal or ACT English examinations. Students may then complete the upper-division component of this requirement by passing one of the approved upper-division courses or by passing the written communication proficiency exam.

#### Lower-Division Courses

ARSC 1080 (3-4) College Writing and Research  
 ARSC 1150-3 Writing in Arts and Sciences  
 EBIO 1950-3 Introduction to Scientific Writing (formerly EPOB 1950)  
 ENGL 1001-3 Freshman Writing Seminar  
 HONR 2020-3 Honors Writing Workshop  
 IPHY 1950-3 Introduction to Scientific Writing in Kinesiology (formerly KAPH 1950)  
 SEWL 2021-3 Conversations on the American West Writing Seminar  
 WRTG 1100-4 Extended First-Year Writing and Rhetoric  
 WRTG 1150-3 First-Year Writing and Rhetoric (formerly UWRP 1150)  
 WRTG 1250-3 Advanced First-Year Writing and Rhetoric (formerly UWRP 1250)

#### Upper-Division Courses

ARSC 3100-3 Multicultural Perspectives and Academic Discourse  
 EBIO 3940-3 Arguments in Scientific Writing (formerly EPOB 3940)

ENVS 3020-3 Advanced Writing in Environmental Studies  
 HONR 3220-3 Advanced Honors Writing Workshop  
 IPHY 3700-3 Scientific Writing in Kinesiology (formerly KAPH 3700)  
 PHIL 3480-3 Critical Thinking and Writing in Philosophy  
 PHYS 3050-3 Writing in Physics: Problem Solving and Rhetoric  
 RLST 3020-3 Advanced Writing in Religious Studies  
 WMST 3800-3 Advanced Writing in Feminist Studies  
 WRTG 3007-3 Writing in the Visual Arts (formerly FINE 3007)  
 WRTG/NRLN 3020-3 Topics in Writing (formerly UWRP/NRLN 3020)  
 WRTG 3030-3 Writing on Science and Society (formerly UWRP 3030)  
 WRTG 3040-3 Writing on Business and Society (formerly UWRP 3040)

**4. Critical Thinking (3 upper-division semester hours).** Courses in this area encourage the active practice of critical reasoning, evaluation, and discussion. They do so by providing opportunities for student participation beyond those offered in ordinary lecture courses, labs, or seminars. Critical thinking courses address matters of controversy within a given field of study or in the society at large. Students learn how to construct, defend, and criticize arguments; identify and assess tacit assumptions; and gather and evaluate evidence. Critical thinking courses emphasize some combination of the methodology of acquiring knowledge in a specific discipline, key arguments in the discipline, and problems of interpreting original literature and data. In addition, they may subject arguments within the discipline to scrutiny from competing cultural, social, or methodological perspectives. Students must pass 3 credit hours of specified course work at the upper-division level that requires them to practice sustained critical thinking and to demonstrate such thinking in both written form and oral discussion. Some of the listed courses are intended for specific majors. Others are open to all students with a general background in the field. Note the prerequisites before registering.

Courses offered at CU-Boulder that satisfy this requirement include the following:

AAST 3670-3 Japanese American Internment  
 AMST 3950-3 Critical Thinking in American Studies  
 ANTH 4180-3 Anthropological Perspectives: Contemporary Issues  
 ANTH 4520-3 Symbolic Anthropology  
 ANTH 4740-3 Peoples and Cultures of Brazil  
 ARTH 3009-3 Critical Thinking in Art History (formerly FINE 3009)  
 ARTH 3109-3 Art in Contemporary Society (formerly FINE 3109)  
 ARTH 3209-3 Art, Culture, and Gender Diversity, 1400–1600: Renaissance Art Out of the Canon (formerly FINE 3209)  
 ARTH 4087-3 Selected Topics in Contemporary Art (formerly FINE 4087)  
 ARTH 4189-3 Medieval Art (formerly FINE 3089 and FINE 4189)  
 ARTH 4289-3 Modern Art 1780–1970 (formerly FINE 3409 and FINE 4289)  
 ARTH 4739-3 Intellectual Roots of Italian Renaissance Art (formerly FINE 4739)  
 ARTH 4749-3 Exchanges Between Theory and Practice in Italian Renaissance (formerly FINE 4749)  
 ARTH/WMST 4769-3 Gender Studies in Early Modern Visual Culture (formerly FINE/WMST 4769)  
 ARTH 4779-3 Multicultural Perspectives on New Mexican Santos (formerly FINE 4779)  
 ASTR 4010-3 Senior Practicum 1: The Practice and Conduct of Science  
 ASTR 4800-3 Space Science: Practice and Policy  
 ATOC 4800-3 Policy Implications of Climate Controversies  
 BLST 4670-3 The Sixties: Critical Black Views  
 CAMW 4001-3 Seminar on the American West  
 CHEM 4181-4 Instrumental Analysis Laboratory with Environmental Emphasis  
 CHEM 4761-4 Biochemistry Lab  
 CLAS 4040-3 Seminar in Classical Antiquity  
 COMM 4220-3 Seminar: Functions of Communication  
 COMM 4300-3 Senior Seminar: Rhetoric  
 COMM 4400-3 Senior Seminar: Codes  
 COMM 4510-3 Senior Seminar: Interpersonal Communication  
 COMM 4600-3 Senior Seminar: Organizational Communication

- EBIO 4180-3 Ecological Perspectives on Global Change (formerly EPOB 4180)  
 EBIO 4570-3 Advanced Plant Physiology (formerly EPOB 4570)  
 EBIO 4800-3 Critical Thinking in Biology (formerly EPOB 4800)  
 ECON 4309-3 Economics Honors Seminar 1  
 ECON 4999-3 Economics in Action: A Capstone Course  
 ENGL 4038-3 Critical Thinking in English Studies  
 ENV5 4800-3 Critical Thinking in Environmental Studies  
 FILM/HUMN 4004-3 Film Theory  
 FREN 3100-3 Introduction to Critical Reading and Writing in French Literature  
 FREN 3200-3 Introduction to Literary Theory and Advanced Critical Analysis  
 GEOG 4173-3 Research Seminar  
 GEOG 4430-3 Seminar: Conservation Trends  
 GEOG 4622-3 City Life  
 GEOG 4742-3 Environment and Peoples  
 GEOG 4812-3 Environment and Development in South America  
 GEOG 4822-3 Environment and Development in China  
 GEOG 4892-3 Geography of Western Europe  
 GEOL 4080-3 Societal Problems and Earth Sciences  
 GEOL 4500-3 Critical Thinking in Earth Sciences  
 GRMN 4550-3 Senior Seminar: The Role of Academics in German Culture  
 HIST 3000-3 Seminar in History (nonmajors)  
 HIST 3010-3 Communist Societies in Historical Perspective  
 HIST 3011-3 Seminar in Ancient History  
 HIST 3012-3 Seminar in Modern European History  
 HIST 3016-3 Seminar in the History of Gender and Science  
 HIST 3018-3 Seminar in Latin American History  
 HIST 3019-3 Seminar in Asian and African History  
 HIST 3110-3 Honors Seminar  
 HIST 3112-3 Seminar in Renaissance and Reformation  
 HIST 3113-3 Seminar in Medieval and Early Modern English History  
 HIST 3115-3 Seminar in Early American History  
 HIST 3116-3 Seminar in the American Diplomatic History  
 HIST 3133-3 Seminar in Britain since 1688  
 HIST 3212-3 Seminar in Early Modern Europe  
 HIST 3317-3 Seminar in the American West  
 HIST 3328-3 Seminar in Middle Eastern History  
 HIST 3414-3 Seminar in European Intellectual Thought  
 HIST 3415-3 Seminar in Recent American History  
 HIST 3416-3 Seminar in American Society and Thought  
 HIST 3417-3 Seminar in African American History  
 HIST 3425-3 The Great Depression, 1929–1945  
 HIST 3511-3 Seminar in Medieval History  
 HIST 3516-3 American Culture and Reform, 1880–1920  
 HIST 3616-3 Seminar in Women's History  
 HIST 3628-3 Seminar in Recent Chinese History  
 HIST/WMST 3656-3 History of Women in Progressive Social Movements  
 HIST 3713-3 Seminar in Russian History  
 HIST 3718-3 Seminar in Japanese History  
 HONR 3270-3 Journey Motif in Women's Literature  
 HONR 4055-3 Discourse Analysis and Cultural Criticism  
 HONR 4250-3 State and Individual: Civil Disobedience  
 HUMN/JPNS 3841-3 Modern Japanese Literature in Translation  
 HUMN 4155-3 Philosophy, Art, and the Sublime  
 HUMN 4555-3 The Arts of Interpretation  
 IAFS 4500-3 The Post-Cold War World  
 IAFS 4800-3 Honors in International Affairs  
 INVS/PSCI 4732-3 Critical Thinking in Development  
 IPHY 4560-3 Quantitative Analysis in Kinesiology (formerly KAPH 4560)  
 IPHY 4660-3 Topics in Exercise Physiology (formerly KAPH 4660)  
 IPHY 4760-3 Critical Thinking in Motor Behavior (formerly KAPH 4760)  
 LDSP 4010-3 Critical Issues in Leadership: A Capstone Course  
 LING 4100-3 Perspectives on Language  
 MATH 3000-3 Introduction to Abstract Mathematics  
 MATH 3200-3 Introduction to Topology  
 MCDB 3100-3 Methods in Developmental Genetics  
 MCDB 3330-3 Evolution, Creationism, and the Origins of Life  
 MCDB 4140-3 Plant Molecular Biology and Biotechnology  
 MCDB 4330-3 Bacterial Disease Mechanisms  
 MCDB 4410-3 Human Molecular Genetics  
 MCDB 4426-3 Cell Signaling and Developmental Regulation  
 MCDB 4444-3 The Cellular Basis of Disease  
 MCDB 4471-3 Mechanisms of Gene Regulation in Eukaryotes  
 MCDB 4550-3 Cellular and Molecular Motion, A Biophysical Approach  
 MCDB 4600-3 Molecular Approaches to Human Diseases  
 MCDB 4680-3 Mechanisms of Aging  
 MCDB 4750-3 Animal Virology  
 MCDB 4790-3 Experimental Embryology  
 MCDB 4810-3 Insane in the Membrane: The Biology and Biophysics of the Membrane  
 PACS 4500-3 Senior Seminar in Peace and Conflict Studies  
 PHIL/WMST 3110-3 Feminist Practical Ethics  
 PHIL 3180-3 Critical Thinking: Contemporary Topics  
 PHIL 3480-3 Critical Thinking and Writing in Philosophy  
 PHIL/PHYS 4450-3 History and Philosophy of Physics  
 PHIL 4830-3 Senior Seminar in Philosophy  
 PHYS 3000-3 Science and Public Policy  
 PHYS 3340-3 Introduction to Research in Optical Physics  
 PHYS 4420-3 Nuclear Particle Physics  
 PHYS 4430-3 Introduction to Research in Modern Physics  
 PSCI 4701-3 Symbolic Politics  
 PSCI 4703-3 Alternative World Futures  
 PSCI 4704-3 Politics and Language  
 PSCI 4711-3 Selected Policy Problems  
 PSCI 4714-3 Liberalism and Its Critics  
 PSCI 4718-3 Honors in Political Science  
 PSCI 4721-3 Rethinking American Politics  
 PSCI 4731-3 Progress and Problems in American Democracy  
 PSCI 4734-3 Politics and Literature  
 PSCI 4751-3 The Politics of Ideas  
 PSCI 4752-3 Seminar: Central and East European Studies  
 PSCI 4761-3 Rethinking Political Values  
 PSCI 4771-3 Civil Rights and Liberties in America  
 PSCI 4783-3 Global Issues  
 PSCI 4792-3 Issues in Latin American Politics  
 PSYC 3105-3 Experimental Methods in Psychology  
 PSYC 4001-3 Honors Seminar 2  
 PSYC 4521-3 Critical Thinking in Psychology  
 RLST 3700-3 Religion and Psychology  
 RLST 4800-3 Critical Studies in Religion  
 RUSS 4230-3 Russian Cultural Idioms  
 RUSS 4851-3 Critical Thinking: Russian Film and Society  
 SLHS 4000-3 Multicultural Aspects of Communication Differences and Disorders  
 SOCY 4461-3 Critical Thinking in Sociology  
 SPAN 3100-3 Literary Analysis in Spanish  
 THTR 4021-3 Development of Theatre 4: American Theatre and Drama  
 THTR 4081-3 Senior Seminar  
 WMST 3090-3 Critical Thinking in Feminist Theory

### Content Areas of Study

**5. Historical Context (3 semester hours).** Courses that fulfill this requirement enable students to study historical problems or issues and to develop an understanding of earlier ideas, institutions, and cultures.

Courses explore the times and circumstances in which social, intellectual, artistic or other developments occurred. The purpose of this exploration is to analyze subjects in their context, that is, to investigate both the processes and the meanings of change. Among the educational aims of these courses are the following: to contribute to historical perspectives that may help to clarify issues that arise today or will arise tomorrow, to arouse the curiosity of students concerning historical conditions that may be relevant to subjects studied in other courses, and to expand the imagination by generating an awareness of the diverse ways in which our common humanity has expressed itself.

Students may choose to meet this 3-hour requirement by passing any course listed below.

ANTH 1180-3 Maritime People: Fishers and Seafarers

ANTH 1190-3 Origins of Ancient Civilizations  
 ANTH/CLAS 2009-3 Modern Issues, Ancient Times  
 ARTH/CLAS 1509-3 Trash and Treasure, Temples and Tombs: the Art and  
 Archaeology of the Ancient World (formerly CLAS/FINE 1509)  
 ASIA 1000-3 Introduction to South and Southeast Asian Civilizations  
 CEES/HIST 2002-3 Introduction to Central and East European Studies  
 CLAS 1030/PHIL 1010-3 Introduction to Western Philosophy: Ancient  
 CLAS/HIST 1051-3 The World of Ancient Greeks  
 CLAS/HIST 1061-3 The Rise and Fall of Ancient Rome  
 CLAS 1140-3 Roman Civilization  
 CLAS 2019-3 Pompeii and the Cities of Vesuvius  
 ECON 4514-3 Economic History of Europe  
 ENGL 3164/HIST 4164-3 History and Literature of Georgian England  
 ENGL 4113-3 History and Culture of Medieval England  
 GRMN/RUSS 3201-3 German and Russian Culture in Comparative  
 Perspective  
 HIST 1010-3 Western Civilization 1: Antiquity to the 16th Century  
 HIST 1020-3 Western Civilization 2: 16th Century to the Present  
 HIST 1038-3 Introduction to Latin American History  
 HIST 1040-3 Honors: Western Civilization 2  
 HIST 1208-3 Sub-Saharan Africa to 1800  
 HIST 1308-3 Introduction to Middle Eastern History  
 HIST 1408-3 Introduction to South Asian History  
 HIST 1608-3 Introduction to Chinese History  
 HIST 1708-3 Introduction to Japanese History  
 HIST 2100-3 Revolution in History  
 HIST 2103-3 History of England to 1660  
 HIST 2112-3 Early Modern Societies (1450–1700)  
 HIST 2123-3 History of England 1660 to Present  
 HIST 2180-3 History of Christianity 2: From the Reformation  
 HIST 2222-3 War and Society in the Modern World  
 HIST 2319-3 Introduction to Islam  
 HIST 2513-3 The History of Ireland, 1600 to Present  
 HIST 2543-3 Medieval Societies  
 HIST 4324-3 History of Modern Science  
 HONR 2251-3 Introduction to the Bible  
 HUMN 1010-6 Introduction to Humanities 1  
 HUMN 1020-6 Introduction to Humanities 2  
 PHIL 1020-3 Introduction to Western Philosophy: Modern  
 PHIL 3000-3 History of Ancient Philosophy  
 PHIL 3010-3 History of Modern Philosophy  
 PHIL 3410-3 History of Science: Ancients to Newton  
 PHIL 3430-3 History of Science: Newton to Einstein  
 RLST 3000-3 The Christian Tradition  
 RLST 3100-3 Judaism  
 RUSS 2211-3 Introduction to Russian Culture  
 RUSS 2221-3 Introduction to Modern Russian Culture  
 RUSS 3601-3 Russia's Past and Present  
 SCAN 2202-3 The Vikings

**6. Cultural and Gender Diversity (3 semester hours).** Courses fulfilling this requirement increase the student's understanding of the world's diversity and pluralism through the study of two broad and interrelated areas: (1) the nature and meaning of the categories of race, ethnicity, and gender; and (2) cultures other than those of Europe and the United States. This requirement explicitly identifies an awareness and understanding of pluralism as essential to a liberal education.

**(1) Gender and Ethnic Diversity.** Courses in this area are designed to expand the range of each student's understanding of the origin, definition, and experience of the categories of gender, ethnicity, and race. They apply new approaches to knowledge and scholarly inquiry and explore the ways in which nonsexist and nonracist language expand understanding of social groups. They are concerned with recovery of knowledge about individuals and groups excluded from traditional studies of societies and share the fundamental goal of identifying the way these social categories define and therefore shape human thought and experience.

**(2) Non-Western Cultures.** These courses are designed to expand the range of the student's understanding of cultures that are not

derived principally from the western experience. A comparative perspective introduces students to the commonality and diversity of cultural responses to universal human problems. Each course seeks to cultivate insight into and respect for diversity by requiring students to explore a cultural world quite different from their own.

Courses satisfying this requirement are intended to portray culture in the most integrated sense, including aspects of material adaptation, social pattern, ideas and values, and aesthetic achievement.

Students are required to pass 3 hours of course work from any course listed below. Students who graduate with a major in ethnic studies are exempt from completing the cultural and gender diversity requirement.

AAST 1015-3 Introduction to Asian American Studies  
 AAST 2210-3 The Japanese American Experience  
 AAST 3671/CHST/ETHN/WMST 3670-3 Immigrant Women in the Global  
 Economy  
 AIST 1125/ANTH 1120-3 Exploring a Non-Western Culture: Hopi and  
 Navajo  
 AIST 2000-3 Introduction to American Indian Studies: Precontact Native  
 America  
 AIST 2015-3 Topical Issues in Native North America  
 AIST/RLST 2700-3 American Indian Religious Traditions  
 AIST/WMST 3210-3 American Indian Women  
 AIST 4565/ANTH 4560-3 North American Indian Acculturation  
 ANTH 1100-3 Exploring a Non-Western Culture: The Tamils  
 ANTH 1110-3 Exploring a Non-Western Culture: Japan  
 ANTH 1130-3 Exploring a Non-Western Culture: Amazonian Tribal Peoples  
 ANTH 1140-3 Exploring a Non-Western Culture: The Maya  
 ANTH/BLST 1150-3 Exploring a Non-Western Culture: Regional Cultures  
 of Africa  
 ANTH 1160-3 The Ancient Egyptian Civilization  
 ANTH 1170-3 Exploring Culture and Gender through Film  
 ARTH 3209-3 Art, Culture, and Gender Diversity, 1400–1600: Renaissance  
 Art Out of the Canon (formerly FINE 3209)  
 ARTH/WMST 4769-3 Gender Studies in Early Modern Visual Culture  
 (formerly FINE/WMST 4769)  
 ASIA 1000-3 Introduction to South and Southeast Asian Civilizations  
 ASTR 2000-3 Ancient Astronomies of the World  
 BLST 2000-3 Introduction to Black Studies  
 BLST 2200-3 Contemporary Black Protest Movements  
 BLST 2210-3 Black Social and Political Thought  
 BLST/HIST 2437-3 African American History  
 BLST 3023-3 African American Family in U.S. Society  
 BLST/PSCI 3101-3 Black Politics  
 CHIN 1061-3 Boudoirs, Books, Battlefields: Voices and Images of Chinese  
 Women  
 CHST 1015-3 Introduction to Chicano Studies  
 CHST 1031-3 Chicano Fine Arts and Humanities  
 CHST/HIST 2537-3 Chicano History  
 CHST/WMST 3135-3 Chicana Feminisms and Knowledges  
 CHST 3153-3 Folklore and Mythology of the Hispanic Southwest  
 CHST 4133/PSCI 4131-3 Latinos and the U.S. Political System  
 CLAS/WMST 2100-3 Women in Ancient Greece  
 CLAS/WMST 2110-3 Women in Ancient Rome  
 EALC 1011-4 Introduction to Traditional East Asian Civilizations  
 EALC 1021-4 East Asian Civilizations: Modern Period  
 ECON 4626-3 Economics of Inequality and Discrimination  
 EDUC 3013-(3-4) School and Society  
 EMUS 2772-3 World Musics  
 ENGL/WMST 1260-3 Introduction to Women's Literature  
 ENGL 1800-3 American Ethnic Literatures  
 ENGL 3677-3 Jewish-American Fiction and Old World Backgrounds  
 ETHN 3675-3 Fight the Power: People of Color and Social Movement  
 Struggles

- FARR/LDSP 2400-3 Understanding Privilege and Oppression in Contemporary Society
- FILM 3013-3 Women and Film
- FREN/ITAL 1400-3 Medieval/Renaissance Women Writers in Italy and France
- FREN 1700-3 Francophone Literature in Translation
- FREN 1750-3 Oriental Representations in French/Francophone Literature and Visual Arts
- FREN/HUMN 4500-3 Reading the Orient: French Literature and Exoticism
- GEOG/WMST 3672-3 Gender and Global Economy
- GEOG 3822-3 Geography of China
- GRMN 3501-3 Jewish-German Writers: Enlightenment to Present Day
- HIST 2616-3 Women's History
- HIST 2626-3 Gender and Culture
- HONR 1810-3 Honors Diversity Seminar
- HONR/WMST 3004-3 Women in Education
- HONR 4025-3 Heroines and Heroic Tradition
- HUMN 2145-3 African America in the Arts
- HUMN 3065-3 Feminist Theory/Women's Art
- HUMN 4064-3 "Primitivism" in Art and Literature
- HUMN/ITAL 4150-3 The Decameron and the Age of Realism
- HUMN/ITAL 4730-3 Italian Feminisms: Culture, Theory, and Narratives of Difference
- INVS 3100-4 Multicultural Leadership: Theories, Principles, and Practices
- KREN 1011-3 Introduction to Korean Civilization
- KREN 3441-3 Religion and Culture in Korea
- LAMS 1000-3 Introduction to Latin American Studies
- LGBT 2000/WMST 2030-3 Introduction to Lesbian, Gay, Bisexual, and Transgender Studies
- LING 2400-3 Language and Gender
- LING 3220-3 American Indian Languages in Social-Cultural Context
- PHIL/WMST 2290-3 Philosophy and Women
- PSCI/WMST 4271-3 Sex Discrimination: Constitutional Issues
- PSCI/WMST 4291-3 Sex Discrimination: Federal and State Law
- PSYC/WMST 2700-3 Psychology of Contemporary American Women
- RLST/WMST 2800-3 Women and Religion
- RLST 3510-3 Australian Religions
- RUSS/WMST 4471-3 Women in 20th Century Russian Culture
- SOCY/WMST 1006-3 The Social Construction of Sexuality
- SOCY/WMST 1016-3 Sex, Gender, and Society 1
- SOCY 2026-3 Man and Masculinity
- SOCY/WMST 3012-3 Women, Development, and Fertility
- WMST 2000-3 Introduction to Feminist Studies
- WMST 2020-3 Social Construction of Femininities and Masculinities
- WMST 2050-3 Women and Society
- AMST 2010-3 Themes in American Culture 2
- AMST/ARTH 3509-3 American Art (formerly AMST/FINE 3509)
- AMST 4500-3 American Autobiography
- ANTH 3170-3 America: An Anthropological Perspective
- BAKR 1500-3 Colorado: History, Ecology, and Environment
- BLST 2015-3 History of the Black Experience 1
- BLST 2016-3 History of the Black Experience 2
- BLST/HIST 2437-3 African American History
- BLST 3023-3 African American Family in U.S. Society
- CAMW 2001-3 The American West
- CHST/HIST 2537-3 Chicano History
- ECON 4524-3 Economic History of the U.S.
- ECON 4697-3 Industrial Organization and Regulation
- EMUS 2752-3 Music in American Culture
- ETHN/SOCY 1015-3 U.S. Race and Ethnic Relations
- HIST 1015-3 History of the United States to 1865
- HIST 1025-3 History of the United States since 1865
- HIST 1035-3 Honors: History of the United States to 1865
- HIST 1045-3 Honors: History of the United States since 1865
- HIST 2015-3 The History of Early America
- HIST 2117-3 History of Colorado
- HIST 2126-3 Modern U.S. Politics and Diplomacy
- HIST 2166-3 The Vietnam Wars
- HIST 2215-3 The Era of the American Revolution
- HIST 2227-3 History of the American Southwest
- HIST 2316-3 History of American Popular Culture
- HIST 2326-3 Issues in American Thought and Culture
- HIST 2516-3 America through Baseball
- HIST 2746-3 Christianity in American History
- HIST 2837-3 Topics in American Working Class History
- HIST 2866-3 American History and Film
- HIST 4326-3 Health and Disease in the United States
- HUMN 3145-3 African America in the Arts
- LING 1000-3 Language in U.S. Society
- PHIL 1200-3 Philosophy and Society
- PHIL 2220-3 The Nature of Law
- PSCI 1101-3 American Political System
- PSCI 3011-3 The American Presidency
- PSCI 3054-3 American Political Thought
- PSCI 3061-3 State Government and Politics
- PSCI 3071-3 Urban Politics
- PSCI 3163-3 American Foreign Policy
- PSCI 3171-3 Government and Capitalism in the U.S.
- PSCI 4021-3 Legislatures and Legislation
- RLST 2450-3 Self, Society, and Spirituality since the Sixties
- RLST 2500-3 Religion in the United States
- RLST 3050-3 Religion and Literature in America
- SOCY 1012-3 Population Issues in the United States
- SOCY/WMST 3016-3 Marriage and the Family in U.S. Society
- SOCY 3151-3 Self in Modern Society
- WMST 2400-3 History of Women and Social Activism

**7. United States Context (3 semester hours).** Courses fulfilling the United States context requirement explore important aspects of American culture and society. They stimulate critical thinking and an awareness of the place of the United States in the world by promoting an understanding of the particular world views that the diversity, environment, culture, history, values, and expression of the United States have fostered. Courses familiarize students with the United States and enable them to evaluate it critically.

These courses teach an appreciation of American culture while inviting students to ask probing questions about American values and ideals. How have Americans derived a sense of identity from geography, language, politics, and the arts? How do Americans view and influence the world beyond their borders? How have the rights and responsibilities of citizenship changed over time? How have Americans dealt with opposing values in their culture? Completing this requirement, students will develop both a better understanding of the American present and past, and a considerable interest in the American future.

This 3-hour requirement may be fulfilled by passing any course listed below.

- AAST/HIST 2717-3 Asian American History
- AAST 3013-3 Asian Pacific American Communities
- AAST/AMST/WMST 3900-3 Asian American Women
- AI 2015-3 Topical Issues in Native North America
- AMST 2000-3 Themes in American Culture 1

**8. Literature and the Arts (6 semester hours, 3 of which must be upper division).** These courses promote a better understanding of fundamental aesthetic and cultural issues. They sharpen critical and analytical abilities so that students may develop a deeper appreciation of works of art. The goal of this requirement is to enhance the student's ability to read critically, to understand the elements of art, and to grasp something of the complex relations between artist and public, and between art work and cultural matrix. The emphasis in courses which fulfill this requirement is on works that are generally recognized as central to and significant for one's cultural literacy and thereby enhance the student's understanding of our literary and artistic heritage.

Courses stress literary works as well as the history and criticism of literature and the arts. They may utilize creative projects as a means of arriving at a better understanding of the art form, but students may not use studio or performance classes to satisfy this requirement.

Students are required to pass 6 hours of course work in literature and the arts, of which at least 3 hours must be upper division, unless either HUMN 1010 or 1020 is completed.

If students graduate with a major dealing in depth with literature and the arts (Chinese, classics, dance, English, fine arts, French, Germanic studies, humanities, Italian, Japanese, Portuguese, Russian, Spanish, or theatre), they are exempt from this requirement.

Courses offered at CU-Boulder that satisfy this requirement include the following:

#### Lower-Division Courses

AAST 2752/ENGL 2757-3 Survey of Asian American Literature  
 ARTH 1300-3 History of World Art 1 (formerly FINE 1300)  
 ARTH 1400-3 History of World Art 2 (formerly FINE 1400)  
 ARTH/CLAS 1509-3 Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World (formerly CLAS/FINE 1509)  
 ARTH 1709-3 Experiencing Art-Image, Artist, and Idea (formerly FINE 1709)  
 ARTH 2409-3 Introduction to Asian Arts (formerly FINE 2409)  
 CHIN 1051-3 Masterpieces of Chinese Literature in Translation  
 CHIN 2441-3 Film and the Dynamics of Chinese Culture  
 CLAS 1100-3 Greek Mythology  
 CLAS 1110-3 Masterpieces of Greek Literature in Translation  
 CLASS 1115-3 Honors—Masterpieces of Greek Literature in Translation  
 CLAS 1120-3 Masterpieces of Roman Literature in Translation  
 DNCE 1029-3 Introduction to World Dance and Culture  
 EMUS 1832-3 Appreciation of Music  
 EMUS 2762-3 Music and Drama  
 EMUS 2862-3 American Film Musical, 1926–1954  
 ENGL 1500-3 Masterpieces of British Literature  
 ENGL 1600-3 Masterpieces of American Literature  
 FREN 1200-3 Medieval Epic and Romance  
 FREN 1800-3 Contemporary French Literature in Translation  
 GRMN 1602-3 Metropolis and Modernity  
 GRMN 2501-3 20th Century German Short Story  
 HONR 2860-3 The Figure of Socrates  
 HUMN 1010-6 Introduction to Humanities 1  
 HUMN 1020-6 Introduction to Humanities 2  
 JPNS 1051-3 Masterpieces of Japanese Literature in Translation  
 RLST 2220-3 Religion and Dance: Africa to America to Africa  
 RLST 2230-3 Religion and Dance: India to Ballet  
 RUSS 2231-3 Fairy Tales of Russia  
 SPAN 1000-3 Cultural Difference through Hispanic Literature  
 THTR 1009-3 Introduction to Theatre  
 THTR 1011-3 Development of Theatre 1: Classical Theatre and Drama

#### Upper-Division Courses

ARTH/CLAS 3039-3 Greek Art and Archaeology (formerly CLAS/FINE 3039)  
 ARTH/CLAS 3049-3 Roman Art and Architecture (formerly CLAS/FINE 3049)  
 ARTH 4329-3 Modern Art 1 (formerly FINE 4329)  
 ARTH 4619-3 Quattrocento Art of Florence and Central Italy (formerly FINE 4619)  
 ARTH 4659-3 The Roman Baroque (formerly FINE 4659)  
 ARTH 4759-3 17th Century Art and the Concept of the Baroque (formerly FINE 4759)  
 CHIN 3351-3 Reality and Dream in Traditional Chinese Fiction  
 CLAS 4110-3 Greek and Roman Epic  
 CLAS/HUMN 4120-3 Greek and Roman Tragedy  
 CLAS/HUMN 4130-3 Greek and Roman Comedy  
 DNCE 3029-3 Looking at Dance  
 DNCE 4017-3 History and Philosophy of Dance  
 EMUS 3822-3 Music Literature 1  
 EMUS 3832-3 Music Literature 2  
 ENGL 3000-3 Shakespeare for Nonmajors  
 ENGL 3060-3 Modern and Contemporary Literature  
 FREN 3110-3 Main Currents of French Literature 1  
 FREN 3120-3 Main Currents of French Literature 2  
 FREN 3200-3 Introduction to Literary Theory and Advanced Critical Analysis  
 FREN 4300-3 Theatre and Modernity in 17th Century France  
 FREN/HUMN 4500-3 Reading the Orient: French Literature and Exoticism  
 GRMN 3502-3 Literature in the Age of Goethe

GRMN/HUMN 4504-3 Goethe's *Faust*  
 HUMN 3065-3 Feminist Theory/Women's Art  
 HUMN 3440-3 Literature and Medicine  
 HUMN 4064-3 "Primitivism" in Art and Literature  
 HUMN/ITAL 4140-3 The Age of Dante: Readings from *The Divine Comedy*  
 HUMN/ITAL 4150-3 *The Decameron* and the Age of Realism  
 HUMN/ITAL 4730-3 Italian Feminisms: Culture, Theory, and Narratives of Difference  
 HUMN/RUSS 4811-3 19th Century Russian Literature in Translation  
 HUMN/RUSS 4821-3 20th Century Russian Literature and Art  
 RUSS 4831-3 Contemporary Russian Literature  
 SCAN 3202-3 Old Norse Mythology  
 SCAN 3203-3 Masterpieces of Modern Scandinavian Literature  
 SCAN 3204-3 Medieval Icelandic Sagas  
 SCAN 3205-3 Scandinavian Folk Narrative  
 SCAN 3209-3 Contemporary Nordic Literature and Film  
 SCAN 3506-3 Scandinavian Drama  
 SPAN 3700-3 Selected Readings: Spanish Literature in Translation  
 SPAN 3800-3 Selected Readings: Modern Latin American Literature in Translation  
 THTR 3011-3 Development of the American Musical Theatre

**9. Natural Science (13 semester hours, including a two-course sequence and a laboratory or field experience).** These courses study the nature of matter, life, and the universe. They enhance literacy and knowledge of one or more scientific disciplines, and enhance those reasoning and observing skills that are necessary to evaluate issues with scientific content. Courses are designed to demonstrate that science is not a static list of facts, but a dynamic process that leads to knowledge. This process is one of subtle interplay between observation, experimentation, and theory, enabling students to develop a critical view toward the conclusions and interpretations obtained through the scientific process.

Through a combination of lecture courses and laboratory or field experiences, students gain hands-on experience with scientific research. They develop observational skills of measurement and data interpretation and learn the relevance of these skills to the formation and testing of scientific hypotheses.

The goal of this requirement is to enable students to understand the current state of knowledge in at least one scientific discipline, with specific reference to important past discoveries and the directions of current development; to gain experience in scientific observation and measurement, in organizing and quantifying results, in drawing conclusions from data, and in understanding the uncertainties and limitations of the results; and to acquire sufficient general scientific vocabulary and methodology to find additional information about scientific issues, to evaluate it critically, and to make informed decisions.

The natural science requirement, which consists of passing 13 hours of approved natural science course work, includes one two-semester sequence of courses and at least 1 credit hour of an associated lab or field experience. No more than two lower-division courses may be taken from any single department (1-credit-hour lab/field experience courses are excepted).

Students who graduate with a major in the natural sciences (biochemistry, chemistry, EBIO, geology, kinesiology, MCD biology, or physics) or students who graduate with a minor in EBIO are exempt from completing the natural science requirement.

Courses offered at CU-Boulder that satisfy this requirement include the following:

#### Two-Semester Sequences

(Note: Although not recommended, the first semester of a sequence may be taken as a single course. Also, some sequences have included or optional laboratories.)

ANTH 2010-3 and 2020-3 Introduction to Physical Anthropology 1 and 2 (optional labs ANTH 2030, 2040)

ANTH 2050-4 and 2060-4 Honors: Human Origins 1 and 2 (optional labs ANTH 2030, 2040)  
 ASTR 1010-4 and 1020-3 Introductory Astronomy 1 and 2 (lab included in ASTR 1010)  
 ASTR 1030-4 and 1040-4 Accelerated Introductory Astronomy 1 and 2 (lab included in ASTR 1030)  
 ASTR 1110-3 and 1020-3 General Astronomy: The Solar System and Introductory Astronomy 2  
 ATOC 1050-3 and 1060-3 Weather and Atmosphere and Our Changing Environment: El Niño, Ozone, and Climate  
 CHEM 1011-3 and 1031-4 Environmental Chemistry 1 and 2 (lab included in CHEM 1031)  
 CHEM 1051-4 and 1071-4 Introduction to Chemistry and Introduction to Organic and Biochemistry (lab included)  
 CHEM 1111-5 and 1131-5 General Chemistry 1 and 2 (lab included)  
 CHEM 1111-5 and 1071-4 General Chemistry 1 and Introduction to Organic Biochemistry (lab included)  
 CHEM 1151-5 and 1171-5 Honors General Chemistry 1 and 2 (lab included)  
 EBIO 1030-3 and 1040-3 Biology: A Human Approach 1 and 2 (optional lab EBIO 1050) (formerly EPOB 1030, 1040 and 1050)  
 EBIO 1210-3 and 1220-3 General Biology 1 and 2 (optional labs EBIO 1230, 1240) (formerly EPOB 1210, 1220, 1230 and 1240)  
 GEOG 1001-4 and 1011-4 Environmental Systems 1 and 2: Climate and Vegetation, Landscapes and Water (lab included)  
 GEOL 1010-3 and 1020-3 Introduction to Geology 1 and 2 (optional lab GEOL 1030)  
 GEOL 1060-3 and 1070-3 Global Change 1 and 2-An Earth Science Perspective (optional lab GEOL 1110)  
 MCDB 1111-4 and 2150-3 Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life and Principles of Genetics (lab included in MCDB 1111)  
 MCDB 1150-3 and 2150-3 Introduction to Cell and Molecular Biology and Principles of Genetics (optional labs MCDB 1151, 2151)  
 PHYS 1010-3 and 1020-4 Physics of Everyday Life 1 and 2 (lab included in PHYS 1020)  
 PHYS 1110-4 and 1120-4 General Physics 1 and 2 (optional lab PHYS 1140)  
 PHYS 1170-4 and 1180-4 Honors General Physics 1 and 2 (optional lab PHYS 1140)  
 PHYS 2010-5 and 2020-5 Honors General Physics 1 and 2 (lab included)

### Nonsequence Courses

ANTH 3000-3 Primate Behavior  
 ANTH 3010-3 The Human Animal  
 ARSC/GEOL 2110-4 Physical Science of the Earth System (lab included)  
 ARSC/MCDB 2115-4 Life Science of the Earth Systems (lab included)  
 ASTR 1120-3 General Astronomy: Stars and Galaxies  
 ASTR 2000-3 Ancient Astronomies of the World  
 ASTR 2010-3 Modern Cosmology: Origin and Structure of the Universe  
 ASTR 2020-3 Introduction to Space Astronomy  
 ASTR 2030-3 Black Holes  
 ASTR 3210-3 Intermediate Astronomy: Solar System  
 ASTR 3220-3 Intermediate Astronomy: Stars and Galaxies  
 ATOC 3180-3 Aviation Meteorology  
 ATOC 3300/GEOG 3301-3 Analysis of Climate and Weather Observations  
 ATOC 3500-3 Air Chemistry and Pollution  
 ATOC/ENVS 3600/GEOG 3601-3 Principles of Climate  
 BAKR 1300-3 Ecosystems of Colorado  
 CHEM 1021-4 Introductory Chemistry (lab included)  
 CHEN 1000-3 Creative Technology  
 CLAS 2020-3 Science in the Ancient World  
 EBIO 3150-3 Introduction to Tropical Conservation Biology (formerly EPOB 3150)  
 EBIO 3180-3 Global Ecology (formerly EPOB 3180)  
 EBIO 3190-3 Tropical Marine Ecology (formerly EPOB 3190)  
 ENVS 1000-4 Introduction to Environmental Studies  
 ENVS/PHYS 3070-3 Energy and the Environment  
 ENVS/GEOL 3520-3 Environmental Issues in Geosciences  
 GEOG 3511-4 Introduction to Hydrology  
 GEOG/GEOL 4241-4 Principles of Geomorphology (lab included)  
 GEOL/PHYS 1600-3 Order, Chaos, and Complexity  
 GEOL 2100-3 Environmental Geology  
 GEOL 3040-3 Global Change: The Recent Geological Record  
 GEOL 3070-3 Introduction to Oceanography

GEOL 3500-3 Mineral Resources, World Affairs, and the Environment  
 GEOL 3720-3 Evolution of Life: The Geological Record  
 GEOL 3950-3 Natural Catastrophes and Geologic Hazards (formerly GEOL 4950)  
 HIST 4314-3 History of Science from the Ancients to Newton  
 IPHY 3420-3 Nutrition, Health, and Performance (formerly KAPH 3420)  
 IPHY 3660-3 The Dynamics of Motor Learning (formerly KAPH 3660)  
 MCDB 1030-3 Plagues, People, and Microorganisms  
 MCDB 1041-3 Fundamentals of Human Genetics  
 MCDB 1042-3 Biological Basis of Human Disease  
 MCDB 3150-3 Biology of the Cancer Cell  
 MCDB 3330-3 Evolution, Creationism, and Origins of Life  
 PHIL 1400-3 Philosophy and the Sciences  
 PHIL 3410-3 History of Science: Ancients to Newton  
 PHIL 3430-3 History of Science: Newton to Einstein  
 PHYS 1230-3 Light and Color for Non-Scientists  
 PHYS 1240-3 Sound and Music  
 PHYS 1700-3 Physics: Its History and Philosophy  
 PHYS 2900-4 Science, Computer Images, and the Internet  
 PSYC 2012-3 Biological Psychology 1  
 SLHS 2010-3 Science of Human Communication

### One-Credit-Hour Lab/Field Courses

(Note: Each course below has a prerequisite or corequisite.)

ANTH 2030-1 Lab in Physical Anthropology 1  
 ANTH 2040-1 Lab in Physical Anthropology 2  
 ATOC 1070-1 Weather and the Atmosphere Laboratory  
 EBIO 1050-1 Biology: A Human Approach Laboratory (formerly EPOB 1050)  
 EBIO 1230-1 General Biology Lab 1 (formerly EPOB 1230)  
 EBIO 1240-1 General Biology Lab 2 (formerly EPOB 1240)  
 GEOL 1030-1 Introduction to Geology Lab 1 (formerly GEOL 1080)  
 GEOL 1110-1 Global Change Lab  
 MCDB 1151-1 Introduction to Molecular Biology Lab  
 MCDB 2151-1 Principles of Genetics Lab  
 PHYS 1140-1 Experimental Physics 1

**10. Contemporary Societies (3 semester hours).** All individuals function within social frameworks. Courses in contemporary societies introduce students to the study of social groups, including social institutions and processes, the values and beliefs shared by their members, and the forces that mold and shape social groups. They prepare students to approach social phenomena of all kinds in an informed and critical way, and to describe, analyze, compare, and contrast them. Such study also provides students with new vantage points from which to view their own socio-cultural assumptions and traditions.

These courses, which treat societies of the 20th century, study an individual society or compare several societies. All explicitly attempt to deepen the students' understanding of the cultural, political, economic, or social contexts that shape people's lives. Their scope may be global or specific, but all courses that fulfill this requirement address social processes, institutions, values, forces, and beliefs.

Students who graduate with a major in anthropology, economics, international affairs, political science, psychology, or sociology are exempt from the contemporary societies requirement. Students may satisfy this 3-hour requirement by passing any course listed below.

AAST 1015-3 Introduction to Asian American Studies  
 AAST 3013-3 Asian Pacific American Communities  
 AIST 4565/ANTH 4560-3 North American Indian Acculturation  
 ANTH 1200-3 Culture and Power  
 BLST 2200-3 Contemporary Black Protest Movements  
 BLST 2210-3 Black Social and Political Thought  
 BLST/PSCI 3101-3 Black Politics  
 BLST/RLST 3125-3 Black Religious Life in America  
 COMM 1210-3 Perspectives on Human Communication (formerly COMM 2210)  
 COMM 2400-3 Communication and Society

ECON 1000-4 Introduction to Economics  
 ECON 2010 (3-4) Principles of Microeconomics  
 ECON 2020-4 Principles of Macroeconomics  
 ECON 3403-3 International Economics and Policy  
 ECON 3535-3 Natural Resource Economics  
 ECON 3545-3 Environmental Economics  
 EDUC 3013 (3-4) School and Society  
 FARR/LDSP 2400-3 Understanding Privilege and Oppression in Contemporary Society  
 GEOG 3742-3 Place, Power, and Contemporary Culture  
 GRMN 1601-3 Introduction to Modern German Culture and Civilization  
 HIST 2126-3 Modern U.S. Politics and Diplomacy  
 HIST 2166-3 The Vietnam Wars  
 HONR 1820-3 Critical Issues in Contemporary Societies  
 HONR 2880 (4-5) Social Ethics in Context: A Service Learning Approach  
 HUMN 4835-3 Literature and Social Violence  
 IAFS 1000-4 Global Issues and International Affairs  
 INVS 3000-3 Innovative Approaches to Contemporary Issues through Service Learning  
 INVS/PSCI 4732-3 Critical Thinking in Development  
 ITAL 1500-3 "That's Amore": Introduction to Italian Culture  
 LING 1000-3 Language in U.S. Society  
 PRLC 1820-3 Community Issues in Leadership  
 PSCI 1101-3 American Political System  
 PSCI 2012-3 Introduction to Comparative Politics  
 PSCI 2223-3 Introduction to International Relations  
 PSCI 3032-3 Latin American Political Systems  
 PSCI 3082-3 Political Systems of Sub-Saharan Africa  
 PSCI 3143-3 Problems in International Relations  
 PSCI 4002-3 Western European Politics  
 PSCI 4012-3 Global Development  
 PSCI 4062-3 Emerging Democracies of Central and East Europe  
 PSCI 4272-3 Capitalist Democracies in Global World Economy  
 PSYC 2606-3 Social Psychology  
 RLST 2400-3 Religion and Contemporary Society  
 RUSS 2221-3 Introduction to Modern Russian Culture  
 RUSS 4831-3 Contemporary Russian Literature  
 SCAN 2201-3 Introduction to Modern Scandinavian Culture and Society  
 SLHS 1010-3 Disabilities in Contemporary American Society  
 SOCY 1001-3 Introduction to Sociology  
 SOCY 1005-3 Social Conflict and Social Values  
 SOCY 4024-3 Juvenile Delinquency  
 WMST 2600-3 Gender, Race, and Class in Contemporary U.S. Society

**11. Ideals and Values (3 semester hours).** Ideals and values have usually been determined by long-standing traditions and fixed social practices. In our modern world, the interaction of different cultures, movement from place to place, electronic media, and the rapidity of change, even within a given society, have combined to generate new constellations of ideals and hard choices among values.

Courses meeting the ideals and values requirement inquire into some specific sphere of human value (e.g. moral, religious, intellectual, aesthetic, environmental, etc.). In these courses students are encouraged to reflect upon fundamental ideals and values, their own and others, and the sources from which those value orientations derive. Such inquiry demands the development of the critical skills which help students identifying the assumptions and ramifications of value structures. It also requires consideration of approaches by which value systems are constructed, justified, and applied, especially in regard to the personal, societal, and in some cases cross-cultural contexts.

Students may complete this 3-hour requirement by passing any course listed below.

AIST/RLST 2700-3 American Indian Religious Traditions  
 BLST/RLST 3125-3 Black Religious Life in America  
 CLAS/PHIL 2610-3 Paganism to Christianity  
 FARR 2510-3 Exploring Good and Evil through Film  
 FARR 2660/HONR 2250-3 The Ethics of Ambition  
 FARR 2820-3 The Future of Spaceship Earth

FILM 2013-3 Film and the Quest for Truth  
 GRMN 1603-3 Should I or Shouldn't I? Ethical Dilemmas in the Modern World  
 GRMN 2502-3 Representing the Holocaust  
 GRMN/HUMN 3505-3 The Enlightenment: Tolerance and Emancipation  
 GRMN/HUMN 4502-3 Nietzsche: Literature and Values  
 HONR 4155-3 Problems of Ancient and Modern Democracy  
 HUMN 3440-3 Literature and Medicine  
 HUMN 3590-3 Modern Literature and the Bible: A Case Study in Intertextuality  
 HUMN 4155-3 Philosophy, Art, and the Sublime  
 INVS 1000-4 Responding to Social Problems: An Introduction to Service Learning  
 LDSP 1000-3 The Foundations of 21st Century Leadership  
 PHIL 1000-3 Introduction to Philosophy  
 PHIL 1100-3 Ethics  
 PHIL 1200-3 Philosophy and Society  
 PHIL 1600-3 Philosophy and Religion  
 PHIL 2200-3 Major Social Theories  
 PHIL 3100-3 Ethical Theory  
 PHIL/WMST 3110-3 Feminist Practical Ethics  
 PHIL 3140-3 Environmental Ethics  
 PHIL 3160-3 Bioethics  
 PHIL 3190 (3-4) War and Morality  
 PHIL 3200-3 Social and Political Philosophy  
 PHIL 3260-3 Philosophy and the International Order  
 PHIL 3600-3 Philosophy of Religion  
 PRLC 1810-3 Ethical Leadership  
 PSCI 2004-3 Survey of Western Political Thought  
 PSCI 3054-3 American Political Thought  
 RLST 1620-3 The Religious Dimension in Human Experience  
 RLST 2220-3 Religion and Dance: Africa to America to Africa  
 RLST 2450-3 Self, Society, and Spirituality since the Sixties  
 RLST 2500-3 Religion in the United States  
 RLST 2600-3 World Religions: West  
 RLST 2610-3 World Religions: India  
 RLST 2620-3 World Religions: China and Japan  
 RUSS 3502-3 Ideals and Values in Modern Russia  
 RUSS 4221-3 Cultural Mythologies of Russian Communism  
 SEWL 2000-3 America, the Environment, and the Global Economy  
 SLHS 1010-3 Disabilities in Contemporary American Society  
 SOCY 1003-3 Ethics and Social Issues in U.S. Health and Medicine  
 SOCY 1004-3 Deviance in U.S. Society  
 SOCY 1005-3 Social Conflict and Social Values  
 SOCY 2031-3 Social Problems  
 SOCY 3151-3 Self in Modern Society

## Majors and Other Areas of Interest

To be eligible for the four-year guarantee, a student must begin the program of study and declare the major by the start of the second semester or earlier for some select majors. For complete information, see the Four-Year Graduation Requirements in this section.

All arts and sciences students pursuing a bachelor's degree must enter a degree-granting major by the end of their sophomore year (i.e., the semester in which they will complete 60 semester hours of work, including transfer work).

Departments are responsible for advising their majors and also for certifying the completion of those students' programs for graduation. The college can assume no responsibility for difficulties arising out of a student's failure to establish and maintain contact with the major department or program.

### Minimum Major Requirements

The following minimum requirements are specified by the college. In many cases departmental requirements may be higher than the minimums listed here.

1. A minimum of 30 credit hours in the major area (for the BFA, a minimum of 50 hours).



2. Thirty semester hours in the major area, all with grades of C- (1.70) or higher.
3. Eighteen credit hours of upper-division courses in the major, all with grades of C- (1.70) or higher.
4. Twelve hours of upper-division course work in the major on the CU-Boulder campus.
5. A 2.00 (C) overall grade point average in all major work attempted.
6. Special requirements as stipulated by the major department.
7. No more than 8 credit hours of independent study.

Students are subject to those major requirements in effect at the time they formally declare the major. All College of Arts and Sciences students have 10 years to complete the requirements for a declared major. If this 10-year limit is exceeded, students may be required to satisfy the current major requirements. Students with further questions should consult a major advisor.

### Open Option

“Open option” (OPNO) is a major, but it is not a degree program. Open option offers a structured advising program that provides students with the necessary support and strategies to investigate and compare academic disciplines so they can make informed decisions about the degree programs they will pursue. Students can explore any major available in the college while completing course requirements toward a baccalaureate degree. To ensure that students graduate in a timely manner, open option majors are required to enter a specific degree program by the time they have completed 60 credit hours (approximately the end of the sophomore year). Students must declare and enter a degree-granting major by the start of the second semester (or earlier for certain majors) to maintain eligibility for the four-year guarantee.

Every open option student is assigned to a specific open option advisor with whom the student works until she or he declares and enters a degree-granting major.

### Double Majors

Students pursuing either the BA or BFA degree may graduate with more than one major within the degree (e.g., economics and French) by completing all requirements for both majors. A minimum of 120 total credit hours is required for double majors.

### Minors

A number of departments and programs in the College of Arts and Sciences offer minor programs. Participation in a minor program is optional for students pursuing a bachelor's degree. Course work applied to a minor also may be applied toward general education (core curriculum or college list) and major requirements. Students may not earn a major and a minor in the same program of study.

Departments and programs with approved minor programs currently include applied mathematics; astrophysical and planetary sciences; atmospheric and oceanic sciences; chemistry and biochemistry; Chinese; classics; dance; economics; environmental, population, and organismic biology; ethnic studies; French; geography; geological sciences; Germanic studies; history; Italian; Japanese; linguistics; mathematics; philosophy; physics; political science; religious studies; Russian studies; theatre; and women's studies. Minors are also available in business offered by the Leeds School of Business and in computer science offered by the College of Engineering and Applied Science. Interested students should contact the college, department, or program office for further information.

Although the structure of specific minor programs may differ, all minors offered in the College of Arts of Sciences must have the following restrictions or minimum requirements:

1. A minimum of 18 credit hours must be taken in the minor area, including a minimum of 9 upper-division hours.
2. All course work applied to the minor must be completed with a grade of C- or better (no *pass/fail* work may be applied). The grade point average for all minor degree course work must be equal to 2.00 (C) or higher.
3. Students pursuing a major in distributed studies or an individually structured major are not eligible to earn a minor.
4. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.
5. Students may earn no more than two minors.
6. Students must complete all requirements for a minor by the time they graduate.

### Areas of Interest

The college sponsors programs—but not undergraduate majors—in the areas of interest below. Course work in these areas is open to all interested students. Contact the Office of the Dean for more information.

- Afroamerican Studies
- American Indian Studies
- Asian American Studies
- Bibliography
- Chicano Studies
- Honors
- International and National Voluntary Service Training Museum

### Certificate Programs

The college also sponsors undergraduate certificate programs in a number of fields of study. Completion of specified course work in the certificate programs below entitles students to a certificate issued by the dean of the college. Students interested in these programs should contact the director of the appropriate program.

- Actuarial Studies
- British Studies
- Central and Eastern European Studies
- Cognitive Sciences
- Lesbian, Gay, Bisexual, and Transgender Studies
- Medieval and Early Modern Studies
- Neurosciences and Behavior
- Peace and Conflict Studies
- Western American Studies

### Multiple Degrees

#### Double Degrees

Two different degrees (i.e., a BA and BFA from the College of Arts and Sciences, or two degrees from different schools or colleges) may be earned from CU-Boulder if the following conditions are fulfilled:

1. The student meets the residency requirements of, and is enrolled in, both the College of Arts and Sciences and the college or school granting the second degree.
2. The student presents a total of at least 150 credit hours passed.
3. For the BA and BFA degrees, 90 credit hours of arts and sciences course work are required (courses from outside arts and sciences that have been approved for the arts and sciences core curriculum will apply toward the 90 credit hours).

4. The student has completed all general education and major requirements of the College of Arts and Sciences.
5. Both degrees must be awarded at the same time.

### Second Baccalaureate Degrees

A student who has been awarded a baccalaureate degree, either from this college or elsewhere, may be granted a second baccalaureate degree provided the following conditions have been fulfilled:

1. All general requirements for the degree to be awarded by the College of Arts and Sciences have been met. (Students are subject to the general degree requirements in effect the semester they enter the second baccalaureate degree program.)
2. The major in the BA or BFA is different from the major in the first degree earned.
3. Arts and sciences students must complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus toward the second degree after admission to the second degree program. Of these 45 credits, a minimum of 30 credits must be in arts and sciences upper-division credit hours completed as a matriculated student in the second degree in the College of Arts and Sciences at the University of Colorado at Boulder and at least 12 of these upper-division hours must be in the major. Courses taken as a nondegree student do not count in these minimum requirements.

### Graduation Deadlines

Arts and sciences seniors must meet appropriate application deadlines in order to graduate. To apply for graduation, students must consult with their primary advisor and complete a graduation packet. Students must submit the complete graduation packet to the main office of the Academic Advising Center by one of the deadlines listed below.

Commencement	Date Due
May	November 1
August	April 1
December	July 1

### Graduate Study

Curricula leading to advanced degrees are offered by most of the departments in the College of Arts and Sciences. Students should consult the Graduate School section for admission and degree requirements of the Graduate School. Curricula for graduate programs are listed alphabetically in this section.

For information about enrollment in graduate course work while still an undergraduate, see Seniors at the University of Colorado in the Graduate School section.

### Actuarial Studies

The actuarial studies certificate program is designed to help students obtain the mathematical, economical, and financial expertise necessary to become actuaries—the mathematical planners of the insurance and pension industries.

The program is an interdisciplinary effort of the Departments of Mathematics, Applied Mathematics, Economics, and the Leeds School of Business.

Students in the program can be of any major or college, or can be nondegree candidates. The entrance requirements are three semesters of calculus completed with grades of B+ or better. There are a number of courses in mathematics, economics, and business required to earn the certificate. The certificate is awarded by the dean of the College of Arts and Sciences.

Besides taking courses, students are encouraged to take the professional exams offered by the various actuarial societies. The entrance requirements can be waived for students who receive a score of eight out of 10 on the first actuarial examination.

Interested students should contact one of the co-directors, Kent Goodrich at 303-492-6687 or David Grant at 303-492-7208, who will provide advice on actuarial studies to students who are not in the program. For more information, see [www.colorado.edu/ActuarialStudies/](http://www.colorado.edu/ActuarialStudies/).

### American Studies

See *Ethnic Studies*.

### Anthropology

Degrees ..... BA, MA, PhD

Anthropology is the study of people, both ancient and modern, in their cultural context. The field involves a global look at human cultures from prehistoric times to the present, integrating findings from the social sciences, natural sciences, and humanities. Students of anthropology learn to appreciate the variety of cultures throughout human history and to understand the meaning of human biological and cultural development as well as diversity.

The undergraduate degree in anthropology emphasizes knowledge and awareness of:

- basic methods, concepts, alternative theories and approaches, and modes of explanation appropriate to each of the three main subfields of the discipline (archaeology, biological anthropology, and cultural anthropology);
- basic archaeological techniques, including stratigraphy, dating, and inference of human behavior from archaeological data, as well as human history from its beginning through the emergence of complex societies;
- variation, patterning, and creativity in human social behavior and symbolic systems, including ecological, social, cultural, and psychological factors, and the kinds of ethnographic data relevant to each (this includes the distribution and diversity of contemporary and recent human societies in terms of social, political, religious, and economic organization, and the effects of global interactions and cultural movements); and
- theories of primate and human evolution and the basic data of the hominid fossil record, as well as biological variation in contemporary human populations.

In addition, students completing the degree in anthropology are expected to acquire the ability and skills to:

- identify trends or patterns in anthropological data from different cultures or periods, identify an appropriate context of explanation or interpretation, and formulate a testable explanation or reasonable interpretation, including the ability to identify data that constitute credible evidence for an explanation or interpretation; and
- identify and define a significant problem or topic in anthropology and analyze and interpret data in a systematic manner.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. (A minimum of 30 credit hours in anthropology, 18 of which must be upper division, is required for the degree.)

<i>Required Courses</i>	<i>Semester Hours</i>
ANTH 2010 Introduction to Physical Anthropology 1 .....	3
ANTH 2100 Frontiers of Cultural Anthropology .....	3
ANTH 2200 Introduction to Archaeology .....	3
One upper-division topical course in cultural anthropology .....	3
One upper-division ethnographic area course in cultural anthropology .....	3
One upper-division course in archaeology .....	3
One upper-division course in physical anthropology .....	3
Electives in anthropology (6 credits must be at the upper-division level; students planning to pursue graduate work in anthropology are advised to take ANTH 4000) .....	9

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in anthropology, students should meet the following requirements:

- Declare a major in anthropology by the beginning of the second semester.
- Complete ANTH 2010, 2100, and 2200 by the end of the fourth semester.
- Complete 12 credits of upper-division anthropology courses by the end of the sixth semester, including fulfilling at least two of the four upper-division requirements.
- Complete 6 additional anthropology credits by the end of the seventh semester, including the two remaining upper-division requirements.
- Complete one 3-credit anthropology course during the eighth semester.

### Graduate Degree Programs

**Prerequisites.** To be considered for admission as a regular degree student, applicants should have a minimum undergraduate grade point average of 3.00 (4.00 = A) or a master of arts degree in anthropology. Graduate Record Examination scores for verbal and quantitative aptitude tests are required. Letters of recommendation and evidence of previous anthropologically oriented experience and work are carefully considered. Students with fewer than 18 credit hours of previous course work in anthropology are considered deficient and may be asked to present a greater number of hours for a degree.

**Application.** Inquiries concerning applications should be directed to the graduate secretary. Completed applications are reviewed once each year and are due by January 15. Students with no previous graduate work should apply for entrance into the MA program which, if successfully completed, will prepare them for the PhD program. Students who have or will have completed an MA degree in anthropology by the time of their admission may apply for direct admission into the PhD program, but they may be required to complete specific remedial requirements in some cases.

**Course Requirements.** All entering graduate students must have had the equivalent of ANTH 4000 or 5000 (Quantitative Methods in Anthropology) or take the course during their first year in residence.

As partial fulfillment towards a graduate degree, all students must complete three graduate core courses, one from each of the three subdisciplines of anthropology (cultural, physical, and archaeology). Core courses must be taken during the first two semesters in residence. Other specific course requirements are established through a consultation with an academic advisor. MA students are normally expected to write a thesis (plan I).

Students may have a primary specialization in any of the major subfields of anthropology: archaeology, cultural, or physical anthropology.

The department expects graduate students to maintain a breadth of competence in general anthropology through the master's degree with specialization intensifying with progress toward the PhD degree.

Additional information about other specific areas of specialization and other requirements for the degree may be obtained by writing directly to the graduate secretary, Department of Anthropology, and by referencing the Graduate School section.

### Applied Mathematics

*Degrees.....MS, PhD*

The Department of Applied Mathematics in the College of Arts and Sciences offers courses and degree programs for undergraduate and graduate students. Course offerings at the undergraduate level focus on providing students with the mathematical tools and problem-solving strategies that are useful in science and engineering. The undergraduate bachelor of science degree is offered through the College of Engineering and Applied Science.

The department offers a range of courses and research opportunities in many areas, including computational mathematics, probability and statistics, nonlinear phenomena, and physical applied mathematics. Each of these areas is described below.

#### Computational Mathematics

The study of computational mathematics has grown rapidly over the past 15 years and has allowed mathematicians to answer questions and develop insights not possible only 20 to 30 years ago. Modern computational methods require in-depth knowledge of a variety of mathematical subjects including linear algebra, analysis, ordinary and partial differential equations, asymptotic analysis, elements of harmonic analysis, and nonlinear equations. Since computers are invaluable tools for an applied mathematician, students are expected to attain a highly professional level of computer literacy and gain a substantial knowledge of operating systems and hardware. Computational mathematics courses include the study of computational linear algebra, optimization, numerical solution of ordinary and partial differential equations, solution of nonlinear equations, and advanced seminars in wavelet and multiresolution analysis.

#### Nonlinear Phenomena

In recent years there has been an explosion of interest in the study of nonlinear waves and dynamical systems with analytical results, often motivated by the use of computers. The faculty in the Department of Applied Mathematics are actively and intensively involved in this growing field. Research areas include integrable systems, conservative and dissipative chaos, numerical computation, wavelets and multi-resolution analysis, solitons, integrable systems, cellular automata, pattern formation, qualitative structure and bifurcation theory, onset of chaos and turbulence, analytic dynamics, and transport phenomena. Department courses in this field include dynamical systems, nonlinear wave motion, and many advanced seminars. Suitable background courses are analysis, computation, and methods in applied mathematics. Valuable supplemental courses include mechanics and fluid dynamics.

#### Physical Applied Mathematics

Physical applied mathematics is a term that generally refers to the study of mathematical problems with direct physical application. This area of research is intrinsically interdisciplinary. In addition to mathematical analysis, it requires an in-depth understanding of the underlying applications area, and usually requires knowledge and experience in numerical computation. The department has approximately 40 affiliated faculty who can direct thesis research in areas such as atmospheric and fluid dynamics, theoretical physics, plasma physics, genetic structure, parallel computation, etc. The department's course requirements are designed to provide students with a foundation for their study (analysis and

computation). The department also requires supplemental courses in one of the sciences or engineering fields necessary for thesis research in physical applied mathematics.

### *Probability and Statistics*

Almost all natural phenomena in the technological, biological, physical, and social sciences have random components. Applied probability is the application of probabilistic methods to understand the random elements in real-life problems. Statistics is the science of using data that typically arise from the randomness inherent in nature to gain new knowledge. Research areas of the applied math and affiliated faculty exhibit this interplay between mathematics and real-life problems. Areas of current interest include optimization of stochastic networks; the study of stochastic processes and stochastic differential equations in hydrology and telecommunications; probabilistic models, and statistical tests based on these models, in genetics and RNA sequencing; and extreme value theory in estimation of maximal wind speeds. Appropriate course work includes analysis, probability and statistics, as well as background courses in one of the sciences or engineering fields in which one intends to do research.

### Bachelor's Degree Programs

A bachelor of science degree in applied mathematics is currently offered by the College of Engineering and Applied Science.

The undergraduate curriculum in applied mathematics trains students in the applications of mathematics in engineering and science. The use of computational methods and implementation of algorithms on computers is central. Technical electives may be selected from mathematics, engineering, physics, chemistry, computer science, biology, astrophysics, and geology.

In general, nontechnical electives should be broadening and have multicultural value. Students interested in research also are encouraged to take a foreign language as early as possible. French, German, or Russian are recommended.

Interested students should contact the applied mathematics office in the College of Arts and Sciences for information on specific major and degree requirements.

### *Minor Program*

A minor is offered in applied mathematics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/minors/minors.html](http://www.colorado.edu/artsscience/minors/minors.html).

A minor in applied mathematics indicates that a student has received in-depth training in mathematical techniques and computational methods well beyond the training usually received by science and engineering majors.

### Concurrent BS/MS Degree Program

The concurrent BS/MS program in applied mathematics enables well-qualified and motivated students to experience graduate-level course work earlier in their education and to obtain an MS degree in a reduced time period. Applied math majors may apply for this program during their junior year. Minimum requirements for admission include completion of at least two APPM courses numbered 3000 or higher, an overall GPA of 3.40 or higher, an APPM and MATH GPA of 3.40 or higher, and two letters of recommendation from APPM faculty. Students interested in this program are encouraged to consult with an applied mathematics faculty advisor early in their undergraduate career.

### Graduate Studies

Prerequisites for graduate study in applied mathematics include three semesters of calculus and a course in differential equations and linear algebra. Other strongly recommended courses are Methods in Applied Mathematics (APPM 4350 and 4360); Intermediate Numerical Analysis (APPM or MATH 4650 and 4660); either Matrix Methods (APPM 3310) or Linear Algebra (MATH 3130); and Analysis (MATH 4310). The overall grade point average for mathematics and applied mathematics must be *B* or better.

Students should carefully read the Requirements for Advanced Degrees in the Graduate School section. What follows is an abbreviated summary of specific requirements for the department. A precise description of the degree requirements is available from the *Applied Mathematics Supplement to the Catalog* available from the applied mathematics office or the Graduate school.

### *MS Degree*

The department requires a candidate to complete an approved program of study consisting of at least 30 semester hours. At least 18 of these 30 hours must be in applied mathematics courses at the 5000 level or above (neither 4350/5350, 4360/5360, nor 4720/5720 generally count toward this requirement). All students must complete two year-long sequences in applied mathematics. (Approved sequences are APPM 5440/5450, 5470/(5460 or 5480), 5520/5560, and 5600/5610. Other sequences require faculty advisor approval.) If APPM 5600/5610 is not taken, then the computational preliminary exam becomes compulsory. All students are required to take a yearlong sequence in an area where mathematics has significant applications or from the math department (faculty advisor approval required).

The master's degree requirements may be fulfilled by following the requirements for either the thesis (Plan I) or the non-thesis (Plan II) option. Students who elect Plan II must have approval of the chair of the Graduate Committee.

### *Combined MS and MA Program with MCD Biology*

This three-year interdisciplinary program offers two master's degrees: an MS in applied mathematics and an MA in MCD biology. The goal of the program is to produce well-trained applied mathematics students who are capable of making serious contributions leading to advancements in molecular biology. Such students will be well educated in computational sciences, statistics, probability, and molecular biology.

Students are expected to meet all requirements for admission to the graduate program in the Department of Applied Mathematics and possess a basic science background suitable for pursuit of this dual degree. Students are also expected to meet minimum requirements for admission to the graduate program in MCD Biology. Adequate undergraduate preparation consists of successful completion of basic courses on cell and molecular biology. Any student deemed deficient in either area will be required to take Cell Biology (MCDB 3120) and Molecular Biology (MCDB 3500) after enrollment. Students will be required to apply to both programs, with APPM the primary one. Subject to joint recommendation and approval by APPM and MCDB, incoming students will be admitted to this dual degree program as a regular part of the applied mathematics recruitment process.

### *MS with Computational Science and Engineering Track*

The purpose of this program is to meet the needs of students who want to learn the basic concepts and skills of Computational Science and Engineering, and then to continue toward a PhD in a discipline outside applied mathematics. A student who completes this program successfully will obtain a master's

degree in applied mathematics, in the Computational Science and Engineering Track. The program is designed to provide interested students with a foundation in computational mathematics and, at the same time, to allow sufficient latitude for the student to become proficient in an outside discipline. Approximately half of the credits for the master's degree will be taken from a department other than applied mathematics.

A student in the Computational Science and Engineering Track will be enrolled simultaneously in two graduate programs, one in applied mathematics and one in the department from which the student wishes to receive a PhD. An interested student can apply for admission to this track either when applying for graduate study at CU, or at any time in the student's first two years of graduate study. First-year and second-year graduate students in any of the participating departments may apply for admission to this program.

### PhD Degree

The Department of Applied Mathematics offers course work and research leading to the PhD degree in applied mathematics.

A minimum of 60 credit hours is required for the degree, including 30 hours in courses numbered 5000 or above (neither 4350/5350, 4360/5360, nor 4720/5720 generally count towards this requirement) and 30 hours of dissertation credit. A grade of B- or higher must be attained in each course. No specific courses are mandatory (apart from two semesters of seminars—APPM 8000, 8100, or 8600), but the selection ought to include some of the department's core sequences, such as applied analysis (APPM 5440/5450) and numerical analysis (APPM 5600/5610). Other recommended sequences are methods (APPM 5470/(5460 or 5480)) and statistics (APPM 5520/5560). Finally, each student must take a yearlong graduate sequence outside of applied mathematics in an area where mathematics has significant application. Faculty advisor approval of the sequence is required. Preliminary exams are offered in four areas: analysis, computation, partial differential equations, and probability/statistics. Students must take the computation and analysis exams, and either one of the other two.

Further information on the department and degree requirements is available from the supplement to the catalog in the applied mathematics office or in the Graduate School.

## Art and Art History

### Degrees .....BA, BFA, MA, MFA

The Department of Art and Art History offers the bachelor of arts in art history and in studio, and the bachelor of fine arts in studio arts.

The undergraduate degree in art history emphasizes knowledge and awareness of:

- the major artistic monuments of the world in a historical context;
- varied methodologies used to study art historically; and
- artistic media and techniques.

In addition, students completing the degree in art history are expected to acquire the ability and skills to:

- relate individual monuments to their historical and cultural context by identifying technique, style, and subject matter;
- interpret historical and critical information about works of art, artists, and related issues; and
- organize and communicate concepts and data pertaining to the history of art effectively in written and oral form.

The undergraduate degree in studio art emphasizes knowledge and awareness of:

- the significance of the major monuments in art history, with an emphasis on contemporary art;
- at least one discipline of studio art;
- related critical issues in studio practice; and
- a wide range of stylistic approaches.

In addition, students completing a degree in studio art are expected to acquire the ability and skills to:

- analyze their own works of art in terms of form and content;
- interpret the work of others;
- execute ideas in one or more artistic media;
- demonstrate artistic ability and technical proficiency in one chosen medium; and
- communicate in verbal and written form the particular conceptual and perceptual attitudes and stances of their own artistic production.

## Bachelor's Degree Programs

BA degrees in art history and in studio arts require 45 credits in the major and a minimum of 75 nonmajor credits. The BFA degree in studio arts requires 66 credits in the major. Regular contact with fine arts advisors is recommended.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Bachelor of Arts (Art History)

(45 credit hours in the major)

<i>Required Courses</i>	<i>Semester Hours</i>
ARTS 1010 Introduction to Art .....	3
ARTH 1300 and 1400 World Art 1 and 2 .....	6
ARTH 4919 BA Art History Seminar .....	3
Any six upper-division art history courses .....	18
ARTS or ARTH electives .....	15

### Graduating in Four Years with a BA in Art History

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in art history, students should meet the following requirements:

Declare the major by the beginning of the second semester.

By the end of the third semester, complete lower-division studio courses, lower-division art history courses, and two classes in upper-division art history.

By the end of the sixth semester complete up to 32 credit hours in the major. Final semesters not to exceed 45 credits toward the major.

### Bachelor of Arts (Studio Arts)

(45 credit hours in the major)

<i>Required Courses</i>	<i>Semester Hours</i>
ARTS 1010 Introduction to Art .....	3
Select three of the following:	
ARTS 1003 Printmaking 1 .....	3
ARTS 1012 Drawing 1 .....	3
ARTS 1171 Photography 1 .....	3
ARTS 1212 Painting 1 .....	3
ARTS 1514 Sculpture 1 .....	3
Two 2000- level courses in area of emphasis .....	6
ARTH 1300 and 1400 World Art 1 and 2 .....	6
Any two upper-division art history courses .....	6
Upper-division studio emphasis (minimum) .....	12
ARTS or ARTH electives .....	3

### Graduating in Four Years with a BA in Studio Arts

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in studio arts, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete ARTS 1010 Introduction to Art, two level-1 studio classes, and lower-division art history courses by the end of the third semester.

Complete 30-36 credit hours in the major by the end of the sixth semester.

Final semesters not to exceed 45 credits in the major.

### Bachelor of Fine Arts (Studio Arts)

(66 credits toward the major)

Students must present and pass a portfolio review to be eligible for the BFA degree (a minimum of 30 credit hours is required).

<i>Required Courses</i>	<i>Semester Hours</i>
ARTS 1010 Introduction to Art .....	3
ARTH 1300 World Art 1 .....	3
ARTH 1400 World Art 2 .....	3
Select three of the following courses:	
ARTS 1003 Printmaking 1 .....	3
ARTS 1012 Drawing 1 .....	3
ARTS 1171 Photography 1 .....	3
ARTS 1212 Painting 1 .....	3
ARTS 1514 Sculpture 1 .....	3
Any two 2000-level studio courses .....	6
Any two upper-division art history courses .....	6
Upper-division studio emphasis (min.) .....	18
ARTS or ARTH electives .....	12
ARTS 4117 BFA Seminar .....	6

*Note: BA/BFA candidates must complete a minimum of 9 out of 15 credits in the major on the Boulder campus.*

### Required Studio Courses for Studio Arts Majors

Painting and drawing majors must take any sequence of courses culminating in ARTS 4002 Drawing 4 or ARTS 4202 Painting 4. Ceramics majors must take ARTS 4085 Ceramics 4 and ARTS 4095 Special Topics in Ceramics. Printmaking majors are not required to take ARTS 1003 and may register for ARTS 3403, ARTS 3413, and ARTS 3423 as sophomores.

### Graduating in Four Years with a BFA in Studio Arts

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in studio arts or divisional studio arts, students should meet the following requirements:

Declare the major by the beginning of the first semester, freshman year.

Complete ARTS 1010, ARTH 1300, 1400, 9 credit hours of lower-division studio, two 2000-level courses, and one lower-division or upper-division studio or art history course by the end of the third semester (27 credit hours).

Apply for the BFA in the fourth or fifth semester, with a minimum of 30 hours in the major.

Complete up to 48 credit hours in the major by the end of the sixth semester.

Final semesters not to exceed 66 credits toward the major.

### Honors

Students may graduate with departmental honors. Those interested in pursuing this program should contact the Honors Department and/or the Department of Art and Art History representative as early as possible. The minimum GPA requirement is 3.30 overall and 3.50 in the major. Students may take Studio or Art History Honors Thesis to complete individual work.

### Student Fees

All fine arts courses are subject to fees ranging from \$50 to \$150, depending upon credit hours. Consult the *Registration Handbook* for more information.

*Special Note:* Students should be aware that work left in studios and/or exhibited in the Sibell Wolle Fine Arts building is left at their own risk. The department will not be held responsible for loss or damage.

### Special Programs

**Art History in Italy.** Art history faculty annually conduct this program, which offers 6 credit hours of upper-division or graduate-level credit during a five-week summer term. Course offerings may vary, covering the late Medieval, Renaissance, and Baroque periods. The course divides its time between Florence and Rome, with up to a week spent in Venice.

Inquiries regarding this and other foreign studies programs should be directed to the Study Abroad Office in the Office of International Education.

**Colorado Collection.** The Colorado Collection is a wide-ranging teaching collection comprised primarily of works on paper ranging from expert old master prints and drawings to innovative contemporary art that speaks to the issues of our times. The collection includes a modest selection of 19th- and 20th century photographs, as well as ceramics, sculptures, and paintings. The collection is housed in the Fine Arts Building, under the auspices of the CU Art Museum. It is used for instruction, research, and special study sessions, and is exhibited periodically in the CU Art Museum. Each summer exhibitions drawn from the collection travel to communities across Colorado as part of the statewide outreach program CU This Summer, sponsored by the University of Colorado at Boulder.

**Exhibitions Program.** The CU Art Museum, located in the Sibell Wolle Fine Arts Building, presents an active program of exhibitions and related activities that reflect the interests, constituencies, and resources of the university community and of the greater metropolitan area. The museum focuses on contemporary art by artists of international, national, and regional significance, and addresses current concerns and developments in the visual arts. Bachelor of fine arts shows and master's of fine arts thesis shows also are held in the museum, which has a total of 5,000 square feet of space. Graduate assistants and student guards help staff the galleries and receive practical training in the field.

**Visiting Artist Program.** Artists of national and international reputation interact with graduate and advanced undergraduate students and discuss their studio work at seminar meetings. Artists present a public lecture during their visit, providing continuous input of significant developments and a comprehensive view of contemporary issues in the arts.

**Visual Resources Collection.** An extensive collection of slides representing art from prehistoric to modern times is maintained by the Department of Art and Art History. This collection is especially strong in the areas of African, Asian, European, Islamic, Medieval, North American, Oceanic, and Pre-Columbian art. Electronic databases are also under development.

**Thesis Collection.** A collection of work donated by MFA candidates from the thesis exhibition is also owned by the department.

### Graduate Degree Programs

The master of arts degree is offered in art history, and the master of fine arts degree is offered in creative arts. It is expected that the program be completed within two years for the MA degree and three years for the MFA degree. The creative arts areas include ceramics, painting and drawing, photography, media

arts (video and digital arts), printmaking, sculpture, and interdisciplinary arts. Students are encouraged to consult with an advisor in the appropriate area in order to obtain advice and current information.

The department, in conjunction with the Leeds School of Business, offers a dual degree program in which both MBA and MFA (or MA) degrees are awarded. The requirements are as follows:

Students must apply to and meet application requirements for each program separately.

Students must meet the admission standards for each program separately; Dual degree students may start either program first; in the first year of studies, courses are taken in one of the two departments exclusively; in the second year, courses are taken in the other department exclusively; in the third year, a combination of MBA and MFA (MA) courses is taken.

### *Master of Arts Degree (Art History)*

**Prerequisites.** The following are required for admission to the graduate program:

1. A baccalaureate degree from an approved college with a cumulative grade point average of at least 3.00.
2. A score of 500 or higher on the verbal section of the Graduate Record Examination.
3. A broad general background in history, literature, and philosophy.
4. An extensive background in art history.
5. Applicants to the master's program in art history are asked to write a 750 to 1,000 word essay in Part II, number 6 on the application form.

**Examinations.** The comprehensive exams are given during the second year of study to measure graduate student knowledge of art history at the master's degree level. The exams consist of slides and essay questions.

**Degree Requirements: Plan I (Thesis Option).** A minimum of 30 semester hours must be completed, of which 21 must be completed in residence on the Boulder campus. Requirements and regulations include:

#### 1. Courses.

Theories of Art History (ARTH 6929) must be taken during the first semester. This course may be taken twice for up to 6 credit hours.

Visiting Scholars Seminar (ARTH 5929) must be taken during the second semester. Students are encouraged to repeat this course.

At least one 3-credit, 5000- or 6000-level course in five of the following areas of art history: ancient, medieval, Renaissance, Baroque, Art of the Americas, modern, contemporary, Asian, tribal arts, American, and critical theory.

Where appropriate, Teaching Practicum, 2 credits per semester while teaching, not to exceed 8 credits.

At least one 3-credit, 3000-level or above course in a department outside the Department of Art and Art History, which supplements the major or minor areas of specialization.

Comprehensive exam.

Master's Thesis (ARTH 6959): 4–6 credit hours (see below).

No more than 9 hours of independent study credit may be applied toward the MA degree.

*Pass/fail* courses do not count toward the MA degree.

ARTH 5087 (Selected Topics) courses do not count toward the MA degree.

A limit of 9 hours of transfer credits may be applied toward the MA degree.

Students are encouraged and expected to attend undergraduate lecture courses as needed to prepare themselves for graduate seminars and for the comprehensive exam.

2. Thesis. See thesis requirements under Master of Arts and Master of Science in the Graduate School section.

3. After acceptance of the final draft of the thesis by the thesis advisor, an oral examination takes place dealing with the

subject matter of the thesis and any areas of weakness that may have been found in the written comprehensive exam.

4. Language Requirement. The candidate for the MA degree in art history is required to demonstrate an adequate reading knowledge of French, German, or another appropriate language before receiving the degree by completing course work equal to 3 progressive semesters at the college level or above or by passing an approved language examination. Minimum scores required on the Graduate Student Foreign Language Test are: German, 450; Russian, 380; French, 425; and Spanish, 425. Other languages, such as Italian or Chinese, must be arranged with the art history faculty on an individual basis.

**Degree Requirements: Plan II (Project Option).** Same requirements as above with the following exceptions:

1. A minimum of 36 semester hours is required.
2. The Project replaces the thesis. The precise nature of the project will be worked out among the student, faculty advisor, and committee, and must be approved by the entire art history faculty.

### *Master of Fine Arts Degree (Creative Arts)*

**Prerequisites.** The following are required for admission to the graduate program:

1. Bachelor's degree from an approved college or school of art with a minimum grade point average of 2.75.
2. Minimum of 34 credit hours of acceptable work in art; 12 credits in fine arts history is preferred.
3. Submission of a slide portfolio, including 20 examples, representing creative work.
4. Electronic media students should submit a portfolio of creative work to include slides, video and/or audio tapes, film, etc., as appropriate (especially for documentation of performance and/or installations) for screening by the electronic media committee for presentation to the full graduate faculty.

**Degree Requirements.** A minimum of 60 credit hours (of which 42 credit hours must be taken in residence on the Boulder campus) of acceptable graduate work must be completed beyond the bachelor's degree.

#### *Required Courses*

#### *Semester Hours*

#### **Studio**

33 credit hours, consisting of the following:

Courses in painting and drawing, ceramics, sculpture, printmaking, photography and media arts, interdisciplinary arts	12
Courses in second area, including studio critiques, independent, and interdisciplinary studies.	9
Electives, preferably taken in an approved allied field, 3000 level or higher.	.6
Additional studio course work, including independent and interdisciplinary study and studio critique.	.6

#### **Nonstudio**

21 credit hours, consisting of the following:

Art history	.6
Theory in this or another research-related department (3000-level or higher in another department)	.3
Visiting Artist Seminar (ARTS 5118). Must be taken during first year of studies.	.3
Graduate Studio Seminar (ARTS 5117). Must be taken during first year of studies	.3
Additional nonstudio course work, e.g. MFA Practicum	.6

#### **Thesis**

MFA creative thesis (ARTS 6957)	.6
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### Graduate First-Year Review

Graduate students are required to schedule a first-year review after one year of full-time study. The purpose of this review is to evaluate the student experience in the program and prepare the student for the qualifying paper (art history) or prethesis review (studio arts).

### Transfer of Credit

Procedures for transferring credit from other graduate programs are governed by the regulations of the Graduate School. Transfer credit, not to exceed 18 semester hours for studio arts or 9 semester hours for art history, must first be approved by faculty in the student major area.

### Change in Area of Concentration

Students who wish to change their area of concentration after admission must petition the departmental graduate committee.

### Graduation

Before registering for ARTS 6957 (MFA Thesis), students must have a pre-thesis review with their faculty advisor and thesis committee. Studio arts thesis work must take the form of original creative work of acceptable professional standards. The oral defense exam must be done in conjunction with the thesis exhibition, and the candidate must provide a critical written statement (creative thesis) concerning the work. The candidate's written creative statement and 10–15 slides (representing work in the exhibition) become part of and are housed with the departmental Visual Resources Collection. The committee may request a contribution of original work.

## Asian Studies

### Degree .....BA

The Asian Studies Program offers a broad interdisciplinary undergraduate major in Asian studies. In addition, a number of departments offer graduate training with an emphasis on Asia.

Students planning to major in Asian studies may participate in study abroad programs with prior approval from the Asian Studies Program and the Office of International Education.

For additional information on the major program, contact Faye Kleeman at **303-735-1725**.

### Bachelor's Degree Program

Student must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
ASIA 1000 Introduction to South and Southeast Asian Studies	3
EALC 1011 Introduction to Traditional East Asian Civilizations <i>or</i> EALC 1021 East Asian Civilizations: Modern Period	4
Two courses in Asian history	3/3
Three semesters of Asian languages	9-15
ASIA 4830 Senior Thesis in Asian Studies	3

Complete additional credit hours to accumulate the 40 credits needed for the major. Select from the following approved Asian Studies courses

### Approved Asian Studies Courses

Most classes are offered for 3 credit hours. Not all classes are taught every semester or even every year. Other courses with primarily Asian-related content may be taken for major credit with the director's approval.

ANTH 1100 Exploring a Non-Western Culture: The Tamils  
 ANTH 1110 Exploring a Non-Western Culture: Japan  
 ANTH 4750 Culture and Society in South Asia  
 ANTH 4760 Ethnography of Southeast Asia and Indonesia

ARTH 2409 Introduction to Asian Art  
 ARTH 4029 Art of Islam  
 ARTH 4449 Art of India and Southeast Asia  
 ARTH 4459/5459 The Arts of Japan  
 ARTH 4469/5469 The Arts of China  
 ASIA 1000 South and Southeast Asian Civilizations  
 ASIA 1010 Beginning Vietnamese 1  
 ASIA 1020 Beginning Vietnamese 2  
 ASIA 1410 Beginning Hindi 1  
 ASIA 1420 Beginning Hindi 2  
 ASIA 2010 Intermediate Vietnamese 1  
 ASIA 2020 Intermediate Vietnamese 2  
 ASIA 2410 Intermediate Hindi 1  
 ASIA 2420 Intermediate Hindi 2  
 ASIA 1840, 2840, 3840, 4840 Independent Study  
 ASIA 4830 Senior Thesis in Asian Studies (required of all majors; only offered to seniors in the spring)  
 CHIN 1010, 1020 First-Year (Beginning) Chinese  
 CHIN 1051 Masterpieces of Chinese Literature in Translation  
 CHIN 2110, 2120 Second-Year (Intermediate) Chinese  
 CHIN 2441 Film and the Dynamics of Chinese Culture  
 CHIN 3110, 3120 Third-Year (Advanced) Chinese 1 and 2  
 CHIN 3311 The Dao and the World in Medieval China  
 CHIN 3321 Culture and Literature of Ancient China  
 CHIN 3331 Culture and Literature of Late Imperial China  
 CHIN 3341 Modern Chinese Literature in Translation  
 CHIN 3351 Reality and Dream in Traditional Chinese Fiction  
 CHIN 3361 Women and the Supernatural in Chinese Literature  
 CHIN 3441 Language and Chinese Society  
 CHIN 4110, 4120 Advanced Readings in Modern Chinese 1 and 2  
 CHIN 4210 Introduction to Classical Chinese  
 CHIN 4220 Readings in Classical Chinese  
 CHIN 4300 Open Topics in Chinese Literature  
 CHIN 4750 Daoism  
 CHIN 4900 Independent Study  
 CHIN 4950 Honor Thesis  
 EALC 1011 Introduction to Traditional East Asian Civilizations  
 EALC 1021 Introduction to Modern East Asian Civilizations  
 ECON 4433 Economics of the Pacific Area  
 GEOG 3822 Geography of China  
 GEOG 4822 Geography and Modernity in China  
 HIST 1608 Introduction to Chinese History  
 HIST 1708 Introduction to Japanese History  
 HIST 2166 The Vietnam Wars  
 HIST 3628 Seminar in Recent Chinese History  
 HIST 3718 Seminar in Japanese History  
 HIST 4538 History of Modern India  
 HIST 4618 Traditional China  
 HIST 4628 Modern China  
 HIST 4638 Contemporary China  
 HIST 4648 History of Modern Chinese Intellectual Thought  
 HIST 4718 Ancient, Classical, and Medieval Japanese History  
 HIST 4728 Modern Japanese History  
 HIST 6019 Readings in Third-World History (Asian Women)  
 HIST 6618 Readings in Chinese History  
 JPNS 1010, 1020 Beginning Japanese  
 JPNS 1051 Masterpieces of Japanese Literature in Translation  
 JPNS 2110, 2120 Intermediate Japanese  
 JPNS 2441 Film and Japanese Culture  
 JPNS 3110, 3120 Advanced Japanese  
 JPNS 3441 Language and Japanese Society  
 JPNS 3811 Classical Japanese Literature in Translation  
 JPNS 3821 Medieval Japanese Literature in Translation  
 JPNS 3831 Early Modern Japanese Literature in Translation  
 JPNS 3841 Modern Japanese Literature in Translation  
 JPNS 4030 Japanese Syntax  
 JPNS 4110, 4120 Readings in Modern Japanese  
 JPNS 4300 Readings in Japanese Literature  
 JPNS 4310, 4320 Classical Japanese  
 JPNS 4900 Independent Study  
 JPNS 4950 Honors Thesis  
 KREN 1010, 1020 Beginning Korean



KREN 1011 Introduction to Korean Civilization  
 KREN 2110, 2120 Intermediate Korean  
 KREN 3441 Religion and Culture in Korea  
 PSCI 4028 Special Topics: Politics of Contemporary Japan  
 PSCI 4052 Political Systems of China, Japan, and Korea  
 RLST 2610 World Religions: India  
 RLST 2620 World Religions: China and Japan  
 RLST 3200 Hinduism  
 RLST 3250 Gandhi: Life and Teaching  
 RLST 3300 Indian Buddhism  
 RLST 3400 Japanese Religions  
 RLST 3600 Islam  
 RLST 3800 Chinese Religions  
 RLST 4200 Topics in Hinduism  
 RLST 4250/5250 Topics in Buddhism  
 RLST 4650 Islam and the Modern World  
 RLST 4700/5700 Confucianism  
 RLST 4750/5750 Taoism  
 RLST 4760 Sufism

## Astrophysical and Planetary Sciences

Degrees.....BA, MS, PhD

A new undergraduate major is now offered and has two tracks—one in general astronomy and one in astrophysics/physics (see the web site at [aps.colorado.edu](http://aps.colorado.edu)).

The track in general astronomy is designed to meet student needs for training in space sciences (astronomy, astrophysics, planetary sciences, and space physics). Undergraduates are prepared for both academic research careers and the industrial market (aerospace, computer software, instrumentation, and other technical areas) as well as for science education, science journalism, and space policy. This track provides a liberal arts degree in the science of astronomy, observations, and technology as well as core training in astronomical sciences and mathematics, applied physics, and computational and instrumental technology for professions in the space sciences. The track can focus on observations (ground-based telescopes, rocket probes, space-borne observatories) or on K–12 science education, for which astronomy provides excellent science content for motivating young students. It also offers broad training for careers in science policy and science writing.

The bachelor's degree track in astrophysics/physics is directed toward students interested in pursuing graduate studies in astrophysics by focusing on multidisciplinary work in physics and mathematics together with astronomy. Graduates are provided with scientific and technological training in the space sciences, including mathematical, physical, computational, and instrumental expertise. A senior thesis or other research work is encouraged.

Specific goals for both new programs are to provide:

- both theoretical and practical knowledge of astronomy and astrophysics at a level comparable to the best programs at other major U.S. public institutions. The Department of Astrophysical and Planetary Sciences is one of the few programs that combines both astrophysics and planetary science, providing a unified view of space sciences, the solar system and comparative planetology, stellar and galactic astronomy, and cosmology.
- courses and significant hands-on experience with telescopes, optics, instrumentation, and computer image processing and modeling. These skills are useful for students wishing to pursue graduate degrees or careers in aerospace, technical, or computer industries.
- opportunities for faculty-advised research and senior (honors) theses.

## Bachelor's Degree Program

A new major with two tracks (general astronomy and astrophysics/physics) was approved by the Regents and CCHE on June 1, 2000.

### General Astronomy Track

This is appropriate for someone aiming for a career in education, science journalism, science policy, information technology, science management, or technical work that does not require a graduate degree.

ASTR 1030 and 1040 Accelerated Introductory Astronomy or ASTR 1010 and 1020 Introductory Astronomy	7-8
PHYS 1110, 1120, and 1140 General Physics 1 and 2	9
APPM 1350 and 1360 or MATH 1300 and 2300 Calculus 1 and 2	8-10
One of the following three courses:	
ASTR/ASEN 2500 Gateway to Space	3
PHYS 2130 General Physics	3
PHYS 2170 Foundations of Modern Physics	3
Minimum of two additional courses selected from:	
ASTR 2000 Ancient Astronomies	3
ASTR 2010 Modern Cosmology	3
ASTR 2020 Space Astronomy	3
ASTR 2030 Black Holes	3
ASTR 2500 Gateway to Space	3
ASTR 3210 Intermediate Astronomy: Solar System	3
ASTR 3220 Intermediate Astronomy: Stars and Galaxies	3
ASTR 3300 Extraterrestrial Life	3

One other science sequence with lab. Can be satisfied by any sequence that satisfies arts and sciences core curriculum in natural sciences with lab, for example:

CHEM 1111 and 1131; EBIO 1210–1230, GEOL 1010, 1020, and 1080, ATOC 1050, 1060, and 1070, or equivalent	7-10
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One upper-division course sequence:

ASTR 3720 Planets and their Atmospheres and ASTR 3750 Planets, Moons, and Rings or	
ASTR 3730 Astrophysics 1: Stellar and Interstellar and ASTR 3830 Astrophysics 2: Galactic and Extragalactic	

Four additional courses from the following or from those sequence courses not used for the upper-division sequence requirement, above:

ASTR 3510 Observations and Instrumentation 1	4
ASTR 3520 Observations and Instrumentation 2	4
ASTR 3740 Cosmology and Relativity	3
ASTR 4010/4020 Senior Research Practicum	3 each
ATOC 4710 Atmospheric Physics	3
ATOC 4720 Atmospheric Dynamics	3
ASTR 5750 Observational Astronomy (with instructor's permission)	3
ASTR 5760 Astronomical Instrumentation (with instructor's permission)	3

A minor is available that may be satisfied by taking various combinations of courses among the diverse possibilities offered by the department (see below).

### Astrophysics/Physics Track (Jointly Supervised by the APS and Physics Departments)

For students aiming for a graduate program in astronomy or planetary sciences. Similar to Physics Plan 2 (Astrophysics), with additional astrophysics instrumentation labs and different electives.

Required Courses	Semester Hours
APPM 1350, 1360, 2350, and 2360 Calculus 1, 2, 3, and 4 or MATH 1300, 2300, 2400, and APPM 2360 Analytic Geometry and Calculus 1, 2, and 3 and Introduction Differential Equations with Linear Algebra	16-18
ASTR 1030 and 1040 Accelerated Introductory Astronomy	8
ASTR 3720 and 3750 planetary sequence or ASTR 3730 and 3830 astrophysics sequence	6
PHYS 1110, 1120, and 1140 General Physics 1 and 2 and PHYS 2140, 2150, and 2170 Sophomore Physics	16

PHYS 3310 and 3320 Electromagnetism and PHYS 3210 and 3220 Analytical and Quantum Mechanics .....	12
Suggested electives: PHYS 4230 Thermodynamics and Statistical Mechanics or PHYS 4410 Quantum Mechanics II or PHYS 4420 Nuclear and Particle Physics or PHYS 4510 Optics or PHYS 4150 Plasma Physics	
Three additional courses from the following:	
ASTR 3510 Observations and Instrumentation 1 .....	4
ASTR 3520 Observations and Instrumentation 2 .....	4
ASTR 3740 Cosmology and Relativity .....	3
ASTR 4010/4020 Senior Research Practicum .....	3 each
ATOC 4710 Atmospheric Physics .....	3
ATOC 4720 Atmospheric Dynamics .....	3
Any ASTR 5000- or 6000-level course with instructor's permission .....	3
Total credit hours for the major 23 hours minimum in astrophysics and 28 hours minimum in physics (this must include at least 15 upper-division hours in astrophysics and 12 in physics).	

## Minor Program

Declaration of a minor in astrophysical and planetary sciences is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [aps.colorado.edu/undergrad/minor.html](http://aps.colorado.edu/undergrad/minor.html).

A total of 18 credit hours is required for the minor. For guidance, see an astrophysical and planetary sciences (APS) faculty advisor or request written information from the departmental office.

## Graduate Degree Programs

The curriculum and research in the department emphasizes three major areas: astrophysics, planetary sciences, and space physics.

The department offers both MS and PhD degrees. During the first year of graduate study, students generally obtain a broad background in courses regarded as basic to all three areas in addition to more specialized studies. Many students take graduate-level courses in other departments (e.g., Departments of Physics, Chemistry and Biochemistry, Geological Sciences, Applied Mathematics, or Aerospace Engineering), depending upon their particular interests or participation in interdisciplinary programs (see below). Examples of basic first-year courses in the three areas include:

- ASTR 5110 Internal Processes 1
- ASTR 5120 Internal Processes 2
- ASTR 5140 Astrophysical and Space Plasmas
- ASTR 5400 Introduction to Fluid Dynamics
- ASTR 5540 Mathematical Methods

Descriptions of more specialized courses follow. Students interested in applying to this department are invited to write to Graduate Program Assistant, Department of Astrophysical and Planetary Sciences, University of Colorado at Boulder, 391 UCB, Boulder, CO 80309-0391.

### *Astrophysics (Including Solar Physics)*

The department offers a broad range of courses and research in this area, leading to the PhD degree. Graduate-level courses are offered in the following subjects:

- ASTR 5140 Astrophysical and Space Plasmas
- ASTR 5700 Stellar Structure and Evolution
- ASTR 5710 High-Energy Astrophysics
- ASTR 5720 Galaxies
- ASTR 5730 Stellar Atmospheres and Radiative Transfer
- ASTR 5740 Interstellar Astrophysics
- ASTR 5750 Observational Astronomy
- ASTR 5760 Astrophysical Instrumentation
- ASTR 5770 Cosmology
- ASTR 6000 Seminar in Astrophysics

Research in observational and theoretical astrophysics is conducted in the following areas:

Stellar atmospheres, radiative transfer, stellar winds of hot/cool stars  
 Formation of stars and planetary systems  
 Solar physics  
 Interstellar and intergalactic medium  
 Cosmology and large-scale structure of the universe; galaxy formation  
 Stellar interiors, pulsations, and neutron stars  
 Cosmic X-ray sources, supernovae and their remnants, and accretion phenomena jets and clusters of galaxies  
 Galactic evolution, quasars, and active galaxies  
 Radio and sub-millimeter astronomy  
 Plasma astrophysics and MHD  
 Astrophysical fluid dynamics  
 Laboratory and atomic astrophysics  
 UV, IR, sub-millimeter, and X-ray space astronomy  
 Instrument and detector development

### *Departmental Equipment and Research*

Research is carried out with the ARC 3.5m Apache Point telescope and with national telescopes and laboratories and international collaborators: High Altitude Observatory (HAO) in Boulder (solar physics), National Optical Astronomical Observatories in Tucson and Chile (optical astronomy), Caltech Sub-Millimeter Observatory, National Radio Astronomy Observatory (NRAO), the Very Large Array (VLA), the Hubble Space Telescope (HST), and the Chandra, RXTE, and XMM X-ray telescopes. CU-Boulder also is involved with the FUSE ultraviolet satellite, Cassini and Galileo missions, and HST Cosmic Origins Spectrograph.

Locally, APS operates a 24-inch Cassegrain-Coude and 16- and 18-inch Cassegrain telescopes, available for photographic, photometric, and spectrographic observations, as well as for instrument and detector development. Opportunities for graduate research also are found with the university's Laboratory for Atmospheric and Space Physics (LASP), the Center for Astrophysics and Space Astronomy (CASA), and JILA. See Graduate School for more information.

### *Planetary Sciences*

As planetary sciences is an interdisciplinary field, students can obtain degrees from the Departments of Astrophysical and Planetary Sciences, Geological Sciences, Physics, and Aerospace Engineering. CU-Boulder is also home to a division of the Southwest Research Institute, with over 25 planetary scientists, many of whom work with CU students. Research and courses related to the physics and dynamics of the atmospheres of other planets, planetary surfaces and interiors, and other solar system studies are available in programs leading to the MS and PhD degrees. Courses related to the physics and dynamics of the Earth's atmosphere are offered through PAOS under the ATOC acronym. Graduate-level courses in these areas are:

- ASTR 5110 Internal Processes 1
  - ASTR 5250 Planetary Aeronomy
  - ASTR 5300 Introduction to Magnetospheres
  - ASTR 5410 Fluid Instabilities, Waves, and Turbulence
  - ASTR 5560 Radiative Processes in Planetary Atmospheres
  - ASTR 5800 Planetary Surfaces and Interiors
  - ASTR 5810 Planetary Atmospheres
  - ASTR 5820 Origin and Evolution of Planetary Systems
  - ASTR 5830 Topics in Planetary Science
  - ASTR 5835 Seminar in Planetary Science
  - ATOC 5050 Physical Processes of the Atmosphere and Ocean
  - ATOC 5960 Theories of Climate and Climate Variability
- Research in theoretical, observational, and laboratory atmospheric and planetary science is conducted in the following areas:
- Planetary disks, Kuiper Belt objects, extra-solar planets;
  - Dynamics and chemistry of planetary atmospheres, planetary clouds, and planetary climates; evolution of planetary atmospheres; and comparison of planetary and terrestrial atmospheres;

Planetary aeronomy, airglow and aurora, UV and IR spectroscopy, noctilucent clouds, structure and composition of planetary atmospheres (Venus, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto), planetary magnetospheres, and cometary physics;  
 Satellite monitoring of the Earth's atmosphere and environment, including remote sensing of mesospheric ozone, stratospheric trace species, convection, outgoing radiation, and magnetospheric dynamics; and  
 Planetary geology, planetary interiors and surfaces, and planetary geophysics.

Graduate research opportunities exist with individual faculty members, as well as jointly with academic and research units such as the Departments of Geological Sciences, Physics, and Aerospace Engineering, as well as the Program in Atmospheric and Oceanic Sciences (PAOS), the National Center for Atmospheric Research (NCAR), the National Oceanic and Atmospheric Administration (NOAA), and the Laboratory for Atmospheric and Space Physics (LASP). The latter is involved in space investigations of the Earth, Sun, and planets. Financial support is available in connection with all of the above research activities.

### *Atmospheric and Oceanic Sciences*

This interdisciplinary program provides an educational and research environment to examine the dynamical, physical, and chemical structures of the atmosphere, ocean, and land surface, and the manner in which they interact. For further information, see the PAOS listing. APS participates in the master's degree program in computational science (under applied math).

### *Geophysics*

The department participates in the interdepartmental PhD program in geophysics. For further information, refer to the discussion of the geophysics program in the Graduate School section.

### *Departmental Requirements*

Those wishing to pursue graduate work in APS leading to candidacy for an advanced degree should carefully read requirements for advanced degrees in the Graduate School section. The following are special departmental requirements.

### *Master's Degree*

**Prerequisites.** A thorough undergraduate preparation in physics and mathematics is necessary for graduate study. Courses should include thermodynamics, mechanics, electricity and magnetism, quantum mechanics, atomic physics, and mathematics at least through complex variables and differential equations.

**Qualifying Examination.** The Graduate Record Examination aptitude tests and advanced test in physics are used in place of a qualifying examination, and this examination should be taken before the time of application to the department.

**Preliminary Interview.** Students in the Department of Astrophysical and Planetary Sciences are given an oral interview prior to the beginning of the fall semester of their first year. This oral interview examines fundamental knowledge in undergraduate physics and mathematics. Students are required to overcome any academic deficiencies within a year in order to remain in the program.

**Course Requirements.** Under Plan I, a student must present a thesis for 6 credit hours plus 24 credit hours of course work, at least 12 of which must be APS courses numbered 5000 or above. Under Plan II, additional hours of approved graduate courses must be presented for a total of 30 credit hours, of which at least 16 must be APS courses numbered 5000 or above. The master's examination under Plan I covers the thesis and related topics. The examination under Plan II is more comprehensive and may be either written or oral or both. Master's examinations are given after other degree requirements have been completed, but may be given during the last semester of residence if the student is making satis-

factory progress on required courses. Students are encouraged to follow Plan I except under special circumstances.

### *Doctoral Degree*

In addition to the master's degree requirements above, PhD students must complete the following.

**Course Requirements.** A minimum of 36 semester hours of work (including 4 hours of graduate seminars) in courses numbered 5000 or above is required; however, the overall emphasis is on independent study and research.

**Language Requirement.** None.

**Examinations.** Students in the PhD program are required to remove any deficiencies identified at the preliminary examination, to pass a two-part comprehensive examination composed of a written test on graduate course material and an oral exam on a research paper, and satisfactorily defend the thesis before a faculty committee.

## **Atmospheric and Oceanic Sciences**

*Degrees.....MS, PhD*

The Program in Atmospheric and Oceanic Sciences (PAOS) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical, and chemical processes in the atmosphere, ocean, and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing, and modeling climate and global change.

Although an undergraduate degree program is not yet offered in PAOS, an undergraduate minor program is available. A total of 18 credit hours is required for the minor, including 9 lower-level ATOC credit hours and 9 upper-level ATOC credit hours. A full list of approved courses for the minor is available online and in the PAOS administrative offices.

Students admitted to the MS or PhD tracks in PAOS will be eligible to pursue a degree in astrophysical, planetary, and atmospheric science. Nondegree-seeking graduate students and graduate students in other departments may pursue a Graduate Certificate in Atmospheric and Oceanic Sciences. For more information on Graduate Certificate programs, see the Graduate School/Interdisciplinary Programs section.

For more information about PAOS programs and application procedures, call the PAOS office at **303-492-6633**, or visit [paos.colorado.edu](http://paos.colorado.edu).

### **Graduate Degree Program**

PAOS offers a comprehensive graduate program with a core course structure that emphasizes the fluid dynamical, chemical, and physical processes in the atmosphere and ocean.

The PAOS (ATOC) graduate core courses comprise the following:

- ATOC 5060 Dynamics of the Atmosphere
- ATOC 5151 Atmospheric Chemistry
- ATOC 5235 Remote Sensing of Atmospheres and Oceans
- ATOC 5600 Physics and Chemistry of Clouds and Aerosols
- ATOC 5720 Introduction to Atmospheric Physics and Dynamics
- ATOC 7500 Physical Oceanography

PAOS offers many graduate elective courses, and students are encouraged to take related electives offered by other departments.

**Prerequisites.** An undergraduate degree in mathematics, physics, engineering, chemistry, or another natural science is recommended. The general prerequisites expected of incoming graduate students include undergraduate courses in calculus, linear algebra, differential equations, and computer programming; as well as one-year sequences of undergraduate calculus-based

physics and chemistry. Upper-division undergraduate courses in physics, chemistry, engineering, and mathematics are strongly recommended. Undergraduate courses in atmospheric and oceanic sciences are useful, but not expected, as part of the undergraduate background.

### Master's Degree

**Course Requirements.** For both thesis and nonthesis options, a total of 30 credit hours is required with at least 15 credit hours of ATOC courses numbered 5000 and above. Other specific course requirements are in the *PAOS Graduate Handbook*.

**Examinations.** For the thesis option, the final examination consists of an oral exam on the thesis. There is a written final exam for the nonthesis option.

### Doctoral Degree

**Course Requirements.** A total of 36 credit hours is required including the 18 credit hours in ATOC core courses listed above, as well as a graduate-level course in applied or computational mathematics. In addition, 30 dissertation hours are required. Other specific course requirements are covered in the *PAOS Graduate Handbook*.

**Examinations.** Students must pass a two-part comprehensive examination before admission into candidacy. Part I of the comprehensive examination is a written exam based on course material and is normally taken in the second year. Part II of the comprehensive examination is normally taken in the third year and is an oral examination based on an original research paper prepared by the student. After the PhD dissertation has been submitted, a final examination of the dissertation will be conducted.

## Bibliography

Several courses in information access and library research methods are offered to students who wish to explore the structure, organization, retrieval, and evaluation of information for their study and career needs. See the course descriptions under Library Research for more information.

## Biological Sciences

Course work and degree programs in the biological sciences are offered through the Department of Ecology and Evolutionary Biology (formerly the Department of Environmental, Population, and Organismic Biology); the Department of Molecular, Cellular, and Developmental Biology; and the Department of Integrative Physiology (formerly the Department of Kinesiology and Applied Physiology). Students should refer to program and course descriptions listed for each department.

## British and Irish Studies

The Center for British and Irish Studies encourages students to develop programs that include a focus on British and Irish culture, history, and contemporary life from a variety of disciplinary perspectives. At the undergraduate level, the center offers a certificate in British and Irish studies for students who have taken 24 credit hours in British and Irish literature, history, and/or other fields. The center also assists undergraduates who want to study or do research in Britain and Ireland.

For graduate students, it offers a series of interdisciplinary seminars, designed and planned by students, with a different focus each semester. These offer exposure to methods and sources outside the students' own departments and provide preprofessional training in presenting research. The center has funds for acquiring microfilm collections for dissertation research, offers

travel fellowships for graduate students, and awards writing prizes for both undergraduate and graduate papers.

For more information, call the Center for British and Irish Studies at **303-492-2723**.

## Central and East European Studies

Students who seek in-depth, interdisciplinary knowledge of the region are encouraged to pursue the certificate in Central and East European studies. The certificate program offers students the opportunity to explore the culture, history, and politics of the nations of central and eastern Europe from a variety of disciplinary perspectives.

The purpose of the certificate program is to enhance, rather than to replace, the department major. Students work with CEES faculty advisors to plan an appropriate certificate program. The certificate is issued by the dean of the College of Arts and Sciences, and is awarded in addition to a bachelor's degree in another field.

The certificate program involves 24 hours of credit, including an introductory course (CEES 2002) and at least one course from each of three core clusters (historical, social science, and literature/culture). Student pursuing the CEES certificate are strongly encouraged to take advantage of a recognized study abroad program in Eastern Europe affiliated with CU-Boulder. Courses taken in such a program, as approved by an advisor, count toward the certificate in CEES. Only 9 credits that apply to the major can be used to fulfill requirements for the CEES certificate.

Contact the director of Central and East European Studies, Professor Padraic Kenney at **303-492-5729** for information.

## Chemistry and Biochemistry

*Degrees* ..... BA, MS, PhD

The undergraduate degree in chemistry and biochemistry emphasizes knowledge and awareness of:

- the basic principles of chemistry—atomic and molecular theory, reactivities and properties of chemical substances, and the states of matter;
- the basic subfields of chemistry—organic, physical, analytical, and inorganic chemistry (and biochemistry for biochemistry majors);
- mathematics sufficient to facilitate the understanding and derivation of fundamental relationships and to analyze and manipulate experimental data;
- the basic principles of physics (and for biochemistry majors, knowledge of biology); and
- safe chemical practices, including waste handling and safety equipment.

In addition, students completing the degree in chemistry or biochemistry are expected to acquire the ability and skills to:

- read, evaluate, and interpret information on a numerical, chemical, and general scientific level;
- assemble experimental chemical apparatus, design experiments, and use appropriate apparatus to measure chemical composition and properties (for biochemistry students, this includes properties of proteins, nucleic acids, and other biochemical intermediates); and
- communicate results of scientific inquiries verbally and in writing.

## Bachelor's Degree Program

A student can earn a bachelor's degree in either chemistry or biochemistry. For either option, students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

Required Courses	Semester Hours
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### Chemistry

CHEM 1111 and 1131 General Chemistry 1 and 2 <i>or</i> CHEM 1151 and 1171 Honors General Chemistry 1 and 2 (Honors CHEM 1151 and 1171 are recommended for the student with advanced high school training in mathematics and physics) . . . . .	10
CHEM 3351 and 3371 Organic Chemistry for Chemistry and Biochemistry Majors 1 and 2 <i>or</i> CHEM 3311 and 3331 Organic Chemistry 1 and 2 . . . . .	8
CHEM 3361 and 3381 Laboratory in Organic Chemistry 1 and 2 for Chemistry Majors . . . . .	4
CHEM 4011 Inorganic Chemistry . . . . .	3
CHEM 4171 Principles of Instrumental Analysis . . . . .	3
CHEM 4181 Environmental Analysis Laboratory . . . . .	3
CHEM 4511 and 4531 Physical Chemistry 1 and 2 <i>or</i> CHEM 4411 and 4431 Physical Chemistry with Biochemistry Applications 1 and 2 . . . . .	6
CHEM 4581/4591 Physical Chemistry Labs 1 and 2 . . . . .	3
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
MATH 1300, 2300, and 2400, Analytical Geometry, and Calculus 1, 2, and 3 <i>or</i> APPM 1350, 1360, and 2350 . . . . .	12

All students, and especially those intending to go on to graduate school in chemistry, will benefit from additional advanced courses. Recommended electives include the following: CHEM 4021, 4191, 4611, 4711, 4731, 4901, graduate courses in various fields of chemistry, or advanced courses in mathematics or physics.

### Biochemistry

CHEM 1111 and 1131 General Chemistry 1 and 2 <i>or</i> CHEM 1151 and 1171 Honors General Chemistry 1 and 2 (Honors CHEM 1151 and 1171 are recommended for students with advanced high school training in mathematics and physics) . . . . .	10
CHEM 3351 and 3371 Organic Chemistry for Chemistry and Biochemistry Majors 1 and 2 <i>or</i> CHEM 3311 and 3331 Organic Chemistry 1 and 2 . . . . .	8
CHEM 3321 and 3341 Laboratory in Organic Chemistry 1 and 2 <i>or</i> CHEM 3361 and 3381 Laboratory in Organic Chemistry for Majors 1 and 2 . . . . .	4
CHEM 4411 and 4431 Physical Chemistry with Biochemistry Applications 1 and 2 <i>or</i> CHEM 4511 and 4531 Physical Chemistry 1 and 2 . . . . .	6
CHEM 4711 and 4731 General Biochemistry 1 and 2 . . . . .	6
CHEM 4761 Biochemistry Laboratory . . . . .	4
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
MATH 1300, 2300, and 2400 Analytical Geometry and Calculus 1, 2, and 3 <i>or</i> APPM 1350, 1360, and 2350 . . . . .	12
MCDB 1150 Introduction to Molecular Biology, MCDB 1151 Intro to Molecular Biology Lab, MCDB 2150 Principles of Genetics, and MCDB 2151 Principles of Genetics Lab <i>or</i> EPOB 1210 and 1220 General Biology 1 and 2 and EPOB 1230 and 1240 General Biology Laboratory 1 and 2 (the latter is recommended for premed students) . . . . .	8
One of the following: MCDB 2150/2151 (if not taken above), MCDB 3120, 3500, EPOB 2070, 3400, 3430, 3530, or 4390 . . . . .	3-5

All students, and especially those intending to go on to graduate school in biochemistry, will benefit from additional advanced courses. Recommended electives include the following: CHEM 4011, 4171, 4181, 4191, 4901, graduate courses in various fields of chemistry, or advanced courses in biology or mathematics.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in chemistry and biochemistry, students should meet the following requirements:

Declare chemistry or biochemistry as the major in the first semester. Students must consult with a major advisor to determine adequate progress toward completion of the major.

### Minor Program

Minors are offered in chemistry and in biochemistry. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

### American Chemical Society Certification

The American Chemical Society maintains a certification program in which a student graduating with a specified minimum program is certified to the society upon graduation. To be certified, a graduate must satisfy requirements in addition to the minimum for graduation. A list of these requirements may be obtained from the undergraduate Chemistry and Biochemistry office.

### Chemistry Honors Program

Opportunity is provided for qualified chemistry and biochemistry majors to participate in the departmental honors program and graduate with honors (cum laude, magna cum laude, or summa cum laude) in chemistry or biochemistry. Students interested in the honors program should contact the departmental honors advisor during their junior year.

Transfer students who plan to take a chemistry or biochemistry major must complete at the Boulder campus a minimum of 12 credit hours of upper-division work covering at least two of the subdisciplines: organic, physical, analytical, inorganic, and biochemistry.

A more detailed listing of the bachelor's degree program, together with advising information and alternate course options, is available at the undergraduate office in the Department of Chemistry and Biochemistry.

## Graduate Degree Programs

Students wishing to pursue graduate work in chemistry or biochemistry leading to candidacy for an advanced degree should read carefully requirements for advanced degrees in the Graduate School chapter. For information on the doctoral program in chemical physics offered jointly with the Department of Physics, see Chemical Physics under Interdepartmental Programs in the Graduate School section. Following are some of the special departmental requirements. Copies of more detailed rules are distributed to graduate students.

**Prerequisites.** An undergraduate major in chemistry, biochemistry, or a related field is desirable since entering graduate students are required to take examinations and complete selected course work covering the major fields of chemistry and biochemistry. The GRE general test and advanced subject test (in either chemistry or in biochemistry, cell, and molecular biology) is required for admission and for fellowship competition. Some or all of these tests may be waived under special circumstances.

### Master's Degree

**Language.** The department does not require foreign language proficiency for the master's degree.

**Examinations.** Administration of preliminary examinations varies, depending on students' entering field. Candidates opting for MS Plan I must pass a master's final oral examination at the time they complete their work. MS Plan II does not require a final oral examination.

**Course Requirements.** There are two methods of obtaining a master's degree from the Department of Chemistry and Biochemistry. Plan I requires 30 credit hours, including 15 credit hours of formal course work, 15 credit hours in research/seminar courses,

the completion of a research investigation, and the presentation of a thesis. Plan II requires 30 credit hours including 21 credit hours of formal course work plus 9 credit hours of research/seminar, and presentation of a research report, but no thesis; Plan II is available only with departmental approval.

### Doctoral Degree

**Language.** The department does not require foreign language proficiency for the PhD degree.

**Examinations.** Administration of preliminary examinations varies, depending on students' entering field. These examinations are used in an advisory capacity. The minimum course work is 30 credit hours at the 5000 level or above, of which 15 credit hours must be in formal course work. In addition, a minimum of 30 credit hours of dissertation work is required. PhD students must pass a comprehensive examination consisting of a series of written cumulative exams and an oral examination. Students entering with a master's degree start the comprehensive examinations in their second semester; others start them in their third semester. Candidates must write a research proposal during their studies, complete a research investigation and present a thesis, and pass a PhD final oral examination at the time they complete their work.

## Classics

*Degrees* ..... BA, MA, PhD

Through consultation with the undergraduate advisor, the bachelor's degree in classics is tailored to the student's interests in the field. Major and minor programs can be arranged with a concentration in either Latin or Greek or a combination of the two, or a broadly based program in classical antiquities (mythology, literature, philosophy, religion, art, archaeology, and history). Prospective majors and minors should consult with the undergraduate advisor and review the departmental list.

The undergraduate degree in classics emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Greek and Roman literature, from Homer to the end of classical antiquity;
- the historical and cultural contexts of particular works; and
- the art, religion, and philosophy of ancient Greece and Rome and their roles in world cultural history.

In addition, students completing the degree in classics are expected to acquire the ability and skills to:

- read, understand, and interpret written documents and works of literature in ancient Greek or Latin where relevant, as well as in translation;
- communicate in spoken and written form with adequate clarity and complexity for the relevant audience; and
- read and think critically.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below, including at least 18 credit hours of upper-division courses.

*Required Courses*

*Semester Hours*

### Track I: Greek, Latin, or Greek and Latin

Greek and/or Latin ..... 30

*Note: Students must designate one language as the primary field of study. The first year of this language does not count toward the major.*

Electives (classical literature, culture and thought or ancient history, art and archaeology courses listed under Tracks II and III) ..... 6

### Track II: Literature, Culture, and Thought

Classical literature, culture, and thought (CLAS 1010, 1030, 1100, 1110, 1115, 1120, 1140, 2020, 2100, 2110, 2610, 3820, 4040, 4110, 4120, 4130, 4840; PHIL 3000) ..... 18

Ancient history, art, and archaeology (CLAS 1051, 1061, 1509, 2009, 2019, 2041, 2100, 2110, 3039, 3049, 4021, 4031, 4041, 4061, 4071, 4081, 4091, 4119, 4129, 4139, 4149, 4169, 4199, 4761, 4849; HIST 3011) ..... 12

Greek and/or Latin ..... 6

*Note: Students must designate either Greek or Latin as the primary field of language study. The first year of this language does not count toward the major. With the approval of the undergraduate advisor, upper-level Greek or Latin courses may be substituted for classical literature, culture, and thought or ancient history, art, and archaeology courses.*

### Track III: History, Art, and Archaeology

Survey course in ancient history or art and archaeology (CLAS 1051, 1061, or 1509) ..... 3

Ancient history, art, and archaeology (CLAS 1051, 1061, 1509, 2009, 2019, 2041, 2100, 2110, 3039, 3049, 4021, 4031, 4041, 4061, 4071, 4081, 4091, 4119, 4129, 4139, 4149, 4169, 4199, 4761, 4849; HIST 3011) ..... 15

Classical literature, culture, and thought (CLAS 1010, 1030, 1100, 1110, 1115, 1120, 1140, 2020, 2100, 2110, 2610, 3820, 4040, 4110, 4120, 4130, 4840; PHIL 3000) ..... 12

Greek and/or Latin ..... 6

*Note: Students must designate either Greek or Latin as the primary field of language study. The first year of this language does not count toward the major. With the approval of the undergraduate advisor, upper-level Greek or Latin courses may be substituted for classical literature, culture, and thought or ancient history, art, or archaeology courses.*

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in classics, students should meet the following requirements:

Declare the classics major by the beginning of the second semester.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

### Minor Program

A minor is offered in classics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

## Graduate Degree Programs

### Master's Degree

Candidates may choose to emphasize Greek, Latin, classical art and archaeology, classical antiquity, or the teaching of Latin.

It is expected that students opting for the teaching of Latin either have achieved accreditation at the secondary level or are planning to do so through the School of Education. The MA degree alone does not satisfy the state requirements for certification.

**Degree Requirements.** Candidates for the MA degree in Latin or Greek are required to pass a written examination in translation of the major language. Students intending to pursue the PhD in classics are strongly advised to develop proficiency in both Latin and Greek, and to acquire a reading knowledge of German, French, or Italian.

Candidates for the MA degree in Classical Art and Archaeology are required to complete at least two graduate-level courses in Greek and/or Latin and five graduate-level courses in ancient and/or medieval art and archaeology (of which at least one must be at the 5000-level or above [not 4000/5000] and one must be a preapproved nonclassical course). In addition, they must pass written examinations on Greek and Roman art and archaeology.

Candidates for the MA degree with emphasis on classical antiquity are required to complete at least two graduate-level

courses in Greek and/or Latin and must pass a written examination in two of the following fields: history, art and archaeology, religion and mythology, philosophy and political theory, and Greek or Latin translation.

Candidates for the MA Plan I (24 hours of course work at the 5000-level or above, plus 6 credit hours of thesis) take an oral comprehensive examination in defense of the thesis. Candidates for the MA Plan II (30 credit hours, 24 of which must be at the 5000-level or above, without thesis) must have departmental approval and pass an oral comprehensive examination covering their course work.

Candidates for the MA degree with emphasis on the teaching of Latin must pass a written examination in both Latin translation and Latin literature and an oral comprehensive examination on teaching methods. Thirty hours of course work, including one Latin workshop and a special project, are required. Plan I is not offered for the MA degree with emphasis on teaching.

### Doctoral Degree

Candidates for the PhD in classics must meet the following requirements:

1. A reading knowledge of two modern foreign languages; one must be German and the other must be approved by the department.
2. Successful completion of at least four graduate seminars.
3. One course each in Greek or Latin prose composition and a special field such as epigraphy, paleography, literary theory, linguistics, or religion.
4. Two courses in ancient history or classical archaeology.
5. The candidate is tested in Greek and Latin languages (translation tests) and must pass an examination on one Greek and one Roman author. There is an oral comprehensive examination in which the student is expected to demonstrate overall factual knowledge of Greek and Latin literature.
6. The candidate must write a PhD dissertation and complete a final oral examination in defense of the dissertation.

### Cognitive Science Studies

The cognitive science certificate program is an interdisciplinary program for undergraduate majors in the Departments of Psychology; Philosophy; Linguistics; Education; Speech, Language, and Hearing Sciences; and Computer Science. Cognitive science is the study of human knowledge, of which one aspect is the study of how knowledge is acquired, stored, and represented in the mind, including the mind's underlying biological mechanisms. Another aspect of cognitive science concerns how knowledge is understood, remembered, communicated, and used in the performance of activities, including the acquisition and application of skills and information. This latter aspect provides the practical applications of cognitive science, and thereby ensures a demand for graduates in both academic and industrial markets. Training in cognitive science prepares students admirably well for many of the fields that are targeted as the major growth fields of the 21st century: telecommunications, information processing, medical analysis, data retrieval, education, and multimedia.

The program requirements include courses in all of the six core departments, basic courses providing mathematical, computational, natural science, and statistical skills, and two of four possible advanced skills sequences of courses. For more information, either see [ics.colorado.edu](http://ics.colorado.edu) or call the program director, Jim Martin, at 303-492-3552.

### Communication

*Degrees .....BA, MA, PhD*

The bachelor of arts in communication provides analytic work from both humanistic and scientific perspectives and practical work to improve communicative performance in various kinds of situations.

The undergraduate degree in communication emphasizes knowledge and awareness of:

- the history and development of communication as an object of scholarly study, including both the humanistic and scientific traditions;
- the basic contexts in which communication is enacted (e.g., interpersonal, small group, organizational, and public contexts);
- the various processes of interaction within these contexts;
- the basic methods of investigating questions about problems in communication;
- the ethical issues and responsibilities of communication practice;
- the diversity of communication styles associated with gender and cultural differences; and
- the uses and implications of communication technology.

In addition, students completing the degree in communication are expected to acquire the ability and skills to:

- express ideas in an informed, coherent, and effective manner, particularly the ability to articulate and develop a sustained argument, both orally and in writing;
- analyze, criticize, evaluate, and reflect messages and interactions in a variety of practical contexts, both orally and in writing; and
- adapt messages and negotiate interactions responsibly in diverse and changing situations.

Graduate study in communication examines problems of human interaction and relationship, participation and collaboration, and deliberation, dialogue, and decision making in personal relationships, workplace and institutional contexts, and community and public life. The master's program provides students with knowledge of selected bodies of communication scholarship and develops their skills in analyzing complex communication situations for a range of professional positions in business, nonprofit institutions, and other types of community groups, and for doctoral study in communication. The doctoral program provides students with opportunities to conduct theoretically grounded, practically useful research that crosses traditional academic boundaries and that prepares them to assume faculty positions in universities, as well as in research and training programs in business, government, and social service agencies.

### Precommunication (PRCM) Major

Students admitted to CU-Boulder beginning in summer 2003 who intend to pursue a COMM major must enroll as PRCM majors, and must complete each of the following courses with a grade of C or higher, before applying for admission to the COMM major.

- COMM 1210 Perspectives on Human Communication
- COMM 1300 Public Speaking
- COMM 1600 Interaction Skills

Although space in these courses cannot be guaranteed, PRCM majors will have priority registration for these courses. Students who complete these courses with the minimum grade

of C or higher in each may apply for admission to the COMM major but are *not* guaranteed admission.

The following rules apply only to students who have matriculated into CU-Boulder as of summer 2003.

### *Freshmen*

New freshmen who desire to pursue a COMM major will be admitted as PRCM majors and will be required to meet the criteria for admission to the major by the time they achieve 60 credits.

### *Transfer Students*

Transfer students from other universities who enter CU-Boulder with freshman standing (29.9 credit hours or fewer completed) who wish to enter the COMM major will be admitted as PRCM majors and will be required to meet the same criteria as new freshmen for admission to the major.

**Advanced Standing Transfer Students:** Transfer students from other universities who enter CU-Boulder with sophomore standing or above (30 hours or more of transfer credit) will be admitted to the PRCM major and will have a maximum of 30 credit hours after transfer to CU-Boulder to meet the criteria for admission to the major. The department will determine the equivalency of transfer courses to courses required for admission to the major.

### *Intra-University Transfers (IUTs)*

**IUTs:** Students from other schools and colleges on the Boulder campus who are in their freshman year and who have not yet met the criteria to enter the COMM major can IUT into the PRCM major provided that they meet the IUT requirements for entry to the College of Arts and Sciences.

**IUTs with Advanced Standing:** Students from other schools and colleges on the Boulder campus with sophomore standing or above (30 hours or more completed) can be admitted to the PRCM major provided that they meet the criteria for IUT into the College of Arts and Sciences. IUTs with sophomore standing or above will have a maximum of 30 credit hours after admission to arts and sciences to meet the criteria for admission to the major.

### *Second Undergraduate Degrees*

Students requesting admission to the COMM major for the purpose of completing a second undergraduate degree will be admitted to the PRCM major and will be required to follow the same process for admission to the major as new freshmen.

### *Change of Major or Second Major*

Students from other arts and sciences majors, including readmitted students, who are in their freshman year and who have not yet met the criteria to enter the COMM major can change their major to the PRCM major or can add the PRCM major to their existing major if they have a cumulative GPA of 2.00 or above.

Students from other arts and sciences majors who are beyond their freshman year, including readmitted students, must meet all criteria and must apply and be directly admitted to the COMM major. They cannot change their major to the PRCM major.

### *Distributed Studies*

A COMM major will not be eligible to be included as an “area option” in the Distributed Studies major except by special permission of the communication department.

### *Applying for Admission to the COMM Major*

Students who have completed the PRCM requirements may apply for admission to the COMM major through the following procedures:

- Except as noted above, students must apply in or before the semester in which they will have completed 60 credit hours.

- Applications must include a completed form and a 500-word essay. See the department’s web site for the application form and guidelines for the essay ([comm.colorado.edu](http://comm.colorado.edu)).

- Applications must be received by the end of the third week of classes in the fall and spring semesters. A faculty committee chaired by the associate chair of undergraduate studies in the department will review applications and make decisions. Applicants will be ranked according to the following criteria: GPA in the three PRCM required courses, cumulative GPA, and quality of the application essay. If any of the PRCM required courses are repeated, including via the university’s course forgiveness policy, only the grade from the first repeat will be used for the purposes of calculating the GPA in those courses; that grade will be averaged with the original course grade received. The grade from the first repeat for any of the three PRCM required courses will be used in the case of course forgiveness to calculate cumulative GPA. Students will be notified of the decision about their applications no later than the sixth week of the term in which they apply.

- Students denied admission may appeal in writing to the associate chair of undergraduate studies in the department. Only appeals based on procedural or clerical error will be considered. Students may not appeal based on their disagreement with the decision. Students who have been denied admission may reapply once up until they achieve 60 credits. Once a student who has applied and been denied admission achieves 60 credits, the student is no longer eligible to reapply.

## Bachelor’s Degree Program

On admittance to the major, students must complete a minimum of 33 hours of course work in communication, 18 of which must be upper division (3000 level or higher). Only courses with grades of C- or better count toward the major, and the overall major GPA must be 2.00 (a C- is 1.70).

<i>Required Courses</i>	<i>Semester Hours</i>
COMM 1300 Public Speaking	3
COMM 1600 Interaction Skills	3
COMM 1210 Perspectives on Human Communication	3
COMM 3210 Human Communication Theory	3
COMM 3300 Rhetorical Foundations of Communication	3
One Senior Seminar: COMM 4220, 4300, 4400, 4510, or 4600	3
Two of the following:	
COMM 2360 Campaigns and Revolutions	3
COMM 2400 Communication and Society	3
COMM 2500 Interpersonal Communication	3
COMM 2600 Organizational Communication	3
Three additional upper division electives (3000, 4000-level courses):	
4000-level courses may be taken twice (only twice) with different topics	9

*Up to 8 credit hours of independent study and 6 hours of internships may be taken.*

*These are upper-division elective hours but do not count toward major requirements. Eligible students interested in graduating with department honors should contact the department’s honor coordinator as soon as possible.*

The department encourages its majors to take related courses in: business; English; ethnic studies; journalism and mass communication; linguistics; philosophy; political science; sociology; speech, language, and hearing sciences; and theatre and dance.

Students who wish to major in communication should meet with a department advisor, where they will be advised of any changes in this list of requirements.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year



guarantee; it is not a requirement for the major. To maintain adequate progress in communication, students should meet the following requirements:

Students should declare the precommunication major by the time they acquire 15 hours of credit.

Students must consult with an advisor assigned to the communication department to determine adequate progress toward admission into the major.

Students should be accepted into the major by the time they acquire 60 hours of credit.

Students who are accepted as majors must consult with a major advisor to determine adequate progress toward completion of the major requirements within the timeframe of the four-year guarantee.

Majors should register at designated times.

### Graduate Degree Program

The department offers programs of study leading to the MA and PhD in communication. Interested students should contact the department for current admission and degree requirements, or see [www.colorado.edu/communication](http://www.colorado.edu/communication).

## Comparative Literature and Humanities

*Comparative Literature Degrees ...MA, PhD  
Humanities Degree.....BA*

### Bachelor's Degree Program

The humanities major takes an interdisciplinary and comparative approach to the study of arts (e.g., literature, fine arts, music, and film) and cultures within their historical contexts. As currently constituted, the introductory sequence in humanities (HUMN 1010 and 1020) looks critically at that tradition whose beginning is often defined by Greece and Rome as well as our habit of still doing so. As students progress through the major, they sharpen their critical skills of analysis and interpretation as they broaden their cultural knowledge, enabling them to decode and compare multiple modes of representation and, to the extent possible, other perspectives.

The undergraduate degree in humanities emphasizes knowledge and awareness of:

- the ways cultures and traditions define both themselves and each other;
- the formal, rhetorical, and ideological properties of cultural texts in a variety of forms and media (literature, history, philosophy, film, music, visual arts, architecture, dance, theatre, performance);
- the dynamic relations between texts and their social and historical contexts;
- the genres and modes of texts and their production, transformation, and reception; and
- the theoretical and ideological underpinnings and implications of one's own and others' interpretive approaches and assumptions.

In addition, students completing the degree in humanities are expected to acquire the ability and skills to:

- analyze and interpret texts in a variety of forms and media;
- articulate such analyses and interpretations at a sophisticated level in both written and oral form;
- discern similarities and differences among individual works, artistic media, historical periods, and cultural traditions;
- reason critically; and

- explore the connections between contemporary issues and academic work.

<i>Required Courses</i>	<i>Semester Hours</i>
HUMN 1010 and 1020 Introduction to Humanities 1 and 2	12
HUMN 2000 Topics in Humanities	3
Upper-division humanities courses	15
Area of concentration: either a single language/literature (English or a foreign language, ancient or modern; first-year courses may not be counted) or a field related to the humanities, such as history, art history, anthropology, etc.	18 (At least 12 of these 18 hours must be taken at the upper-division level.)
Secondary field: courses chosen from one other humanities-related discipline such as fine arts, music, dance, theatre, film, philosophy, foreign language literature (first-year courses may not be counted), or other discipline	12

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. Because the Department of Comparative Literature and Humanities is unique in requiring courses from a number of different departments in addition to its own courses, it is imperative that students wishing to graduate in four years declare the major early and meet regularly with a departmental advisor. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in humanities, students should meet the following requirements:

Complete the lower-division sequence HUMN 1010–1020 by the end of the fourth semester.

Complete at least two lower-division courses in the secondary field and/or area of concentration by the end of the fourth semester.

Complete 15 of the remaining 42 credit hours at the upper-division level by the end of the sixth semester—at least two of these must be upper-division humanities courses.

Complete all remaining required courses (no more than 27 credits) by the end of the eighth semester.

### Graduate Degree Programs

#### *Comparative Literature*

The master's and doctoral degree programs in comparative literature are offered through the Graduate School. Students wishing to pursue graduate work in comparative literature leading to candidacy for an advanced degree should read the information provided in the Graduate School section and the guidelines for the MA and PhD degrees in this field. These guidelines contain the most recent information on program requirements and are available from the Department of Comparative Literature and Humanities, Ketchum 233, University of Colorado at Boulder, 331 UCB, Boulder, CO 80309-0331, or online at [www.colorado.edu/comparativeliterature](http://www.colorado.edu/comparativeliterature).

All entering students must submit GRE scores, a sample course paper, and a statement describing intellectual goals and language preparation. Normally, entering students have majored in a national literature; applicants who have majored in a related field or those who have had substantial training in literature may also apply. Note that the department provides a number of special graduate tracks in national literatures that do not offer a doctorate at CU-Boulder. The literatures currently covered by this provision are Chinese, German, Japanese, and Russian.

#### *Master's Degree*

**Prerequisites.** Upon entrance to the program, students must have pursued one foreign language to the point of being able to take courses at the 4000 level. Ideally, they should also have completed a second-year college course in a second foreign language.

**Requirements.** Candidates for the MA in comparative literature must take a total of 10 courses (representing 30 credit hours). Students take the Proseminar in Comparative Literature (COML 5000) and Introduction to Literary Theory (COML 5610) early in their course of study. Half the required credit hours are in courses offered by the Program in Comparative Literature. At least 9 hours are in courses numbered 4000 or above in the department of the student's primary literature, and an additional 6 hours are in the department of the secondary literature.

**Examinations and Thesis.** Candidates for the MA in comparative literature must submit and defend orally a master's thesis.

### Doctoral Degree

**Prerequisites.** Prospective candidates should have an MA degree in comparative literature, in a national literature (which may be English), or in a cognate discipline (e.g., philosophy). Students should be qualified to take graduate courses in two foreign languages and should have begun study of a third.

**Requirements.** Students take the Proseminar in Comparative Literature (COML 5000) and Introduction to Literary Theory (COML 5610) early in their course of study. Students who receive their MA in comparative literature from CU-Boulder are required to take a minimum of 48 hours of graduate course work, including 30 hours completed during the preparation for the MA and 18 hours completed during the first year of doctoral studies. In addition to fulfilling course distribution requirements for the MA, doctoral students must take a further 6 hours in courses offered by the Program in Comparative Literature and at least 6 hours in graduate-level courses in the department of the student's primary literature. Note that students receiving the MA from another institution are required to take a minimum of 36 credit hours (12 courses) at CU-Boulder.

**Examinations and Thesis.** All PhD candidates take a comprehensive examination and a final examination. The final examination is an oral defense of the doctoral dissertation, and is conducted by the student's advisory committee after all other requirements for the PhD have been completed.

## Distributed Studies Program

*Degree* .....BA

Students working toward the BA degree may elect a two- or three-area major track in the distributed studies program. The areas that may be used in the program are limited to those in which a departmental major for the BA is offered. An individually structured track also is available in the distributed studies program. Students pursuing the individually structured track must write and defend a thesis based on original scholarly or creative work.

For more information, contact the College of Arts and Sciences Academic Advising Center in Woodbury 109.

## East Asian Languages and Civilizations

*Chinese or Japanese Degree* ..... BA

*East Asian Languages and Literature Degree* .... MA

Undergraduate students may choose to major in either Chinese or Japanese. In either case they receive a thorough grounding in the modern language, an introduction to the classical language and literature, and a broad familiarity with the literary and cultural history of the selected area.

Before registering for specific courses, students should consult with a departmental advisor concerning appropriate placement in language classes. Also, students interested in Chinese or Japanese

are encouraged to broaden their career options through a double major, combining either language with another field of interest. Recent graduates have found positions in such fields as government service, international business, and secondary-school teaching; others have gone on to graduate study in Chinese or Japanese.

## Bachelor's Degree Programs

### Chinese

The undergraduate degree in Chinese emphasizes knowledge and awareness of:

- Chinese literary history, focusing on selected canonical or widely recognized works;
- the historical and cultural contexts in which particular works were written;
- critical approaches to the study of Chinese language and civilization; and
- the challenges, deficiencies, and possible gains inherent in the process of translating from one language to another.

In addition, students completing the degree in Chinese are expected to acquire the ability and skills to:

- read modern Chinese at a level at which critical literary analysis can be performed;
- read classical Chinese, with the aid of appropriate reference works, at the level at which the text may begin to be appreciated for its literary value;
- speak and comprehend Mandarin sufficient for all situations in daily life and for a basic level of academic conversation;
- analyze and interpret literary texts in terms of style, structure, character, themes, and use of allusion; and
- communicate such interpretations competently in standard written English.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. CHIN 1010, 1020, and 2110 do not count toward the maximum of 45 credits in the major department.

### Chinese Language and Literature Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below, including 30 credit hours of courses in Chinese language and literature above CHIN 2110. CHIN 2120 or its equivalent is the prerequisite to upper-division courses required for the major. At least 25 credit hours must be in upper-division courses.

<i>Required Courses</i>	<i>Semester Hours</i>
CHIN 2120 Intermediate Chinese 2	5
CHIN 3110 and 3120 Advanced Chinese 1 and 2	10
CHIN 4210 Introduction to Classical Chinese	4
CHIN 4220 Readings in Classical Chinese	4
Additional credit hours selected from the following courses:	
CHIN 3311 The Dao and the World in Medieval China	3
CHIN 3321 Culture and Literature of Ancient China	3
CHIN 3331 Culture and Literature of Late Imperial China	3
CHIN 3341 Modern Chinese Literature in Translation	3
CHIN 3351 Reality and Dream in Traditional Chinese Fiction	3
CHIN 3361 Women and the Supernatural in Chinese Literature	3
CHIN 3371 Topics in Chinese Film	3
CHIN 3441 Language and Chinese Society	3
CHIN 4110 Readings in Modern Chinese 1	3
CHIN 4120 Readings in Modern Chinese 2	3
CHIN 4300 Open Topics	3
CHIN 4750 Daoism	3
CHIN 4900 Independent Study	1-3
CHIN 4950 Honors Thesis	3

### Chinese Language and Civilization Track

Requires successful completion of 30 credit hours, apportioned as follows:

CHIN 2120 Intermediate Chinese 2 .....	5
CHIN 3110 and 3120 Advanced Chinese 1 and 2 or CHIN 4210 and 4220 Introduction to Classical Chinese and Readings in Classical Chinese ..	8-10

The remaining 15 or 17 credits may be chosen from other CHIN or EALC courses, excluding only language courses numbered below 2120. Six of these remaining hours may be satisfied by courses focusing wholly or substantially on China offered in other departments, subject to approval by the undergraduate advisor in Chinese.

Of the 30 credit hours presented for the degree, at least 18 must be at the upper division.

#### *Graduating in Four Years with a BA in Chinese*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Chinese, students should meet the following requirements:

Declare the major in the first semester.

Students wishing to major in Chinese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

#### *Minor Program*

A minor is offered in Chinese. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

#### *Japanese*

The undergraduate degree in Japanese emphasizes knowledge and awareness of:

- the outlines of the history of Japanese literature from the Nara period to the present;
- the outlines of Japanese historical and cultural development; and
- appropriate research strategies for Japanese language, literature, and culture.

In addition, students completing the degree in Japanese are expected to acquire the ability and skills to:

- speak and comprehend Japanese sufficiently for daily life;
- read, interpret, and analyze modern written texts;
- compose letters and simple compositions;
- use cultural awareness and understanding to function appropriately in a range of social situations; and
- communicate the results of research in English.

In addition, students target one or more of the following goals:

- read and comprehend classical Japanese, with the aid of appropriate reference works;
- translate a range of Japanese texts into English; and
- understand and analyze the structure of the Japanese language and communication patterns in Japanese.

### Japanese Language and Literature Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. JPNS 1010, 1020, and 2110 do not count towards the maximum of 45 credits in the major department.

#### *Required Courses* *Semester Hours*

Successful completion of 30 credit hours of courses in Japanese language and literature above JPNS 2110. JPNS 2120 or its equivalent is the prerequisite to upper-division language courses required for the major. At least 25 credit hours must be at the upper-division level.

JPNS 2120 Intermediate Japanese .....	5
JPNS 3110 and 3120 Advanced Japanese 1 and 2 .....	10
JPNS 4110 and 4120 Readings in Modern Japanese 1 and 2 .....	6

Additional credit hours selected from the following courses:

JPNS 3441 Language and Japanese Society .....	3
JPNS 3811 Classical Japanese Literature in Translation .....	3
JPNS 3821 Medieval Japanese Literature in Translation .....	3
JPNS 3831 Early Modern Japanese Literature in Translation .....	3
JPNS 3841 Modern Japanese Literature in Translation .....	3
JPNS 4030 Japanese Syntax .....	3
JPNS 4310 and 4320 Classical Japanese 1 and 2 .....	6
JPNS 4300 Open Topics .....	3
JPNS 4900 Independent Study .....	1-3
JPNS 4950 Honors Thesis .....	3

### Japanese Language and Civilization Track

Requires successful completion of 30 credit hours, apportioned as follows:

JPNS 2120 Intermediate Japanese .....	5
JPNS 3110 and 3120 Advanced Japanese 1 and 2 .....	10

The remaining 15 credits may be chosen from other JPNS or EALC courses, excluding only language courses numbered below 2120. Six of these remaining credit hours may be satisfied by courses focusing wholly or substantially on Japan offered in other departments, subject to approval by the undergraduate advisor in Japanese.

Of the 30 credit hours presented for the degree, at least 18 must be at the upper-division level.

#### *Graduating in Four Years with a BA in Japanese*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Japanese, students should meet the following requirements:

Declare the major in the first semester.

Students wishing to major in Japanese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

#### *Minor Program*

A minor is offered in Japanese. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

#### *Courses Taught in English*

The department offers several courses in translation. These courses require no previous study of the language, history, or culture of the area involved and are open to all interested students, whether majors in this department or not. They provide excellent introductions to Chinese or Japanese literary and cultural history.

CHIN 1051 is a core curriculum course in the area of literature and the arts that focuses on the great books of China, both ancient and modern. CHIN 2441 and CHIN 3371 focus on film and culture. CHIN 3311, 3321, 3331, and 3341 focus, respectively,

on medieval, ancient, late imperial, and modern Chinese culture. CHIN 3351 and 3361 focus, respectively, on issues in fiction and on women and the supernatural. CHIN 4750 (cross-listed with RLST) focuses on the historical development of Daoism.

EALC 1011 provides an interdisciplinary introduction to the history, literature, religion, and art of both China and Japan before major contact with the western world. EALC 1021 focuses on the modern period, after major contact with the western world. Both of these are core curriculum courses in the area of cultural and gender diversity.

JPNS 1051 is a core curriculum course in the area of literature and the arts focusing on both ancient and modern great books of Japan.

JPNS 2441 focuses on film and culture, JPNS 3441 explores language and society. JPNS 3811, 3821, 3831, and 3841 focus, respectively, on classical, medieval, early modern, and modern Japanese literature. JPNS 3841 meets the arts and sciences core requirement for critical thinking.

### *Study Abroad*

The department strongly recommends that all majors participate in study abroad. The University of Colorado is affiliated with study abroad programs based at Beijing, Nanjing, and East China Normal Universities in China; National Chengchi University in Taiwan; and Kansai Gaidai, Tsukuba University, and Sophia University in Japan. Consult a departmental advisor. For further information, contact the Office of International Education. Note, however, that not more than 20 transfer credit hours from universities in the U.S. or abroad may count toward the major in Chinese or Japanese.

### *Concurrent BA/MA Program*

The concurrent BA/MA degree program in East Asian Languages and Civilizations language and literature tracks offers a challenging and focused academic experience for exceptional students who demonstrate the ability to express their ideas clearly, both orally and in written form, using standard English. Highly motivated students who are accepted into the program begin graduate work no later than the senior year and earn both the BA and MA in five years. Students must have a minimum 3.25 GPA for all courses taken at CU-Boulder and must have completed most MAPS and core requirements by the end of the sophomore year. Three letters of recommendation indicating strong potential for advanced intensive study also are required. Applications will be reviewed by the graduate faculty in Chinese or Japanese. For specific requirements, please contact the department.

### *BA/MSIB Program (Bachelor of Arts in Chinese or Japanese/Master of International Business)*

The Department of EALC, in conjunction with the Business School at the University of Colorado at Denver, offers a degree track in either Japanese or Chinese leading to accelerated admission to the CU-Denver MSIB program. Students complete the standard requirements for the Japanese or Chinese major and a block of basic courses in Boulder Leeds School of Business. These courses, along with Japanese or Chinese language and culture requirements, are counted by the CU-Denver Business School, allowing EALC graduates to complete the MSIB on an accelerated schedule. EALC students are also given special consideration for fellowship funding at CU-Denver. See the undergraduate advisor for details.

### *Master's Degree Requirements*

Applicants to the graduate program in East Asian Languages and Literature (Chinese or Japanese emphasis) should have successfully completed the equivalent of the undergraduate major in

Chinese or Japanese language and Literature with advanced competence in modern Chinese or Japanese, an introduction to classical Chinese or Japanese, an understanding of the interrelationship of Chinese or Japanese language and society, and a familiarity with the history, major writers, and works of Chinese or Japanese literature. Foreign applicants must submit results from a TOEFL exam, with 560 being the minimum acceptable score.

The MA may be pursued in one of four different tracks: Chinese language and literature, or Japanese language and literature, Chinese language and civilization, and Japanese language and civilization. All entering students must take either CHIN 5010 or JPNS 5010 at the earliest opportunity. Students employed as teaching assistants also must take CHIN/JPNS 5020 Methods of Teaching Asian Languages. Selection of courses beyond these is made in consultation with the graduate advisor. Minimum requirements for graduation include a total of 24 hours of course work numbered 5000 or above, plus a thesis of 6 credit hours, or 30 hours of course work without a thesis. If deemed appropriate by the student's graduate committee, up to three courses (9 credit hours) taken outside the department may be included in the graduate curriculum.

### *Dual Master's Program*

The Department of East Asian Languages and Civilizations also participates in a dual master's program with the Departments of History and Religious Studies. Students interested in exploring this option should contact the department for specific requirements.

## **Ecology and Evolutionary Biology**

### *Degrees ..... BA, MA, PhD*

The goal of ecology is to understand how ecosystems function, how populations expand, are regulated, and interact to form biological communities, and how individual organisms and populations respond to changes in the physical environment. This knowledge lies at the core of understanding how to manage natural landscapes for the conservation of biological diversity, and how biological diversity in turn influences the function and resilience of the ecosystems upon which humans ultimately depend. Studies of biodiversity intersect with some of the major ecological challenges currently facing humankind, including the effects of invasive species and the emergence of newly infectious diseases. Knowledge of how ecosystems function provides the foundation for understanding how organisms interact with natural biogeochemical cycles that underlie important environmental issues such as global climate change.

Evolutionary biology seeks to understand the history of life on Earth, including its present distribution and variety, and the genetic, population, and environmental processes that lead to the evolution of new forms, and to extinction. Studies in evolutionary biology provide insight into the origins of developmental processes in plants and animals, the co-evolution of disparate taxonomic groups, and the adaptive context for form, function, and behavior. Understanding the variety of living things from an evolutionary perspective provides insights into the role of historical patterns and processes in forming the natural world, and highlights the need for considering such processes in efforts to conserve the Earth's biological diversity.

Students who understand how organisms interact with their environment and are constrained by their evolutionary histories are well prepared for anticipated careers in many applied fields of health and law, as well as conservation and natural resource management. Ecological and evolutionary principles underlie most current issues in dietary health, epidemiology, human ecology, and global environmental change. When combined

with elective courses in related departments, the ecology and evolutionary biology (EBIO) major is an ideal preparation for post-graduate studies in medicine, public health, environmental law, and environmental policy.

In light of these principles and relationships, the undergraduate EBIO degree emphasizes knowledge and awareness of:

- the ecology of organisms, populations, and biological communities
- the distribution and function of terrestrial, freshwater, and marine ecosystems
- principles and patterns of evolution, including natural selection and the history of life on earth
- comparative, systematic, evolutionary, and environmental aspects of botany, microbiology, and zoology
- adaptation of organisms to the physical and biotic environment, from the molecular through the individual to the population level
- animal behavior
- molecular, organismic, developmental, and population genetics
- conservation biology
- the relevance of mathematics, chemistry, and physics to biology
- the development of biological thought
- application of the scientific method to ecology, evolution, and conservation biology, including the ability to read, critically evaluate, and synthesize information from biological literature; generate and test hypotheses to account for observations; and articulate, in oral and written form, the results of biological investigations

## Bachelor's Degree Program

In addition to the general requirements of the College of Arts and Sciences, students in EBIO must complete a minimum 38 hours of course work in the major (in addition to the ancillary courses in chemistry, physics, and mathematics specified below), including 18 hours of upper-division work. All EBIO and required ancillary courses must be completed with a grade of C- or better. Students with scores of 4 or 5 on the AP biology test receive 8 hours of credit and are exempt from EBIO 1210, 1220, 1230, and 1240. Students who score in the 66th percentile or higher on the CLEP test in biology receive 6 hours of credit and are exempt from EBIO 1210 and 1220. EBIO majors with transfer credit in biology from other institutions and/or advanced placement credits must consult the EBIO Undergraduate Advising and Resource Center for proper placement.

<i>Required Courses</i>	<i>Semester Hours</i>
EBIO 1210 General Biology I	3
EBIO 1220 General Biology II	3
EBIO 1230 General Biology Laboratory I	1
EBIO 1240 General Biology Laboratory II	1
<i>Note: Options for students who declare the EBIO major after having taken other introductory biology courses are available from the EBIO Undergraduate Advising Center.</i>	
EBIO 2040 Principles of Ecology	4
EBIO 2070 Genetics: Molecules to Population	4
EBIO 3080 Evolutionary Biology	4
MCDB 3120 Cell Biology	3
One EBIO laboratory or field course, 3000-level or above	3-4
EBIO 4000-level or above; at least 6 hours*	6
Additional elective EBIO courses	5-6

\*These 6 hours must be taken in the EBIO department on the Boulder campus, may include critical thinking courses, and may include a maximum of 3 hours of independent study or independent research.

Students interested in ecology and evolutionary biology may want to consider the Baker Residential Academic Program. See Residential Academic Programs for more information.

## Optional Tracks

In addition to completing the required courses, students are encouraged to work with their EBIO advisors to design individualized tracks related to their particular career and general interests. Examples of these optional tracks include health sciences, conservation biology, ecology, evolutionary biology and diversity, behavior, botany, zoology, and microbiology. Handouts describing recommended coursework for optional tracks are available in the EBIO advising office.

<i>Ancillary Courses</i>	<i>Hours</i>
One year of college chemistry: Recommended: CHEM 1111 + CHEM 1131 Also acceptable: CHEM 1111 + 1071, or 1151 + 1171	9-12
One year of college physics: Recommended: PHYS 2010 + PHYS 2020 Also acceptable: PHYS 1110 + 1120+1140	9-10
One year of college mathematics, including: One semester of calculus (e.g., MATH 1310) One semester of statistics	7-9

(Note: recommended course work fulfilling this requirement presently is being developed; see EBIO advising office for details.)

Note: Up to 12 credit hours of courses taken in other departments may be counted toward the 38 hours required for the EBIO biology major. A listing of acceptable courses may be obtained from the EBIO Undergraduate Advising Center. Transfer students must complete at least 12 upper-division hours in EBIO courses on the Boulder campus.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ecology and evolutionary biology, students must meet the following requirements:

- Declare the EBIO major and begin course work in the major in the first semester of the freshman year.
- Sign up during the first semester with the department undergraduate services coordinator as a participant in the guarantee program.
- Complete additional requirements for the four-year guarantee that are described on a handout available in the EBIO Undergraduate Advising and Resource Center.

## Minor Program

A minor is offered in ecology and evolutionary biology. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

## Concurrent BA/MA Program

A combined BA and MA degree with thesis is offered for the highly motivated undergraduate major who is interested in completing a bachelor and master's degree within five years. Applications for the BA/MA degree are considered on a competitive basis. Freshmen, sophomores, and juniors are eligible. Applicants must have an overall GPA of 3.50 or higher and the support of a faculty research advisor. Applications are available from the EBIO graduate secretary, and are due on October 15 and March 15.

Candidates for this degree must complete all college core requirements by the end of the senior year. To be awarded BA and MA degrees, students must maintain a GPA of 3.30 or better and complete at least 138 credit hours. The degree requires 24 hours of graduate credit at the 5000-level or above and 4-6

hours of thesis credit. In addition to a thesis based on original research, the candidate is required to take a comprehensive examination in three subject areas by the end of the senior year. The final examination consists of a thesis defense to the thesis committee; it should be scheduled by the end of the fifth year.

Students interested in this degree are encouraged to consult with the director of the program early in their undergraduate career. The department considers this a terminal degree, and no financial support is available from the department for students enrolled in this program.

### Graduate Degree Programs

The Department of Ecology and Evolutionary Biology offers degree programs leading to the MA and PhD in a wide range of areas of biological inquiry, as generally described above in the description of the undergraduate program. Modern laboratory facilities for graduate study are in the Ramaley biology building. In addition, the department has strong ties with the University Museum, the Institute of Arctic and Alpine Research (INSTAAR), the Institute of Behavioral Genetics (IBG), the Cooperative Institute for Research in Environmental Sciences (CIRES), the Environmental Studies Program (ENVS), and the Departments of Integrative Physiology, Geology, Geography, Anthropology, and Molecular, Cellular, and Developmental Biology. INSTAAR operates the Mountain Research Station, an alpine field laboratory 25 miles from campus. Graduate research support is available in the form of fellowships, teaching assistantships, and research assistantships.

#### Graduate Admission

Admission materials may be obtained from the departmental office. Completed applications are due in the departmental office by January 2 for consideration for fall semester admission. A complete application includes a statement of intent, letters of recommendation, official transcripts, and GRE scores (both the general as well as the biology subject test). Applications for spring semester admission are not accepted. Students are required to have a bachelor's degree in biology or an equivalent. Students admitted without a sufficient background in chemistry, physics, or mathematics are expected to make up those deficiencies during their first year of graduate study.

#### The MA I Program

A master's degree with thesis is offered for students interested in continuing their training as professional biologists. For some students the MA I provides a basis for work on a PhD at the University of Colorado or at another institution, although the MA is not required for admission to the PhD program. Prospective students are urged to consult with faculty advisors before January 2 to see whether application for the MA I or PhD program is appropriate. Applications for the MA I program are considered on a competitive basis; the department only admits students for whom financial support is available. Thirty hours of course work, which must be at the 5000-level or above, including 4–6 hours of thesis credit, are required for the degree. In addition to a thesis based on original research, each MA I student is required to take a comprehensive examination within the first three semesters of degree work. The thesis topic is presented to the thesis committee as a written research proposal. The MA I final examination consists of the thesis defense; it should be scheduled within two years for full-time students.

#### The MA II Program

A non-thesis master's degree program is offered for students who are interested in obtaining a greater knowledge of ecology and evolutionary biology but who are not interested in degree

work beyond the MA. This program is suitable for secondary school teachers and others whose career choices do not require a research thesis. A faculty sponsor is required before admission can be granted; applicants are encouraged to communicate with potential sponsors before January 2. Financial support is not guaranteed for MA II students. Thirty credit hours of course work are required for the degree, at least 24 of which must be at the 5000 level or above, including 4 hours of independent research leading to a paper to be presented to the faculty sponsor. A final oral exam may be required by the student's MAII faculty advisory committee.

#### Doctoral Program

The PhD is a research degree, involving the production of a major piece of original research (the dissertation). Most recipients of the PhD from EBIO go on to teach and conduct research in a university setting, or to do research and pursue leadership roles in private or governmental institutions. Applicants are encouraged to communicate directly with potential thesis advisors and visit the department before completing the application. Applications are considered on a competitive basis and financial support in the form of fellowships or assistantships usually is made available. Students are expected to form an advisory committee of five faculty members (including one from outside EBIO) soon after beginning their studies. This committee aids the student in designing a research program and in making choices concerning course work. The PhD comprehensive exam is administered by the student's dissertation committee and must be taken within the first five semesters of degree work. It consists of a written research proposal on the dissertation topic, a formal presentation summarizing the student's research progress, and an oral examination centered on the student's research. Upon completion of the dissertation, the student will be given a final examination administered by the dissertation committee.

A total of 30 hours of course work must be taken, although independent study credit may be included in this total. PhD students are required to teach at least one year, generally by serving as a departmental teaching assistant.

### Economics

#### Degrees.....BA, MA, PhD

The undergraduate degree in economics emphasizes knowledge and awareness of:

- the conditions for efficiency in free market production and exchange;
- contemporary theories concerning economic growth, inflation, unemployment, distribution of income, and international environment;
- a few of the specialized fields of economics, such as international economics and finance, natural resources and environment, the economics of gender and discrimination, and public economics;
- the descriptive statistics commonly used by economists; and
- the institutional characteristics of the U.S. economy, and how these differ from those in other economies.

In addition, students completing the degree in economics are expected to acquire the ability and skills to:

- apply the tools of microeconomic theory to reach sound conclusions for simple economic problems;
- follow arguments concerning macroeconomic theory, to distinguish between sound and fallacious reasoning, and understand how differences in policy prescription may arise;

- perform statistical analysis such as multiple regression and understand similar analyses performed by others; and
- communicate economic reasoning in writing, understand similar writing by others, and appreciate the diversity of views that may reasonably exist about economic problems.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
Economics Courses (32-33 credit hours)	
ECON 1000 Introduction to Economics or ECON 2010 and 2020 Principles of Microeconomics and Macroeconomics	4-8
ECON 1078 and 1088, Math Tools for Economists I and II, or MATH 1071 and 1081 or MATH 1071 and MATH 1300 Analytic Geometry and Calculus 1 or Mathematics at or above the level of MATH 1300 (or APPM 1350) plus any one mathematics course above the level of MATH 1300	6-8
ECON 3070 Intermediate Microeconomic Theory and ECON 3080 Intermediate Macroeconomic Theory	6
ECON 3818 Introduction to Statistics with Computer Applications	4
ECON 4808 Introduction to Mathematical Economics, or ECON 4818 Introduction to Econometrics, or ECON 4838 Microcomputer Applications in Economics	3
Electives in upper-division ECON courses (15 credit hours of upper-division ECON courses if ECON 1000 is substituted for ECON 2010 and 2020)	12

*Note: Transfer students majoring in economics must complete at least 12 credit hours of upper-division economics courses at CU-Boulder.*

### Graduating in Four Years

Consult the "Four-Year Guarantee Requirements" for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in economics, students should meet the following requirements:

- Declare economics as a major by the beginning of the second semester.
- Complete ECON 2010 and 2020 or ECON 1000 and all mathematics requirements by the end of the fourth semester.
- Complete ECON 3070, 3080, and 3818, as well as 4808, 4818, or 4838 by the end of the sixth semester.
- Complete 12 credit hours (15 if ECON 1000 is substituted for ECON 2010 and 2020) of additional upper-division economics credit by the end of the eighth semester.

### Special Emphasis Options

The Economics Department offers four tracks for students who have a relatively high GPA and want to focus their upper division course work in a specific area of interest. Interested students must have completed at least 6 hours of economics course work at CU and have at least a 3.00 GPA in economics work completed at CU. Requirements are listed on the economics web site at [www.colorado.edu/Economics](http://www.colorado.edu/Economics).

#### Business Emphasis

The business emphasis is designed for students interested in sampling the business core courses. This option allows students to supplement their economics major with core business skills in areas of accounting, finance, marketing, and management. This option may be of interest to students planning careers in business or intending to pursue graduate studies in business.

#### International Emphasis

The international emphasis is designed for students who have an interest in courses with an international perspective both within economics and outside the department. Courses in international trade and finance are combined with selections of

international courses in related social science disciplines. This program may be of particular interest to students seeking careers in international business, international organizations, nongovernmental organizations, and government agencies.

#### Public Economics Emphasis

The public economics emphasis is designed for students who have an interest in taking courses with a public policy perspective both within economics and outside the department. Courses in public economics are combined with selections of policy oriented courses from various social sciences. This emphasis is recommended for students with interests in public policy seeking careers in local, state, national, or international agencies.

#### Quantitative Emphasis

The quantitative emphasis is designed for well-qualified majors with an interest in either theoretical or applied mathematics. Economics courses in quantitative methods are combined with courses from the Department of Mathematics and the Department of Applied Mathematics. This program may be of interest to students planning to pursue graduate studies in economics or those seeking a career in applied quantitative research.

#### Minor Program

A minor is offered in economics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

#### Economics Honors Program

The honors program in economics provides an opportunity for highly motivated majors to undertake individualized research and to graduate with honors (cum laude, magna cum laude, summa cum laude) in economics. Economics majors with senior standing and both economics and overall GPAs of 3.40 or better are eligible to participate. Participants enroll in the economics honors seminars, which provide instruction in research methodology essential to the preparation of the honors thesis. Students interested in the economics honors program should contact the departmental honors advisor during their junior year.

#### Economics Internship Program

This program offers course credit while providing students the opportunity to integrate theoretical concepts of economics with practical experience in economics-related institutions. Juniors and seniors interested in the program should contact the departmental internship coordinator.

#### Concurrent BA/ MA Program

This program is designed for exceptional students who wish to combine their BA and MA degrees in economics. Because six hours of course work taken for the master's degree (6000 level) also count for the undergraduate degree, students are able to complete BA requirements in four years and the combined BA/MA requirements in five years. The BA/MA requirements are identical to the requirements for the two separate degrees.

In the fourth year, candidates for the BA/MA degree take a number of required courses (6000-level) for the MA degree. Two of these courses are counted twice for both the BA and MA degrees, allowing students to satisfy elective and total hour requirements for the BA in economics after four years of study. Students in this program are encouraged to take two semesters of calculus (MATH 1300 and 2300) and linear algebra.

*Note:* Any undergraduate economics credits over 45 hours will not count towards the BA degree except by petition to the Dean of Arts and Sciences.

All MA degree candidates must complete five core courses (ECON 6070, 6080, 6808, 6818, and 6209). Honors students who write an honors thesis may substitute 3 hours from the honors seminar (ECON 4309 and/or 4339) for the research methods course (ECON 6209).

In addition to the core requirements listed below, candidates who plan to write a master's thesis are required to take two 6000-level and one 8000-level field electives during their fourth and fifth years of study. These candidates also take the 4-credit hour thesis course (ECON 6959) during their fifth year. Candidates who complete these requirements for the MA degree with thesis will have completed a total of 28 graduate credit hours. These will include 24 course hours at the 6000-level or above, and a minimum of 6 thesis hours.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Fourth Year

##### Fall Semester

ECON 6070 Applied Microeconomic Theory	3
ECON 6080 Applied Macroeconomic Theory	3
ECON 6808 Introduction to Quantitative Economics	3

##### Spring Semester

ECON 6818 Econometric Methods and Application	3
ECON 6xxx Field Electives	6

#### Fifth Year

##### Fall Semester

ECON 6209 Research Methods in Economics	3
ECON 8xxx Field Elective	3

##### Spring Semester

ECON 6959 Master's Thesis (spring)	6
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Candidates who do not plan to write a master's thesis are required to take two 6000-level courses and three 8000-level courses as field electives during their fourth and fifth years of study. At the end of their fifth year, these students take a comprehensive examination covering their MA course work. Candidates who complete these requirements will have completed a total of 30 graduate credit hours.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Fourth Year

##### Fall Semester

ECON 6070 Applied Microeconomic Theory	3
ECON 6080 Applied Macroeconomic Theory	3
ECON 6808 Introduction to Quantitative Economics	3

##### Spring Semester

ECON 6818 Econometric Methods and Application	3
ECON 6xxx Field Electives	6

#### Fifth Year

##### Fall Semester

ECON 6209 Research Methods in Economics	3
ECON 8xxx Field Elective	3

##### Spring Semester

ECON 8xxx Field Electives	6
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**Admission Procedures.** Undergraduates interested in pursuing the concurrent BA/MA degree should apply during the second semester of their third year by completing the application for admission to the concurrent bachelor/master degree program and requesting the submission of four letters of recommendation. Graduate Record Examinations are not required for those seeking admission to the program. All other standing requirements for admission to the regular MA program, including one year of calculus (MATH 1300 and 2300) or the equivalent area, are applied for admission to the combined degree program. Candidates for admission to this program need to complete the undergraduate course in econometrics (ECON 4818) as an elective during their

second or third year. Students must have at least a 3.40 GPA in economics and a 3.40 overall GPA to be eligible.

## Graduate Degree Programs

### Master's Degree

**1. Admission Requirements.** An applicant for admission as a regular degree student must:

- Hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree and equivalent to the degree given at this university. The undergraduate GPA must be at least 2.75 (2.00 = C).
- Have at least 16 credit hours in economics.
- Submit Graduate Record Examination scores for aptitude (verbal, quantitative, and analytical). Foreign applicants must also submit a TOEFL score.
- Submit four letters of recommendation.

Graduate study in economics is quantitative and analytical. Students should be comfortable with basic calculus (derivatives and integration), linear algebra, matrix algebra, and basic statistics.

Students who do not meet the requirements for admission as regular degree students may be recommended for provisional degree status. (See the Graduate School section for more information.)

The application deadline for foreign students is March 1 for the following fall semester. Students desiring admission beginning with other terms will be considered but may be referred to the Economics Institute, 1030 13th St., Boulder, CO 80302.

**2. Degree Requirements.** There are three options open to students for fulfilling the requirements for the master of arts degree in economics.

- Plan I—Thesis:** This option requires a minimum of 24 credit hours of graduate course work plus a master's thesis (which entails registering for an additional 6 master's thesis semester hours) plus passage of a comprehensive final examination over all work presented for the degree.
- Plan II—Nonthesis:** This option requires a minimum of 30 credit hours of graduate course work plus passage of a comprehensive final examination over all course work presented for the degree.
- Plan III:** This option, open only to students enrolled in the PhD program in economics, requires a minimum of 30 credit hours of graduate course work in the PhD program plus passage of all PhD preliminary examinations, which shall count as the master's comprehensive examination.

**3. Sequence of Study.** The sequence of study for these degree options, including required and elective courses, is outlined as follows:

#### Plan I and II

##### First Year

##### Fall Semester

ECON 6070 Applied Microeconomic Theory
ECON 6080 Applied Macroeconomic Theory
ECON 6808 Introduction to Quantitative Economics

##### Spring Semester

ECON 6xxx Field Elective
ECON 6xxx Field Elective
ECON 6818 Econometric Methods and Application

##### Second Year

##### Fall Semester

ECON 6209 Research Methods in Economics
ECON 8xxx PhD Field Elective



**Spring Semester**

ECON 6959 Master's Thesis (6 hours) (Plan I only)

ECON 8xxx PhD Field Elective (Plan II only)

ECON 8xxx PhD Field Elective (Plan II only)

All students opting for Plan I or Plan II are required to take five core courses (ECON 6070, 6080, 6808, 6818, and 6209). The last of these courses, ECON 6209, is Research Methods in Economics. This 3-credit course trains students at the masters level in scientific methodology and research in economics. This course culminates in a research project that normally leads directly to thesis work. However, this course and its research project are required even if the student opts for the nonthesis plan.

The exact timing of course work is subject to the specific requirements of individual students. For instance, in some cases all requirements for the degree might be fulfilled in three semesters. Up to 9 hours of transfer credit, including courses taken at the Economics Institute, can be substituted for required or elective courses with the approval of the Director of Graduate Studies (DGS). When transfer credit is allowed for a required course, the DGS may require the student to pass the final examinations of required courses he or she omits because of transfer credit.

Before attempting course work at the 8000 level, students in Plan I or Plan II must meet specific prerequisites. Consult the course descriptions for the exact prerequisites in each field.

**Plan III (MA degree for students in the PhD program)****First Year****Fall Semester**

ECON 7010 Microeconomic Theory 1

ECON 7020 Macroeconomic Theory 1

ECON 7818 Mathematical Statistics for Economists

**Spring Semester**

ECON 7030 Microeconomic Theory 2

ECON 7040 Macroeconomic Theory 2

ECON 7828 Econometrics 2

**Second Year**

ECON 7050 Advanced Economic Theory

9 hours of elective graduate course work.

Consult the PhD degree requirements for more details.

**4. Comprehensive Final Examination.** All students must pass a comprehensive final examination before earning the master of arts degree. Consult the Graduate School section for details.

A student opting for Plan I takes an oral examination covering his or her master's thesis and course work. The examining committee consists of three members including, if possible, the student thesis advisor(s) and the student instructor in ECON 6209. This examination takes place following the completion of the student thesis work.

A student opting for Plan II takes a written comprehensive examination put together and graded by a committee normally consisting of faculty members who taught elective courses taken by the student. This examination follows the completion of the fall or spring term in which the student completes his or her course work.

For a student earning the master of arts degree by following Plan III, the comprehensive examination consists of passing all of the preliminary examinations required by the rules of the PhD program.

The DGS has final say on the composition of the comprehensive final examination committees. The evaluation of the final exam committee is final. If a student fails an initial comprehensive examination, he or she may attempt a second examination by the same examining committee (if at all possible) after a period of time of at least three months.

**5. Satisfactory Progress Toward a Degree.** In order to attain satisfactory progress toward the MA degree, students in Plan I or Plan

II must complete all courses in the core with a grade of B- or better by the end of their second fall semester. Furthermore, a final comprehensive examination must ordinarily be passed within three years of entering the program (the maximum time allowed by the Graduate School is four years). Failure to make satisfactory progress is grounds for suspension from the graduate program.

Students in Plan III must satisfy the requirements listed for satisfactory progress in the PhD rules.

**6. Other Requirements.** See relevant sections for details on: transfer of credits, residence, time limitations, thesis, and admission to candidacy.

**Doctoral Degree**

**1. Admission Requirements.** An applicant for admission as a regular degree student must:

- Hold a bachelor's degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree and equivalent to the degree given at this university. For those applicants who do not have a master's degree in economics, the undergraduate grade point average must be at least 2.75 (2.00=C).
- Have completed intermediate microeconomic and macroeconomic theory courses, 6 semester hours of calculus at the university level or equivalent, and statistics.
- Submit Graduate Record Examination (GRE) scores for aptitude (verbal, quantitative, and analytical). Foreign applicants must also submit a TOEFL score.
- Submit four letters of recommendation.

Graduate study in economics is quantitative and analytical. Students should be comfortable with basic calculus (derivatives and integration), linear algebra, matrix algebra, and basic statistics.

It is not necessary to have an MA degree to be admitted to the PhD program; qualified applicants may be admitted directly to the PhD program and may obtain the MA degree while working toward the PhD. See the list of MA requirements for more information.

The application deadline for foreign students is February 1 for the following fall semester. There is no deadline for U.S. applicants; however, those students who wish to be considered for financial assistance should apply by February 1. Students must begin the program in the fall semester; those requiring prior remedial work may be referred to the Economics Institute, 1030 13th Street, Boulder, CO 80302.

**2. Degree Requirements.** Full-time students are ordinarily expected to complete all requirements for the PhD degree within four years of entering the program (the maximum time allowed by the Graduate School is six years), and the schedule of required courses below is centered on this expectation. However, it is recognized that some students may require five years to finish the degree. Failure to make timely and satisfactory progress toward the degree, as prescribed in a supplemental document on file in the graduate secretary office, may result in loss of financial assistance or dismissal from the program.

**3. Course Requirements**

a. Prior to beginning the program, students must demonstrate an acceptable degree of competence in integral and differential calculus and optimization techniques. Students with extensive mathematical preparation in prior studies are judged by the DGS to have done so. Otherwise, such competence may be demonstrated in one of three ways:

- Take ECON 7800, an intensive, two-week preparatory course offered immediately prior to each fall semester and pass its final examination with a grade of B- or better (no credit is offered for this course);

- Pass the final examination in ECON 7800 without taking the course; or
- Pass a substantially equivalent course at the Economics Institute or other accredited graduate institution.

Students who fail the examination in ECON 7800 are given a second opportunity to pass an equivalent examination two weeks later. Students who fail it on the second try are required to take ECON 6808 in the fall semester and pass the course examination.

b. There are seven core courses in the PhD program (ECON 7010, 7020, 7030, 7040, 7050, 7818, and 7828). Course requirements beyond the core courses include four courses taken in the student two proposed fields of specialization at the 8000-level; two graduate elective courses with at least one of the courses at the 8000-level and at least one of the courses outside the two fields of specialization; 6 credit hours in a research colloquium; and at least 30 hours of dissertation credit after admission to candidacy.

c. At least four of the core courses must be taken on the Boulder campus. Courses transferred for credit must be approved by the DGS. After entry into the PhD program, all remaining core requirements must be taken on the Boulder campus.

d. All courses for PhD credit taken on the Boulder campus must be passed with a grade of B- or better. A student who receives a grade of C+ or lower in a core course must retake that course the following academic year.

e. No more than 12 credit hours (exclusive of dissertation credit) from a single faculty member may be counted toward PhD requirements. Independent study is allowed only to satisfy elective requirements. No more than 6 credit hours of independent study may be applied to the PhD degree and no more than 3 credit hours of independent study may be taken from a single faculty member. Students who wish to take independent study must apply to the Graduate Curriculum and Review Committee (GCRC) in order to do so. In consultation with the DGS, students may choose to take up to two graduate offerings in other departments as elective courses.

f. Course requirements for the program include:

#### First Year

##### Fall Semester

ECON 7010 Microeconomic Theory 1  
ECON 7020 Macroeconomic Theory 1  
ECON 7818 Mathematical Statistics for Economists

##### Spring Semester

ECON 7030 Microeconomic Theory 2  
ECON 7040 Macroeconomic Theory 2  
ECON 7828 Econometrics 2

#### Second Year

##### Fall Semester

ECON 7050 Advanced Economic Theory  
Field or elective course  
Field or elective course

##### Spring Semester

Field or elective course  
Field or elective course  
Elective course

Ordinarily, students would be expected to complete course work in at least one field of specialization in the second year.

g. Course requirements in the third year include ECON 8209 (fall) and ECON 8219 (spring), which constitute the third-year research colloquium; remaining elective course(s); and dissertation research, if practicable.

h. Course requirements in the fourth year consist of relevant dissertation credit hours.

**4. Preliminary Examinations.** Written preliminary examinations in microeconomic theory, macroeconomic theory, and econometrics must be taken in the August examination period following the successful completion of the core courses in these areas. Under most circumstances this period would be prior to the second year. An examination attempted and failed must be taken again and passed in the next examination period. A second failure results in dismissal from the program, subject to appeal under extraordinary circumstances to the GCRC. In no case are attempts beyond the third granted.

Students who have failed any of the core courses are ineligible to take the preliminary examination in the area of failure. These students must retake the failed course(s) in the following year and attempt the relevant preliminary examination in the first scheduled examination period thereafter.

Students must pass all preliminary examinations within two-and-one-half years of beginning the PhD program. Exceptions for part-time students may be allowed under extraordinary circumstances by the DGS.

**5. Fields of Specialization.** By the conclusion of the second year each student must declare to the graduate secretary his or her proposed two fields of specialization. With the approval of the DGS, one of the fields may be designed to include a course outside the economics department. Fields consist of at least two courses at the 8000-level as designated by faculty in particular areas. In lieu of one of the standard fields the student may offer a combination field when courses from different areas are complementary in meeting the specialization objectives of the student. In such a case, the student is responsible for obtaining the approval of the DGS and the written agreement of at least two faculty members who will be involved in evaluating his or her competence in the field.

**6. Comprehensive Examinations.** Students must pass a written comprehensive examination in two fields of specialization. The examination for each field must be taken in the examination period immediately following the successful completion of all required courses in that field. Comprehensive examinations are administered regularly in August and January.

Students who fail a comprehensive examination in one or more fields on the first attempt must retake the unsatisfactory examination(s) in the next examination period. Students who fail such an examination a second time may appeal to the GCRC for a final third attempt under extraordinary circumstances. Subject to this appeal, students who fail a particular field comprehensive examination twice are required to choose a different field of specialization and complete the course requirements and comprehensive examination in the following academic year. This procedure is available only for one field; students who fail the comprehensive examination twice in two fields are dismissed from the program.

**7. Third-Year Research Colloquium.** By the end of October following the second academic year, students must submit to the graduate secretary a written proposal describing the topic, methodology, and objective of the third-year paper to be completed in the colloquium. The proposal must include the names and signatures of the student main and secondary faculty advisors. All second-year students are given a packet of lists of faculty research interests to facilitate this process.

Each third-year student is required to register for 3 credit hours per semester in the research colloquium, which meets weekly under the direction of a faculty member. The purpose of the colloquium is to provide students the opportunity and guidance to complete the required third-year paper and to facilitate progress toward the dissertation stage. Meetings in the fall semester allow preliminary discussions of the research and

lectures in research methodology, data sources, and the like. In the spring semester each student presents work in progress in the colloquium. In April or May of the third year each student must present a final version of the research paper in a departmental seminar series. Ordinarily, this seminar also constitutes the required dissertation proposal defense (see below).

Under some circumstances, students may delay taking this colloquium until the fourth year with the approval of the DGS.

**8. Admission to Candidacy and Dissertation Requirements.** Students are formally admitted to candidacy for the PhD degree after completing all course requirements (other than the research colloquium) and all preliminary and comprehensive examinations and after earning four semesters of residency (see the front section of this catalog for details). After admission to candidacy, students must register each fall and spring semester for dissertation credit (ECON 8999) until attaining the degree; the accumulated credit for the thesis must total at least 30 semester credit hours to attain the degree. A student must prepare a written dissertation and successfully pass an oral examination before a dissertation committee and other interested persons on its content before receiving the degree. The minimum residence requirement for the PhD degree is six semesters of scholarly work beyond the bachelor's degree.

#### 9. Administration.

*a. Examining Committees for Preliminary Examination.* Examining committees for preliminary examinations consist of three members of the economics department who teach in the relevant area. Examining committees for comprehensive committees consist of at least two members of the economics department who teach in the relevant area, with a third member appointed from another department in cases where the student has structured a field including a course from that department.

*b. Grading Preliminary and Comprehensive Examinations.*

- Written examinations are numbered so that insofar as possible the identity of the student is unknown. Each faculty member grades independently and writes no comments in the examination booklet. A meeting of the graders is called by the chair of the examination committee and the committee grade is submitted to the graduate secretary. The possible grades include High Pass or Distinction (used sparingly), Pass, Fail, and Marginal Fail (used sparingly).

- Shortly after submission of grades a general faculty meeting is held to discuss and report examination results. In cases where the committee initial grade was marginal fail, if two of the members of the committee then vote affirmatively, a grade of pass will be recorded; if two of the members of the grading committee then vote negatively, a grade of fail will be recorded. If the vote of the grading committee is tied and the third member is absent (but will be available within seven days), the decision to pass or to fail is to be made by the reconvened grading committee. If fewer than two members of the grading committee are present and voting, or if the vote of the grading committee is tied and the third member is not available within seven days, the decision to pass or fail will be made by the assembled faculty; in such circumstances the grade is reported as pass if a majority votes affirmatively.

- When examination results are reported, a student who failed should have an opportunity to discuss his performance with a member of the examining committee.

*c. Dissertation Guidelines.*

- To facilitate progress on the dissertation, a "basic committee" consisting of a supervisor and two other members who are most interested in the proposed research is organized by the student, in conjunction with the DGS, during the third year. Any subsequent changes in this committee

(or of the full committee later) must be approved by the supervisor and recorded with the graduate secretary after all basic committee members have been consulted.

- By September 1 of the academic year following the research colloquium, each student must submit a written dissertation proposal to his or her basic committee and the graduate secretary. The dissertation proposal form must be signed by each member of the basic committee and submitted to the graduate secretary as well by this date. An acceptable proposal must include a statement of purpose and a justification for the importance of the work; a full literature review and a statement of how this research will contribute to the literature; and a detailed description of the methodologies to be used and of the data bases, if appropriate.

- By October 15 of the same academic year, students must present the proposal in an open seminar. If the dissertation topic is related to the third-year paper, the proposal may be presented at the end of the paper presentation (see above). Otherwise a separate presentation must be scheduled. At the conclusion of the seminar, the basic committee and candidate must agree on necessary changes. If these are major, an additional proposal defense will be scheduled after they are made. A successful proposal defense results in a letter from the basic committee to the candidate indicating that successful completion of the planned research constitutes an acceptable dissertation. Students who fail to present a proposal in a timely fashion are denied a passing grade on dissertation credit for which they are registered.

- Within three months of the dissertation proposal presentation, the DGS, in consultation with the dissertation supervisor, appoints remaining members of the full dissertation committee. A full dissertation committee consists of at least four faculty members from the economics department and one member from outside the department.

- Normally students are expected to complete their dissertations by the end of their fourth academic year (or fifth in exceptional cases). The graduate secretary provides details on submission of the dissertation and arrangements for the oral defense. After the defense, minor changes are agreed upon between candidate and supervisor. If major changes arise, the candidate and supervisor will consult with the DGS on a future course of action.

*d. Yearly review.* Each spring the graduate faculty of the Department of Economics meets to review the progress of each student in the PhD program. The regulations herein serve as a standard of minimal acceptable progress, but additional rules on this issue are specified in a document available for the graduate secretary or the DGS.

## English

*Degrees.....BA, MA, PhD*

The undergraduate degree in English emphasizes knowledge and awareness of:

- canonical and noncanonical works of English and American literature;
- the general outlines of the history of British and American literature;
- literary theories, including recent theoretical developments; and
- the social and historical contexts in which the traditions developed.

In addition, students completing the degree in English are expected to acquire the ability and skills to:

- analyze literary texts;
- interpret texts on the basis of such analysis;
- relate analyses and interpretations of different texts to one another; and
- communicate such interpretations competently in written form.

The undergraduate degree in creative writing emphasizes knowledge and awareness of:

- literary works, including the genres of fiction, poetry, playwriting, and screenwriting, and the major texts of contemporary writers;
- literary history, including the origins and development of genres, major writers of the past, and the role of the writer in society; and
- literary analysis, including theories of literary composition and critical theory.

In addition, students completing the degree in creative writing are expected to acquire the ability and skills to:

- write in various poetic modes and styles;
- write in various fictive styles;
- write in various nonfiction styles; and
- evaluate other students' written work.

### Bachelor's Degree Programs

Expository writing courses (except ENGL 1001 and 3151) do not apply toward the major. English courses taken on a pass/fail basis do not fulfill major requirements. Independent study credit hours cannot fulfill a major requirement unless that requirement is not being offered or available within the year that the student graduates. A minimum of 12 hours of upper-division course work for the English major must be completed on the Boulder campus. English courses taken at other colleges must be evaluated by the Department of English. Courses taken in other departments (except approved cross-listed courses) normally do not count toward the English major.

*Note:* For the Advanced Placement examination in English literature and composition, students will receive credit for ENGL 1500 for an exam score of 3, or ENGL 1500 and 2502 for an exam score of 4 or 5.

Students must complete the general requirements of the College of Arts and Sciences and one of the two programs listed below.

#### Literature

Students are subject to the major requirements in effect at the time they formally declare the major. A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division. Requirements may be fulfilled by taking specific courses designated by the Department of English.

<i>Required Courses</i>	<i>Semester Hours</i>
ENGL 2000 Literary Analysis .....	3
ENGL 2010 Introduction to Literary Theory .....	3
One course from each: backgrounds to literature in English, British literature to 1660, British literature after 1660, and American literature .....	12
One course from both categories: advanced theory/genre studies/popular culture and multicultural/gender studies .....	6
ENGL 4038 Critical Thinking in English Studies or ENGL 4728 Seminar: Topics in English .....	3
Three elective courses in English .....	9

In addition to the 36 hours required for the major, another 9 hours may be taken, for a maximum of 45 hours in English.

The recommended sequence of courses to be taken during the initial year of the literature program is ENGL 2000 and an English elective for the first semester, and ENGL 2010 and a 2000-level ENGL course for the second semester.

#### Creative Writing

Students are subject to those major requirements in effect at the time they formally declare the major.

A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division.

ENGL 2000 Literary Analysis .....	3
ENGL 2010 Introduction to Literary Theory .....	3
One course from any two of the following: the backgrounds to literature in English, British literature to 1660, British literature after 1660, and American literature .....	6
One course from advanced theory/genre studies/popular culture or multicultural/gender studies .....	3
ENGL 4038 Critical Thinking in English Studies or ENGL 4728 Seminar: Topics in English .....	3
Six creative writing workshops, three of which must be upper division ...	18

In addition to the 36 hours required for the major, another 9 hours may be taken, for a maximum of 45 hours in English.

The recommended sequence of courses to be taken during the initial year of the creative writing program is ENGL 2000 and ENGL 1191 for the first semester, and ENGL 2010 and a 2000-level workshop for the second semester.

Admission to the creative writing program is not automatic. Students must have completed at least 6 hours of writing within the program before being considered (for transfer students, 3 hours of creative writing can be transferred in). In addition, they must submit two copies of a manuscript (at least 7 poems, 20 pages of fiction, or a short stage or screen play) to the admissions committee for approval. Students should apply no later than the second semester of their junior year.

In order to take a workshop beyond the 2000-level, students who have not been formally admitted to the creative writing program must submit a manuscript to the Department of English prior to registration. Each workshop may be taken three times for credit. Students may not take two poetry or two fiction workshops in the department in the same semester.

#### Advising

The director of undergraduate studies oversees the department advising program, working in conjunction with the College of Arts and Sciences Academic Advising Center. Upon declaring an English major, students are assigned to one of two primary English advisors. The primary advisors are available to meet with students by appointment or on a drop-in basis. The primary advisors monitor and evaluate student progress in completing the arts and sciences core curriculum and major requirements, evaluate transfer credit, preapprove study abroad course work, and certify students for graduation. The department encourages students to meet with their primary advisor at least once each semester to update their student file and ensure that they are making satisfactory progress in meeting the core and major requirements.

#### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in English, students should meet the following requirements:

- Declare the English major and begin course work in the major no later than the beginning of the second semester.
- Successfully complete one-third of the hour requirements for the major by the end of the fourth semester. For literature track majors, this includes ENGL 2000, 2010, an English elective, and any 2000-level course for the major. For creative writing track majors, this includes ENGL 2000, 1191, 2010, and 2021 or 2051, as well as formal admission to the program.

Successfully complete two-thirds of the hour requirements for the major by the end of the sixth semester.

Successfully complete the remaining major requirements by the end of the eighth semester.

### Departmental Honors

Students interested in pursuing a special program leading to graduation with departmental honors should confer with the director of undergraduate studies as soon as possible, but definitely no later than the beginning of spring term in their junior year.

### Students Who Contemplate Teaching

Sheets listing the curriculum required for a teaching license for secondary schools may be obtained in Education 151. Since fulfilling requirements for both education and English make a very tight schedule, students should seek early advising to complete their college requirements.

### Undergraduate English Awards and Prizes

**The Katherine Lamont Scholarship.** The Lamont scholarship is a variable annual award to a continuing English major in recognition of sustained excellence and exceptional scholarly performance in the major.

**The Harold D. Kelling Essay Prize.** The Kelling prize is a variable cash award for the best essay on literature submitted by an undergraduate currently enrolled in the university. The essay must have been written for an English class at CU-Boulder and should be submitted to the English department before March 15.

**The Jovanovich Imaginative Writing Prize.** The Jovanovich prize is an annual award for excellence in poetry, fiction, playwriting, or nonfiction prose. Information is available in Hellem 111.

## Graduate Degree Programs

### Admission Requirements

**Master's Degree in English.** The MA program offers theory and literary history combined with a rigorous training in either critical analysis or creative writing. Applicants interested in *English literature* should have satisfactory scores on the verbal and analytical writing sections of the GRE General Test. In addition, at least 24 credit hours in English (exclusive of composition, creative writing, and speech) are normally required for admission. Fifteen of the 24 hours must be in upper-division courses.

Applicants interested in *creative writing* must submit satisfactory scores on the verbal and analytical writing sections of the GRE, plus at least 18 credit hours in literature is strongly recommended. In addition, each student must submit a manuscript of at least 10 pages of poetry or a minimum of 25 pages of fiction, nonfiction prose (other than literary criticism), or a screen or stage play for evaluation.

**Doctoral Degree in English.** Students must present satisfactory scores on the verbal and analytical writing sections of the GRE General Test and on the Advanced Literature Test, and must have either an MA degree in English or at least 30 hours of postgraduate English course work beyond the BA degree. Entering graduate students with no degree beyond the BA are normally admitted to the MA program. They may later apply for admission to the PhD program.

### Degree Requirements

Students wishing to pursue graduate work in English should note requirements for advanced degrees in the Graduate School section and write the department for a more complete description of graduate programs in English, or visit [www.colorado.edu/English](http://www.colorado.edu/English).

## Environmental Studies

Degrees.....BA, MS, PhD

The environmental studies major is administered through the Office of Environmental Studies and draws from curricula in the earth and natural sciences as well as the social sciences. See the program office (Benson Earth Sciences 246A) for details of the program requirements.

The bachelor's degree program is composed of a required common curriculum that exposes all students to the basics of physical and social environmental sciences, as well as to a choice between two tracks. The environmental science track has specializations in water, biogeochemistry, and climate, and the social science track has specializations in environment and natural resources, environmental analysis, international environment and development, and decision-making, planning, and policy.

The undergraduate degree in environmental studies emphasizes knowledge and awareness of:

- the causes, scale, and relative importance of the major environmental problems in the United States and the world;
- the complexity of factors relating to human interaction with the environment, especially the fact that environmental problems have both human and biophysical components; and
- the general principles of human-environmental interaction, global habitability and environmental change, and sustainable human societies.

Environmental studies is an interdisciplinary program, drawing on courses and expertise from over a dozen departments. Students who also wish to pursue a traditional, discipline-based education are encouraged to double major or complete a minor in one of the participating departments. An internship program is offered to provide the upper-level student with practical experience working in the field.

Students interested in environmental studies may want to consider the Baker Residential Academic Program. See Residential Academic Programs for more information.

## Bachelor's Degree Programs

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Common Curriculum

Students are expected to complete the following common curriculum:

<i>Required Courses</i>	<i>Semester Hours</i>
ENVS 1000 Introduction to Environmental Studies .....	4
Biology sequence (EBIO 1030 and 1040 Biology: A Human Approach 1 and 2, and EBIO 1050 Biology: A Human Approach Laboratory; or EBIO 1210 and 1220 General Biology 1 and 2, and EBIO 1230 and 1240 General Biology Lab 1 and 2) .....	7-8
Chemistry sequence (CHEM 1011 and 1031 Environmental Chemistry 1 and 2; or CHEM 1051 Introduction to Chemistry and 1071 Introduction to Organic and Biochemistry; or CHEM 1111 and 1131 General Chemistry 1 and 2; or CHEM 1151 and 1171 Honors General Chemistry 1 and 2) .....	7-12
Economics sequence (ECON 1000 Introduction to Economics or ECON 2010 Principles of Microeconomics and ECON 3535 Natural Resource Economics and ECON 3545 Environmental Economics). <i>Note:</i> Students doing track A must complete <i>both</i> ECON 3535 and 3545; students doing track B must complete <i>either</i> ECON 3535 or 3545. ....	7-10
Geography/geology sequence (GEOG 1001 Environmental Systems 1—Climate and Vegetation and 1011 Environmental Systems 2—Landscapes and Water; or GEOL 1010 and 1020 Introduction to Geology 1 and 2 and 1080 and 1090 Introductory to Geology Lab 1 and 2; or GEOL 1060, 1070, and 1110 Global Change 1 and 2 and Lab) .....	8

Lab requirement (a total of three labs from any of the following: CHEM, EBIO, GEOL, or GEOG). Track B students are encouraged to take all labs  
 PHIL 3140 Environmental Ethics or GEOG 3422 Conservation Thought or ENVS/ETHN 3003 Race, Class, and Pollution Politics .....3  
 PSCI 3201 The Environment and Public Policy or PSCI 2101 Introduction to Public Policy Analysis .....3  
 One calculus or statistics course .....3-5

In addition, students are required to complete either Track A (Society and Policy), or Track B (Environmental Sciences). Each track has several choices of specializations. An internship may be used as one course in a specialized area. Courses used to satisfy a common curriculum requirement cannot be used to satisfy a specialization requirement.

### Track A: Society and Policy

Students must complete the three required courses and one of the four areas of specialization.

<i>Required Courses</i>	<i>Semester Hours</i>
ANTH 4150 Human Ecology	3
ECON 3545 Environmental Economics	3
GEOG 3412 Conservation Practice	3

### Environment and Natural Resources

Complete a minimum of 15 credit hours from the following courses:

ENVD 4023 Environmental Impact Assessment	3
ENVS/EBIO 3040 Conservation Biology	3
ENVS/PHYS 3070 Energy in a Technical Society	3
GEOG 3351 Biogeography	3
GEOG 3662 Economic Geography	3
GEOG 4371 Forest Geography	3
GEOG 4430 Seminar: Conservation Trends	3
GEOG 4501 Water Resources and Water Management of Western United States	3
GEOG 4732 Population Geography	3
GEOG 4742 Environment and Peoples	3
GEOL 3070 Introduction to Oceanography	3
HIST 4417 Environmental History of North America	3

### International Environment and Development

Complete a minimum of 15 credit hours from the following courses:

ECON 3403 International Economics and Policy	3
GEOG 3672 Gender and Global Economy	3
GEOG 3682 Geography of International Development	3
GEOG 3862 Geography of Africa	3
GEOG 4712 Political Geography	3
PHIL 2140 Environmental Justice	3
PSCI 2223 Introduction to International Relations	3
PSCI 3143 International Relations	3
PSCI 3193 International Behavior	3
PSCI 4012 Global Development	3
PSCI 4173 International Organization	3
PSCI 4183 International Law	3
PSCI 4782 Global Issues	3
SOCY 1002 Global Human Ecology	3
SOCY 3002 Population and Society	3
SOCY/WMST 3012 Women, Development, and Fertility	3

### Decision Making, Planning, and Public Policy

Complete a minimum of 15 credit hours from the following courses:

AREN 4830/CVEN 4834 Energy and Environmental Policy	3
ATOC 4800 Policy Implications of Climate Controversies	3
ENVD 4023 Environmental Impact Assessment	3
ENVS/PHYS 3070 Energy in a Technical Society	3
GEOG 3402 Natural Hazards	3
GEOL 4950 Natural Catastrophes and Geologic Hazards	3
PHIL 2140 Environmental Justice	3
PSCI 2101 Introduction to Public Policy Analysis	3
PSCI 3201 Environment and Public Policy	3
SOCY 3091 Environment and Society	3

### Environmental Analysis

Complete a minimum of 15 credit hours from the following courses:

ATOC 3300 Analysis of Climate and Weather Observations	3
ECON 4808 Introduction to Mathematical Economics	3

ENVD 4023 Environmental Impact Assessment	3
GEOG 2053 Maps and Mapping	4
GEOG 3053 Cartography 1	4
GEOG 3093 Geographic Interpretation of Aerial Photographs	3
GEOG 4083 Mapping from Remotely Sensed Imagery	4
GEOG 4093 Remote Sensing of the Environment	4
GEOG 4103 Introduction to Geographic Information Science	4

### Track B: Environmental Sciences

Students must complete the required courses and one of three areas of specialization.

<i>Required Courses</i>	<i>Semester Hours</i>
Calculus	4-5
EBIO 2050 Environmental Biology or GEOG 3601/ATOC 3600/ENVS 3600 Principles of Climate	3
GEOG 3511 Introduction to Hydrology	4
Field course: EBIO 4350 Aquatic Field Biology or ENVS/EBIO 4630 Field Biology or Mountain Research Station field course or GEOL 2700 Introduction to Field Geology and one other 2-credit geology field course	3-4

### Water

Complete a minimum of 12 credit hours from the following courses:

CVEN 3454 Water Quality	4
EBIO 3190 Tropical Marine Ecology	3
EBIO 4020 Stream Biology	3
EBIO 4030 Limnology	3
EBIO 4110 Freshwater Marine Ecology	2-4
EBIO 4460 Fish Ecology	4
GEOG 4251 Fluvial Geomorphology	4
GEOG 4321 Snow Hydrology	4
GEOG 4430 Seminar: Conservation Trends	3
GEOG 4501 Water Resources and Water Management of Western United States	3
GEOL 3030 Introduction to Hydrogeology	3
GEOL 4060 Oceanography	4

### Biogeochemistry

Complete a minimum of 12 credit hours from the following courses:

CHEM 4191 Environmental Chemistry of the Biosphere	3
ENVS/GEOL 3520 Environmental Issues in Geosciences	3
ENVS/EBIO/GEOL 4160 Introduction to Biogeochemistry	3
EBIO 4170 Ecosystem Ecology	3
EBIO 4360 Microbial Ecology	3
GEOG/GEOL 4241 Principles of Geomorphology	4
GEOG 4251 Fluvial Geomorphology	4
GEOG 4401 Soils Geography	3
GEOL 3040 Global Change: Recent Geological Record	3
GEOL 3320 Geochemistry	3
GEOL 4060 Oceanography	4

### Climate

Complete one physics sequence and a minimum of 12 credit hours from the following courses:

ATOC 3300/GEOG 3301 Analysis of Climate and Weather Observations	3
ATOC 3500 Air Chemistry and Pollution	3
ATOC 4100 Modeling the Environment and Climate	3
ATOC 4710 Atmospheric Physics	3
ATOC 4720 Atmospheric Dynamics	3
ATOC 4800 Policy Implications of Climate Controversies	3
ENVS/GEOG 4201 Biometeorology	3
GEOG 4211 Physical Climatology: Principles	3
GEOL 3040 Global Change: Recent Geological Record	3
GEOL 4060 Oceanography	4

Choose one sequence from the following:

PHYS 1110 and 1120 General Physics 1 and 2; or PHYS 2010 and 2020 General Physics 1 and 2	8-10
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### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain

adequate progress in environmental studies, students should meet the following requirements:

Begin the common curriculum in the freshman year.

Declare environmental studies as the major by the beginning of the second semester.

Students must consult with a major advisor to determine adequate progress toward completion of major requirements.

## Graduate Studies

Opportunities for interdisciplinary graduate studies and original research, leading to the MS and PhD degrees, are available with a variety of emphases, including water sciences, environmental policy and sustainability, energy, and biogeosciences. Particular programs of study are limited only by course offerings and faculty expertise.

### Master's Degree

Candidates for the master's degree in environmental studies must complete at least 36 credit hours of graduate course work plus an internship (Plan I), or a thesis, including 3–6 semester hours of thesis research (Plan II). Plan II students are required to defend the thesis in a final examination. Plan I students are required to pass a final examination. Additional information can be found at [envs.colorado.edu/graduate](http://envs.colorado.edu/graduate).

### Doctoral Degree

The PhD degree is a research degree, involving the production of a major piece of original research (the dissertation). Candidates for the doctoral degree must complete at least 42 degree-hours from a list of approved ENVs core and elective courses. A capstone, team-building course is required. In addition, 30 semester hours of dissertation credit must be taken. Students are expected to form an advisory committee of five faculty members (including one from outside ENVs) soon after beginning their studies. This committee helps the student in designing a research program and in making choices concerning course work. The PhD comprehensive exam is administered by the student dissertation committee and must be taken within the first five semesters of degree work. It consists of a written research proposal on the dissertation topic, a formal presentation summarizing the student research progress, and an oral examination centered on the student research. Upon the student completion of the dissertation, a final examination is administered by the dissertation committee.

Additional information may be found at [envs.colorado.edu/graduate](http://envs.colorado.edu/graduate).

## Ethnic Studies

*Degree* ..... BA

The ethnic studies major was built on the strengths of the Center for Studies of Ethnicity and Race in America (now the Department of Ethnic Studies). It promotes interdisciplinary research and teaching in Afro-American studies, American Indian studies, Asian American studies, Chicano/a studies, and in cross-cultural and comparative race and ethnic studies and American studies. The goals for this major are to enable students to think comparatively and cross-culturally about the relationships within and across racially defined communities, and to the dominant society; allow students to gain substantive knowledge and expertise in one of the four specific racial/ethnic fields, and familiarity with at least a second racial/ethnic field; reinforce students' acquisition of a critical approach to knowledge; involve learning and thinking within interdisciplinary frameworks; encourage participatory, experiential, diverse and student-centered learning; develop skills in

oral and written expression; develop appropriate skills in research design, information retrieval, and use from an ethnic studies perspective; empower students of color to move beyond being objects of study toward being subjects of their own social realities, with a voice of their own; motivate majority and racial/ethnic students to examine and interrogate their inherited political/economic and social/cultural positions; and prepare all students to live and contribute to an increasingly diverse America, in an ever-interdependent world.

In short, the ethnic studies major provides a broad liberal arts education for the 21st century. It should impart fundamental skills in critical thinking, comparative analysis, social theory, data gathering and analysis, and oral and written expression. As a liberal arts degree with focus on American diversity, it is an especially appropriate training for those considering admission to graduate or professional schools and careers in education, law, medicine, public health, social work, journalism, business, urban planning, politics, counseling, international relations, creative writing, as well as university teaching and research.

The Department of Ethnic Studies has a core faculty of its own, but also draws on the faculty resources of many departments in the College of Arts and Sciences, as well as the College of Architecture and Planning, the School of Education, the School of Journalism and Mass Communication, the School of Law, the College of Music, and the University Libraries.

## Bachelor's Degree Program

In addition to the general requirements of the College of Arts and Sciences, students must complete at least 33 credit hours of ethnic studies requirements: students must complete 15 hours of required ethnic studies core courses, 12 hours in a primary ethnic-specific concentration, and 6 hours in a secondary ethnic-specific concentration. A comparative ethnic studies concentration option is also available upon consultation with and approval of the department chair.

A grade of C- or better must be received in all courses used to satisfy the major requirements, with an overall average of 2.00 in the major. At least 24 hours must be upper-division credit (3000 or 4000 level). No more than 6 credit hours may be taken in independent study. No *pass/fail* graded courses may satisfy the 33-semester-hour minimum requirement. Required ethnic studies courses may be substituted by other appropriate courses on a case by case basis, if requested by the student in advance and in writing, and with the approval of the student faculty advisor, as well as that of the department chair.

<i>Required Courses</i>	<i>Semester Hours</i>
ETHN 2000 Foundations of Ethnic Studies .....	.3
ETHN 3500 Research Methods in Ethnic Studies .....	.3
ETHN 4510 Research Practicum in 3000- .....	.3
ETHN 4950 Senior Seminar in Ethnic Studies .....	.3
ETHN 3000- or 4000-level comparative course .....	.3
Primary ethnic-specific concentration .....	.12
Secondary ethnic-specific concentration .....	.6

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ethnic studies, students should meet the following requirements:

Declare ethnic studies as the major no later than the beginning of the second semester of study.

Complete at least 12 credit hours toward the ethnic studies major requirements by the fourth semester.

Complete at least 24 credit hours toward the ethnic studies major requirements by the end of the sixth semester.

Complete ETHN 3500 Research Methods in Ethnic Studies no later than the sixth semester.

Complete ETHN 4510 Research Practicum in Ethnic Studies no later than the seventh semester.

Complete ETHN 4950 Senior Seminar in Ethnic Studies no later than the eighth semester.

### Minor Program

A minor is offered in ethnic studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/minors/minors.html](http://www.colorado.edu/artssciences/minors/minors.html).

## The American Studies Program

As of July 2002 the American Studies Program is administered by the Department of Ethnic Studies. The American Studies Program will continue to offer the required courses for those students who had declared American Studies before or as of spring 2002.

<i>Required Courses</i>	<i>Semester Hours</i>
Two semesters of introductory American Studies courses (or equivalent): AMST 2000 Themes in American Culture 1 and AMST 2010 Themes in American Culture 2 .....	6
Completion of one of the tracks in American Studies, consisting of five upper-division courses and representing at least two different departments (see a departmental advisor for course approval), plus one course from one of the two tracks not chosen .....	18
AMST 3950 Methods in American Studies .....	3
Two senior seminars in American Studies (AMST 4500, 4950, or 4960) .....	6
One upper-division course in the language, culture, or history of a non-North American civilization (a course that fits the theme of the track the student has chosen) .....	3
Total hours for major .....	36
(30 hours of the required 36 must be upper-division)	

## Ethnic Studies Faculty Involvement in Graduate Studies

Faculty actively work to recruit Afroamerican, American Indian, Asian American, and Chicano/a students for graduate studies at the University of Colorado at Boulder, with special attention given to students who are interested in carrying out theses and/or dissertations that involve substantive and theoretical work revolving around the broad topic of "ethnicity and race in America." Faculty are further committed to the intellectual mentorship of such students, which might include instruction in graduate courses, directed reading courses, service on students' MA or PhD committees, as well as helping to prepare graduate students for their qualifying examinations. An important dimension of this commitment includes attention to the step-by-step progress of these graduate students through their academic course work and research agendas.

Ethnic studies faculty will also recruit and employ whenever possible such students as graders and teaching assistants in large undergraduate courses, with the intention of providing experience in all aspects of classroom instruction, including syllabus design, design of assignments, grading, and issues of pedagogy vis-à-vis course content.

Ethnic studies faculty will mentor such graduate students in the area of writing for publication, and seek to facilitate publication opportunities in journals focusing on "ethnicity and race." After successful completion of graduate studies, faculty will assist graduates with their employment goals.

In sum, by making an active commitment in each of these areas, ethnic studies faculty assume a responsible, proactive, role in ensuring a greater diversity in the graduate programs at the University of Colorado.

## Study Abroad

The Department of Ethnic Studies encourages students to participate in the study abroad programs offered through the Office of International Education. These programs give students a deeper understanding of culture and attitudes of people of color in other parts of the world and their carryover into the United States. CU-Boulder is a member of the Council on International Educational Exchange that offers semester and full-year exchange programs with many institutions abroad, most notably in Africa, Asia, and Latin America.

Programs of special interest include study abroad in Mexico, Dominican Republic, Ghana, Tunisia, Spain, Taiwan, and Japan. Information appears in the International Education section.

## Film Studies

### Degrees .....BA, BFA

The Film Studies Program educates students in the history and development of film as an art form and contemporary medium. The curriculum instills an informed analytic awareness of the ways in which film has been used and provides the resources for significant creative exploration of the medium.

The undergraduate degrees in film studies emphasize knowledge and awareness of:

- the major artistic contributions to the evolution of film, from the advent of the moving image to the present;
- the general outlines of world film from the silent period to the present, with emphasis on the historical contributions of major national cinemas; and
- film criticism and film theory.

Students completing either the BA or the BFA degree in film studies are expected to acquire the ability and skills to:

- analyze and interpret films critically;
- communicate such interpretations competently in essay form; and
- make a short 16-mm sound film (BFA majors only).

## Admission to the BFA Program

Students are encouraged to consult with an advisor in the appropriate area in order to obtain advice and current information.

The BFA degree is competitive. In order to graduate with a BFA degree, students must first satisfy a number of prerequisites and then submit a formal application to the BFA program at the end of a semester. In particular, applicants must have a cumulative GPA at CU-Boulder of 2.50 or higher and have passed FILM 1502, 2000, and 2600 each with a grade of C or higher, with a mean GPA in all three courses of at least 3.30 (B+). Applicants must submit their final film from FILM 2600. Admission into the BFA program, and registration for FILM 3600, 4500, and other upper-division production courses are contingent upon approval of the application by the BFA committee. Students may only apply twice to the BFA program; complete details on the BFA application procedure are available from the film studies office.

*Note:* Admission to any class after the third meeting of the class is contingent on professor permission. The department may drop a student from a class if the student misses the first two classes of the semester.



## Bachelor's Degree Programs

### Bachelor of Arts

No more than 6 hours of independent study may be credited toward the major. All course work submitted for a film studies degree must have a grade of C or better. The arts and sciences 18-hour minimum of upper-division hours must be met with film studies courses.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. The Film Studies Program requires a minimum of 41 hours in support of the BA requirements, including film courses and courses taken in other departments.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Arts History Requirement

In addition to the 6-hour literature and the arts core requirement, Film Studies majors must take an additional 6 hours (3 of them upper-division) of literature and the arts core courses to satisfy the degree requirements.

Students taking the HUMN 1010/1020 sequence are exempted from the 3-hour upper-division requirement.

#### Required Critical Studies Courses

FILM 1502 Introduction to Film Studies (Note 1) .....	3
FILM 3051 and 3061 Film History 1 and 2 (Note 2) .....	8
FILM 4004 Film Theory .....	3

#### Required Production Course

FILM 2000/2300 Beginning/Intermediate Filmmaking (Note 3) .....	3
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#### Production Electives (not required)

FILM 3930 Internship .....	1-3
FILM 4005 Workshop: Topics in Film Studies .....	1-3
FILM 4105 Advanced Screenwriting .....	3

#### Critical Studies Elective Requirements

BA students must complete 18 hours from the following courses. At least 12 must be upper division.

FILM 2002 Recent International Cinema .....	3
FILM 2003 Film Topics (Note 4) .....	3
FILM 2012 Road Movies: Journeys into the Interior .....	3
FILM 2013 Film and the Quest for Truth .....	3
FILM 2412 Melodrama and Culture .....	3
FILM 2413 Ken Burns and Documentary Film .....	3
FILM 2513 Major Asian Filmmakers .....	3
FILM 2521 Classics of the Foreign Film: 1960s to the present .....	3
FILM 2522 Hollywood Western .....	3
FILM 3002 Major Film Movements (Note 4) .....	3
FILM 3003 Major Film Directors (Note 4) .....	3
FILM 3004 Films of Alfred Hitchcock .....	3
FILM 3005 Issues in Film Comedy .....	3
FILM 3013 Women and Film .....	3
FILM 3022 Jung, Film, and Literature .....	3
FILM 3023 Stage Drama into Film: O'Neill and Williams .....	3
FILM 3032 Stage Tragedy and Film .....	3
FILM 3042 Horror Film .....	3
FILM 3071 American Film in the 1940s .....	3
FILM 3081 American Film in the 1980s and 1990s .....	3
FILM 3603 Sound and Vision .....	3
FILM 3901 Independent Study (Note 5) .....	1-6
FILM 3930 Film Studies Internship .....	1-6
FILM 4003 Film and Fiction .....	3
FILM 4010 Topics in Film Studies (Note 4) .....	1-3
FILM 4013 Film, Photography, and Modernism .....	3
FILM 4021 Film/Theatre Practicum .....	3
FILM 4024 Advanced Research Seminar (Note 4) .....	3
FILM 4105 Advanced Screenwriting .....	3
FILM 4604 Colloquium in Film Aesthetics .....	3

Any FILM class crosslisted with another department (i.e. foreign language) that has been approved by the film studies chair .....

#### Curriculum Notes

1. This course is a prerequisite for FILM 2000 and 3051.
2. Must be taken in chronological order. FILM 1502 is a prerequisite.
3. FILM 2300 may be taken instead of FILM 2000; however, only one of the two courses may be counted toward the BA degree. Students will not receive credit for both courses. FILM 2300 is offered summer session only.
4. Course may be taken for credit more than once, provided that the topics vary.
5. Total number of independent study credit hours cannot exceed 6.

### Graduating in Four Years with a BA

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in film studies, students should meet the following requirements:

Declare a film studies major by the beginning of the second semester.

Complete the lower-division arts history requirement (3 credit hours), FILM 2000 (3 credit hours), and FILM 1502 (3 credit hours) by the end of the fourth semester.

Complete the upper-division arts history requirement (3 credit hours) and FILM 3051 and 3061 by the end of the sixth semester.

Complete 6 critical studies elective credits by the end of the seventh semester (at least 3 of these credits must be upper-division credits).

Complete an additional 12 credit hours of critical studies elective courses, including at least three upper-division courses (9 credit hours), and FILM 4004 (3 credits) by the eighth semester.

### Bachelor of Fine Arts

No more than 6 hours of independent study may be credited toward the major. All course work submitted for a BFA degree in film must have a grade of C or better.

Students must complete the general requirements of the College of Arts and Sciences as well as the required courses listed below. The Film Studies Program requires a minimum of 44 hours in support of the BFA degree requirements.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Arts History Requirement

In addition to the 6-hour literature and the arts core requirement, Film Studies majors must take an additional 6 hours (3 of them upper division) of literature and the arts core courses to satisfy the degree requirements. Students taking the HUMN 1010/1020 sequence are exempted from the 3-hour upper-division requirement.

#### Required Critical Studies Courses

FILM 1502 Introduction to Film Studies (Note 1) .....	3
FILM 3051 and 3061 Film History 1 and 2 (Note 2) .....	8

#### Required Production Courses

BFA students also must complete 12 credit hours of the following courses:	
FILM 2000 or 2300 Beginning/Intermediate Filmmaking (Note 3) .....	3
FILM 2600 Intermediate Filmmaking, 16mm .....	3
FILM 3600 Digital Postproduction Techniques for Film and Video .....	3
FILM 4500 Advanced Filmmaking (Note 4) .....	3

#### Production Course Electives

BFA students must take 3 hours of any combination of the following courses:	
FILM 2600 Intermediate Filmmaking, 16mm (taken a second time) .....	3
FILM 2610 Animation Production (Note 4) .....	3
FILM 2900 Lighting Workshop .....	3
FILM 3010 Film Production Topics .....	3
FILM 3501 Film Production Management or FILM 3563 Producing the Feature Film. (Both are usually offered through Continuing Education; only one may count toward the film studies degree.) .....	3
FILM 3610 The Art of Filming Technique .....	3
FILM 3700 Audio and Special Affects .....	3
FILM 3900 Production Independent Study (Note 5) .....	1-6
FILM 3930 Internship .....	1-2

FILM 4000 Advanced Digital Post Production	3
FILM 4005 Screenwriting: Short Form	3
FILM 4015 Advanced Digital Post Production	3
FILM 4105 Advanced Screenwriting	3
FILM 4500 Advanced Filmmaking (Note 4)	3

### Critical Studies Elective Requirements

BFA students must complete 12 hours, including 6 hours of upper-division classes.

FILM 2002 Recent International Cinema	3
FILM 2003 Film Topics (Note 7)	3
FILM 2012 Journeys into the Interior	3
FILM 2013 Film and the Quest for Truth	3
FILM 2412 Melodrama and Culture	3
FILM 2413 Ken Burns and Documentary Film	3
FILM 2513 Major Asian Filmmakers	3
FILM 2521 Classics of the Foreign Film: 1960s to the Present	3
FILM 2522 Hollywood Western	3
FILM 3002 Major Film Movements (Note 4)	3
FILM 3003 Major Film Directors (Note 4)	3
FILM 3004 Films of Alfred Hitchcock	3
FILM 3005 Issues in Film Comedy	3
FILM 3013 Women and Film	3
FILM 3022 Jung, Film, and Literature	3
FILM 3023 Stage Drama into Film: O'Neill and Williams	3
FILM 3032 Stage Tragedy and Film	3
FILM 3042 Horror Film	3
FILM 3071 American Film in the 1940s	3
FILM 3081 American Film in the 1980s and 1990s	3
FILM 3603 Sound and Vision	3
FILM 3901 Independent Study (Note 5)	1-6
FILM 3930 Film Studies Internship	1-6
FILM 4003 Film and Fiction	3
FILM 4024 Advanced Research Seminar	3
FILM 4010 Topics in Film Studies	1-3
FILM 4013 Film, Photography, and Modernism	3
FILM 4021 Film/Theatre Practicum	3
FILM 4105 Advanced Screenwriting	3
FILM 4604 Colloquium in Film Aesthetics	3

### Curriculum Notes

1. This course is a prerequisite for FILM 2000 and 3051
2. Must be taken in chronological order.
3. Either FILM 2000 or 2300 may be taken for degree credit. Only one of the two courses may be counted toward the BFA degree. FILM 2300 is offered summer session only.
4. Course may be taken for credit more than once.
5. Total number of independent study credit hours cannot exceed 6, and they cannot be used to duplicate regular course offerings.
6. May be repeated for completion of final thesis project.
7. Course may be taken for credit more than once, provided the topics vary.
8. Repeatable for credit within same term (maximum 6 hours total).
9. Satisfies college requirement for critical thinking course; required for BA majors and strongly recommended for BFA majors.
10. Sometimes taught with FREN 4600.

### Graduating in Four Years with a BFA

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in film studies, students should meet the following requirements:

Declare and start the film studies major the first semester freshman year.

Complete FILM 2000 (3 credit hours), FILM 1502 (3 credit hours), and one lower-division critical studies course (FILM 2002, 2003, 2013) for 3 credits by the end of the third semester.

Complete the arts history lower-division requirement (3 credit hours), FILM 2600 (3 credit hours) by the end of the fourth semester.

*Note: Admission into FILM 3600 is subject to review of a student creative film work in FILM 2600 by a faculty committee. FILM 2600 may have to be repeated if the work does not meet faculty standards. In order to graduate in four years, a student must be accepted into FILM 3600 on the first review.*

Complete 3 credit hours of upper-division arts history requirement and 8 credit hours of film history by the end of the fifth semester.

Complete FILM 3600 (3 credit hours), and an additional 3 credit hours of critical studies elective requirements by the end of the sixth semester.

Complete two courses of critical studies electives by the end of the seventh semester. At least 6 credit hours must be upper-division critical studies courses.

Complete 3 credit hours of FILM 4500 and 3–6 credit hours of production electives by the end of the eighth semester.

## French and Italian

*Degrees in French...BA, MA, PhD*

*Degree in Italian .....BA*

### Bachelor's Degree Programs

#### French

Beyond providing mastery of the language skills (listening, speaking, reading, writing) of modern French needed for all purposes of daily life, the major introduces students to a central tradition of western and world culture. Since the Middle Ages, French literature, thought, taste, and art have helped shape the essential experience and self-understanding of humanity at large. Survey courses and upper-division seminars offer a range of exposures to the French cultural past and the far-flung ethnic and national diversity of the French-speaking present. The major explores distinctively French contributions to world culture, such as Arthurian romance, troubadour poetry, and Gothic architecture; the love sonnets of the *Pléiade*, the comic novels of Rabelais, and the essays of Montaigne; the neoclassical theatre of Corneille, Molière, and Racine and the critical philosophy of Descartes and Pascal; the Enlightenment philosophies of Voltaire, Diderot, and Rousseau; the psychological refinements of French fiction from Mme de La Fayette to Proust; artistic revolutions like impressionism and surrealism; the renewal of artistic conventions in the Theatre of the Absurd, the New Novel, and the cinema of the New Wave; the French-language literature of Africa, Canada, and the Caribbean; and the vital presence of French writers in major movements of 20th century thought like existentialism, structuralism, feminism, psychoanalysis, and contemporary cultural studies and multiculturalism.

The undergraduate degree in French emphasizes knowledge and awareness of:

- the fundamental outlines of the history of French literature from the Middle Ages to the present;
- significant works of French literature and the literary culture of the French-speaking world;
- the historical context in which particular works were written and the relation between literature and other forms of cultural expression (e.g., art, philosophy, politics, religion);
- contemporary French culture, politics, and current events;
- a range of literary genres, their development and reception, and relevant critical methodologies; and
- the grammatical structure of modern standard French.

In addition, students completing the degree in French are expected to acquire the ability and skills to:

- speak and understand modern, spoken standard French sufficient for all purposes of daily life and for intellectual discussion in academic settings;
- read and write modern standard French with sufficient fluency and correctness for successful literary or linguistic analysis of French texts;

- analyze and interpret literary texts in terms of style, plot, structure, characters, themes, and the use of literary devices;
- communicate such analyses and interpretations simply in French or at a more sophisticated level in English, and discuss a wide range of topics concerning French culture, civilization, and current events; and
- follow with reasonable comprehension French broadcasts or film.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Students wishing to pursue an Honors major should also consult the Honors requirements listed below.

*Note:* Students undertaking a major in French should expect to have regular conferences with a college advisor and the department associate chair for undergraduate studies to ensure that they are making adequate progress and that requirements are being met in a timely way. The department will not certify majors for graduation when a failure to satisfy requirements is the fault of the student.

A minimum of 30 upper-division hours in French must be completed (see below for specific courses). FREN 2120 or its equivalent is the prerequisite for admission to courses required for the major.

<i>Required Courses</i>	<i>Semester Hours</i>
FREN 3010 French Phonetics and Pronunciation	3
FREN 3050, 3060 French Composition 1 and 2	6
FREN 3100 Critical Reading and Writing in French Literature	3
FREN 3110, 3120 Main Currents of French Literature 1 and 2	6
Four or more other courses at the 3000 or 4000 level, of which 9 hours must be at the 4100 level or above	12
FREN 4990 Senior Seminar (including a senior essay and oral presentation, except where a student elects to present a senior honors thesis). <i>Note:</i> The seminar runs concurrently with one of the three courses taken at the 4100 level or above. See departmental brochure for details.	3

<i>Honors Requirements</i>	<i>Semester Hours</i>
Honors candidates must meet all of the regular requirements for the major plus the following:	
FREN 3200 Introduction to Literary Theory	3
One semester of independent study. <i>Note:</i> The semester of independent study is taken concurrently with FREN 4980, and is devoted to one-on-one work on the senior honors thesis with a faculty advisor. See departmental brochure for details.	3

### ***Graduating in Four Years with a BA in French***

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in French, students should meet the following requirements:

- Declare French major by the beginning of the second semester of study. Complete FREN 3010, 3050, 3060, and 3100 by the end of the second (sophomore) year.
  - Complete FREN 3110 and 3120 and two other 3000- or 4000-level courses (including one at the 4100 level or above) by the end of the third (junior) year.
- Note:* Completion of French requirements includes the successful written and oral presentation of a senior essay or honors thesis by the end of the fourth (senior) year.

### ***Minor Program***

A minor program is offered in French. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### ***Concurrent BA/MA Program in French***

The department also administers a concurrent undergraduate and graduate degree program in French, offering students the opportunity to graduate with a BA and an MA in French in five years. Students interested in this program should consult a college advisor and the associate chair for graduate studies for details. Students should also read the relevant guidelines available in the main department office.

### ***Italian***

The major provides the language skills (listening, speaking, reading, writing) of modern Italian needed for all purposes of daily life. Moreover, by combining courses offered by the faculty of the Department of French and Italian with courses of Italian interest taught in other units, including film studies, fine arts, and history, the program promotes an understanding of the role of the Italian literary and cultural tradition within western civilization at large. As the birthplace of Dante, Petrarca, Boccaccio, Ariosto, Tasso, Marino, Michelangelo, Raphael, and Da Vinci, Italy is the cradle of the Renaissance. Italy projects a powerful, formative influence into our own day through the work of 19th- and 20th century writers like Leopardi, Manzoni, Pirandello, Levi, and Calvino; operatic composers like Rossini, Puccini, and Verdi; philosophers and critics like Croce, d’Annunzio, Gramsci, and Ginzburg; and filmmakers like Fellini, Pasolini, and Bertolucci. Thus, in addition to supplying the necessary background for advanced professional study and specialization, the Italian major introduces students to a rich literary, artistic, and intellectual history at the roots of the modern world.

Students wishing to major in Italian are required to have a thorough advising session with the Italian program advisor. In this session the student program of study is outlined in detail. Students are required to see the advisor in the event that any of their major courses are canceled so that substitutions and revisions in their programs can be made. The department will not approve a major in Italian unless the student has been advised by the program advisor.

For courses in other departments with an Italian emphasis (e.g., comparative literature, fine arts, history, honors, etc.), see those sections.

The undergraduate degree in Italian emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Italian literature from the Middle Ages to the present;
- significant works of Italian literature and the contribution to world literature of Italian letters;
- the historical context in which particular works were written;
- contemporary Italian culture, politics, and current events;
- a range of literary genres, their development and reception, and relevant critical methodologies; and
- the grammatical structure of modern standard Italian.

In addition, students completing the degree in Italian are expected to acquire the ability and skills to:

- speak and understand modern, spoken, standard Italian sufficient for all purposes of daily life and for intellectual discussion in academic settings;
- read and write modern standard Italian with sufficient fluency and correctness for successful literary or linguistic analysis of Italian texts;
- analyze and interpret literary texts in terms of style, plot structure, characters, themes, and the use of literary devices;

- communicate such analyses and interpretations simply in Italian or at a more sophisticated level in English, and discuss a wide range of topics concerning Italian culture, civilization, and current events; and
- follow with reasonable comprehension authentic Italian broadcasts or film.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Thirty-six hours beyond the first year with a 2.00 (C) grade point average or better are required, as listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Italian lower-division required</b> .....	<b>.9</b>
ITAL 2110 Intermediate Italian Reading, Grammar, and Composition 1	
ITAL 2120 Intermediate Italian Reading, Grammar, and Composition 2	
ITAL 2130 Introduction to Literary Analysis	

<b>Italian 3000 level required courses</b> .....	<b>.12</b>
ITAL 3010 Advanced Composition and Conversation 1	
Choose <i>one</i> from the following two courses:	
ITAL 3020 Advanced Composition and Conversation 2	
ITAL 3030 Storia dell'arte: Advanced Composition and Conversation 3	
Choose <i>two</i> from the following three courses prereq. ITAL 2130:	
ITAL 3140 Readings in Italian Literature—20th Century	
ITAL 3150 Readings in Italian Literature—19th Century	
ITAL 3160 Readings in Italian Literature—Medieval/Renaissance	

<b>Italian 4000 level courses</b> .....	<b>.9</b>
Students must take at least three 4000-level courses in the Italian department, of which one will be ITAL 4990, the Senior Seminar. Before registering for ITAL 4990, students must meet with the Italian advisor.	

<b>Upper-division electives</b> .....	<b>.6</b>
Electives may be chosen from courses outside the Department of French and Italian, the content of which is consistent with the goals of the Italian major, and always in consultation with the major advisor. It is recommended that students select courses in diverse disciplines and time periods.	

<i>Honors Requirements</i>	<i>Semester Hours</i>
Honors candidates must meet all of the regular requirements for the major plus the following:	
FREN 3200 Introduction to Literary Theory. <i>Note:</i> FREN 3200 is taught in English and presupposes no knowledge of French. ....	.3
One semester of independent study. <i>Note:</i> The semester of independent study is taken concurrently with ITAL 4980, and is devoted to one-on-one work on the senior honors thesis with a faculty advisor. It does not run concurrently with required 4000-level courses. See departmental brochure for details. ....	.3

### Graduating in Four Years with a BA in Italian

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Italian, students should meet the following requirements:

Declare the Italian major by the beginning of the second semester of study. Complete 12 credit hours of requirements (including ITAL 2110 and 2120) by the end of the second (sophomore) year.

Complete 12 of the remaining 24 credit hours by the end of the third (junior) year. Complete the remainder of the major requirements in the fourth (senior) year.

### Minor Program

A minor program is offered in Italian. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Study Abroad

CU-Boulder offers French study abroad programs in Toulouse, Paris, and Rennes, and Italian study abroad programs in affiliation with the Syracuse University Program in Florence and with the Arcadia University Program in Perugia. Transfer credit is readily available. For further information about study abroad programs, students may visit departmental advisors or the Office of International Education. CU-Boulder also supports a summer program in Italy for students of art history. Credits earned on this program may be applied to the Italian major. The Ayer Romance Language Scholarship is available for majors who plan to study abroad; it is awarded by the Department of French and Italian.

### Graduate Degree Programs in French

Students wishing to pursue graduate work in French leading to candidacy for an advanced degree should read carefully Requirements for Advanced Degrees in the Graduate School section. Graduate teaching exchanges at the Universities of Tours and Neuchâtel are available to students who have earned a master's degree. The Lamont Scholarship is available for a graduate student in alternate years.

### Master's Degree

**Prerequisites.** The following are prerequisite to graduate study in French: the ability to read, write, speak, and understand spoken standard French; general knowledge of French literature and civilization; and ability to read one language in addition to English and French. This last requirement may be fulfilled either by taking at least 3 credit hours of a fourth semester undergraduate course in the language with a minimum grade of B- or by passing the Graduate Student Foreign Language Test. See department guidelines for the specific requirements for the MA in French.

### Doctoral Degree

**Prerequisites.** Doctoral candidates should possess excellence in reading, speaking, writing, and understanding spoken standard French; general knowledge of French literature and civilization; and knowledge of one language other than English and French (see below).

**Required Courses.** See department guidelines for PhD candidates.

**Language Requirement.** A sound reading knowledge of one modern language other than English and French is required. Proficiency must be shown by taking an undergraduate course in the language at the 4000 level. In some cases, when directly related to a student research area, a reading knowledge of a fourth language can be substituted for the 4000-level course in the third language. Such reading knowledge must be certified by the student passing a reading examination in the language. The examination normally consists of a timed translation of a literary text or a text dealing with literature (e.g., literary criticism). A dictionary is permitted. This language may be one of the following: German, Spanish, Italian, Latin, Greek, or Russian. Other languages are considered depending on the student area of research.

### Geography

*Degrees*.....BA, MA, PhD

The Department of Geography offers theoretical and practical work in physical geography, including climatology, geomorphology, and biogeography; conservation of natural resources, including environmental education; human geography, including urban, social, economic, political, cultural, and population geography; geographic information science (GIS), including spatial analysis using GIS, remote sensing, computer cartography, GIS and society, and geography education; and regional

analysis, including mountains, natural hazards, and specific regional courses. To complement its curriculum, the department offers geography majors internship opportunities.

The Department of Geography offers BA, MA, and PhD degree programs in geography.

The undergraduate degree in geography emphasizes knowledge and awareness of:

- the unique contributions of the discipline to understanding the spatial components of problems and the diverse factors relating to human interaction with the environment;
- the spatial distributions of physical and human characteristics on the Earth surface, the general patterns these form, and the processes that have created and are changing these patterns;
- the major themes of geographical analysis, including absolute and relative location; human and physical characteristics of place; human and environmental relations; movement of people, ideas, and products; and regionalization; and
- the general geographical principles of human-environment interaction, global change, and human spatial organization.

In addition, students completing the degree in geography are expected to acquire proficiency in:

- one or more of the specific geographic skill areas of cartography, remote sensing, and geographic information systems;
- writing, quantitative methods, computer literacy, and library and field methods of data collection; and
- identifying the geographic dimensions of a problem and analyzing, synthesizing, and evaluating relevant data, and applying geographic principles offering a geographic perspective on that problem.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Students must complete at least 32 and no more than 45 credit hours in geography courses with grades of C- or better (18 hours must be upper division). No *pass/fail* grades are allowed in the major. Transfer students majoring in geography must complete at least 12 credit hours of upper-division geography courses at CU-Boulder.

<i>Required Courses</i>	<i>Semester Hours</i>
GEOG 1001 Environmental Systems 1—Climate and Vegetation	4
GEOG 1011 Environmental Systems 2—Landscapes and Water	4
One of the following:	
GEOG 1982 World Regional Geography	3
GEOG 1992 Human Geographies	3
GEOG 2002 Geographies of Global Change	3
GEOG 2412 Environment and Culture	3
Additionally, students must take one other approved human geography course. See department list of approved courses.	
One of the following:	
GEOG 2053 Mapping a Changing World	4
GEOG 3053 Cartography: Visualization and Information Design	4
One of the following:	
GEOG 3002 Introduction to Research in Human Geography	3
GEOG 3023 Statistics for Earth Sciences	4
GEOG 4023 Introduction to Quantitative Methods in Human Geography	3
GEOG 4043 Cartography 2: Interactive and Multimedia Mapping	4
GEOG 4083 Mapping from Remotely Sensed Imagery	4
GEOG 4093 Remote Sensing of the Environment	4
GEOG 4103 Introduction to Geographic Information Science	4
GEOG 4173 Research Seminar	3
GEOG 4383 Methods of Vegetation Analysis	3
GEOG 4411 Methods of Soil Analysis	3
ANTH 4000 Quantitative Methods in Anthropology	3

ECON 3818 Introduction to Statistics with Computer Applications	4
MATH 2510 Introduction to Statistics	3
PSCI 4074 Quantitative Research Methods	3
PSYC 3101 Statistics and Research Methods in Psychology	4
SOCY 2061 Introduction to Social Statistics	3
SOCY 4061 Social Statistics	3
Additional electives	11

Students should consult the departmental office for further information and referral to departmental advisors.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in geography, students should meet the following requirements:

Declare a geography major by the beginning of the second semester.

Complete GEOG 1001, 1011, and one of the following courses: GEOG 1982, 1992, 2002, or 2412, by the end of the third semester.

Complete GEOG 1982, 1992, 2002, or 2412 (must be different than the course used to complete the previous requirement) and 9 credit hours of upper-division geography courses by the end of the sixth semester.

Complete the remaining upper-division credit hours by the eighth semester.

### *Minor Program*

A minor is offered in geography. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/minors/minors.html](http://www.colorado.edu/artssciences/minors/minors.html).

### *MAPS (Minimum Academic Preparation Standards)*

To fulfill a MAPS deficiency in geography, students may take any one of the following courses: GEOG 1982, 1992, 2002, or 2412.

### *Geography Honors Program*

Students interested in participating in a special honors program should contact the departmental honors advisor during their junior year.

### *Geography Internship Program*

To complement its curriculum, the department offers geography majors internship opportunities in which students earn academic credit in GEOG 3930 Internship while working in selected positions in public agencies and firms.

### *Residential Academic Program*

Geography students specializing in environmental issues may want to consider the Baker Residential Academic Program. Students may visit the geography department office or refer to Residential Academic Programs.

## Graduate Degree Programs

Students wishing to pursue graduate work in geography leading to candidacy for advanced degrees should read carefully the requirements for advanced degrees in the Graduate School section. Graduate-level course work at the Boulder campus may be combined with graduate courses offered at the Denver and Colorado Springs campuses. Additional information should be obtained from the Department of Geography. The following are departmental requirements.

### *Master Degree*

**Prerequisites.** For admission without deficiency and to meet the department mandatory requirements for a knowledge of basic geography, all entering graduate students are required to have the kind of knowledge presented in the department introductory courses in physical geography (GEOG 1001 Environmental Systems/

Climate and Vegetation and GEOG 1011 Environmental Systems/Landscapes and Water) and human geography (GEOG 1982 World Regional Geography, GEOG 1992 Human Geographies, GEOG 2002 Geographies of Global Change, and GEOG 2412 Environment and Culture). It is the responsibility of the student to obtain this knowledge as part of his/her preliminary exam. Students may gain the required knowledge by formally taking the introductory courses, by auditing the courses, by reading the textbooks, or by other means. This knowledge will enhance the student ability to perform at the level expected in the GEOG 5152-5161 core series. In addition to knowledge of basic geography, it is desirable that the student has course work in at least two areas outside geography in cognate fields in the social and natural sciences. Students are encouraged to have some background in college math, statistics, and computer skills.

**General Requirements.** The minimum requirements for an MA in geography may be fulfilled by completing 30 semester hours of graduate work, including a thesis, which carries up to 6 credit hours (i.e., 24 hours of course work at the 5000 level or above, plus a minimum of 4 but not more than 6 hours of thesis). Master students may, with the written approval of their advisor, use a maximum of 6 hours of 3000- or 4000-level course work to reach the required 30 hours.

### Doctoral Degree

**Prerequisites.** The minimum requirements for admission to the PhD program are normally a master degree, significant published research, or equivalent standing.

**General Requirements.** The PhD degree is not conferred merely upon the satisfactory completion of a course of study. The candidate must also demonstrate proficiency in some broad subject of learning, and be able to critically evaluate work in the field, show the ability to work independently in the chosen field, and make an original contribution of significance to the advancement of knowledge.

The minimum requirements are 30 credit hours of course work numbered 5000 or above and 30 credit hours of dissertation. Ordinarily the number of course work hours and dissertation hours will be greater than 30 each. At least 20 of these hours must be taken at the University of Colorado; up to 10 credit hours from another institution may be transferred upon approval.

A 3.00 (B) average or higher must be maintained in all course work.

Six semesters of residence are required beyond the bachelor's degree, of which four must be at the University of Colorado; this may include two semesters for the master degree. Students with a University of Colorado master degree in geography, with departmental approval, may apply all credit hours from 5000 or above courses (except thesis credits) to the PhD requirements.

## Geological Sciences

### Degrees.....BA, MS, PhD

The options available in the undergraduate program in geology are trifold: geology, geophysics, or environmental geoscience. Each program leads to the BA degree. The environmental geoscience option offers flexibility and broad training; the geology and geophysics options offer more traditional paths of training. All options provide a strong basis for graduate study and professional employment. Students who are uncertain as to which option best suits their needs should consult a departmental advisor. The BA in geology is also excellent preparation for later professional work in other fields, such as law, journalism, economics, engineering, etc.

Students who do not plan a career in the geosciences, or who would like to combine a basic knowledge of geology with that of some other field, should consider using geology as one sub-

ject in a distributed studies major. Individual programs can be tailored for such students.

Students interested in geological sciences may wish to consider the Baker Residential Academic Program.

The undergraduate program emphasizes course work in theoretical, laboratory, and field-oriented aspects of the geological sciences. The nearby Rocky Mountains provide a natural laboratory for the study of geological materials and processes.

The undergraduate degree in geology emphasizes knowledge and awareness of:

- the ways in which Earth responds to internal and external forces; the physical, chemical, and biological evolution of Earth; the nature of the materials of which Earth is made; and mineralogy and petrology of igneous, metamorphic, and/or sedimentary rocks;
- interactions of the solid Earth with the hydrosphere and atmosphere, and how these interactions affect mankind and the environment;
- the processes of sedimentation, the use of stratigraphy, paleobiology of marine environments, and the role of geophysics and tectonics in understanding the nature of Earth and its history;
- the roles of physics, chemistry, biology, and mathematics in understanding geological processes;
- the history of discoveries and ideas that have contributed to our current awareness of the Earth and the planetary system;
- appropriate techniques for measuring and recording both past and present Earth processes; and
- the methods used in the field to map and interpret the diverse variety of rock types and structures.

In addition, students completing the degree in geology are expected to acquire the ability and skills to:

- read and critically evaluate relevant geological literature;
- observe and measure, in the field and laboratory, physical, chemical, and biological aspects of rock successions and to develop models of Earth history;
- present geological information in both written and oral form; and
- use appropriate tools from mathematics, chemistry, physics, and biology, including computers, to solve geological problems.

## Bachelor's Degree Programs

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

All majors are required to take the following courses, and also must demonstrate a basic ability to work interactively with computers. Information on how to satisfy the requirements for computer literacy is available in the departmental office.

<i>Required Courses</i>	<i>Semester Hours</i>
GEOLOGY 1010 and 1020 Introduction to Geology 1 and 2 or GEOLOGY 1060 and 1070 Global Change 1 and 2	.6
GEOLOGY 2700 Introduction to Field Geology	.2
GEOLOGY 3010 Introduction to Mineralogy	.3
GEOLOGY 3050 Computer-Assisted Geologic Techniques	.2
GEOLOGY 4960 Writing in Geosciences	.1
CHEMISTRY 1111 and 1131 General Chemistry 1 and 2 or CHEMISTRY 1151 and 1171 Honors General Chemistry 1 and 2	5-6
MATH 1300 and 2300 Analytical Geometry and Calculus 1 and 2 or MATH 1310 and 1320 Calculus 1 and 2 with Computer Applications or APPM 1350 and 1360 Calculus for Engineers 1 and 2	8-10
PHYSICS 1110, 1120, and 1140 General Physics 1 and 2 and Experimental Physics 1 9	9

*Note: GEOLOGY 1030 Geology Laboratory is also recommended, particularly for students taking GEOLOGY 1010 and 1020. GEOLOGY 1110 Global Change Laboratory is recommended for students taking GEOLOGY 1060 and 1070.*

**Geology Option**

Students electing the geology option are required to take the following additional courses:

<i>Required Courses</i>	<i>Semester Hours</i>
GEOL 3020 Petrology .....	3
GEOL 3120 Structural Geology 1 .....	4
GEOL 3430 Sedimentology and Stratigraphy .....	4
Two 2-credit-hour advanced (4000-level) field geology modules .....	4

And any two of the following courses:

GEOL 3320 Introduction to Geochemistry .....	3
GEOL 3410 Paleobiology .....	3
GEOL 4130 Principles of Geophysics .....	3

**Environmental Geoscience Option**

Students electing the environmental geoscience option are required to take the following additional courses:

Two 2-credit-hour advanced (4000-level) field geology modules .....	4
GEOL 3030 Introduction to Hydrogeology .....	3
GEOL 3320 Introduction to Geochemistry .....	3
GEOL 3430 Sedimentology and Stratigraphy .....	4

One course from Group A below, one course from Group B below, and a third course from either A or B:

**Group A**

GEOL 3023 Statistics for Earth Sciences .....	3
GEOL 4093 Remote Sensing of the Environment .....	4

**Group B**

GEOL 3040 Global Change: The Recent Geological Record .....	3
GEOL 3120 Structural Geology .....	4
GEOL 3520 Environmental Issues in Geosciences .....	3
GEOL 4241 Principles of Geomorphology .....	4

**Geology and Environmental Geoscience Options**

Students in either of these options must take additional 3000- or 4000-level courses so that the total number of upper-division hours in geological sciences is at least 28 hours. Any upper-division course is acceptable, with the exception that only one of the following may be counted toward the 28-hour minimum in the geology option:

<i>Required Courses</i>	<i>Semester Hours</i>
GEOL 3040 Global Change: The Recent Geological Record .....	3
GEOL 3070 Introduction to Oceanography .....	3
GEOL 3500 Mineral Resources, World Affairs, and the Environment .....	3
GEOL 3520 Environmental Issues in Geosciences .....	3
GEOL 3620 Controversies in Planetary Geology .....	3
GEOL 3630 Great Geological Controversies .....	3
GEOL 3720 Evolution of Life: The Geologic Record .....	3
GEOL 4080 Societal Problems and Earth Sciences .....	3
GEOL 4500 Critical Thinking in the Earth Sciences .....	3
GEOL 4950 Natural Catastrophes and Geologic Hazards .....	3

**Geophysics Option**

Students electing the geophysics option are required to take the following additional courses:

<i>Required Courses</i>	<i>Semester Hours</i>
GEOL 3020 Petrology .....	3
GEOL 3120 Structural Geology .....	4
GEOL 4130 Principles of Geophysics .....	3
GEOL 4714 Field Geophysics .....	2
PHYS 2130 General Physics 3 .....	3
PHYS 2140 Methods of Theoretical Physics .....	3
PHYS 2150 Experimental Physics Lab .....	1
PHYS 3210 Analytical Mechanics .....	3
PHYS 3310 Electricity and Magnetism .....	3
MATH 2400 Analytical Geometry and Calculus 3 .....	4
APPM 2360 Introduction to Linear Algebra and Differential Equations .....	4

Additional information on required courses and other departmental requirements may be obtained from the departmental office. Students should contact the department for a list of current major requirements.

Transfer students must satisfactorily complete a minimum of 12 credit hours of advanced work (3000-level or above) in the Department of Geological Sciences in Boulder if they wish to obtain a degree in geology from CU-Boulder. Before registering for the first time, or within the first week of the semester, such students must see a member of the departmental academic progress committee to have previous course work in geology, math, and allied sciences evaluated.

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in geology, students should meet all college requirements plus specific departmental requirements. These departmental requirements vary slightly between the three major options. Detailed information is available from the department office, but in general these requirements include:

Declare a geology major and begin course work in the major during the first semester freshman year.

Meet with a departmental advisor prior to the second and fifth semesters and during the seventh semester.

Complete at least 33 credit hours (geology and environmental geoscience options; 44 credit hours for geophysics option) required for the major by the end of the fourth semester.

Complete at least 47 credit hours (geology and environmental geosciences options; 63 credit hours for geophysics option) required for the major by the end of the sixth semester.

Complete the remaining requirements for the major by the end of the eighth semester.

**Minor Program**

A minor is offered in geology. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

**Geology Honors Program**

Opportunity is provided for qualified geology majors to participate in the geology honors program and graduate with honors (cum laude, magna cum laude, or summa cum laude) in geology. Students interested in the honors program should contact the departmental honors advisor during their junior year.

**Graduate Degree Programs**

Students interested in graduate work in the geological sciences should carefully read the detailed information regarding admission, registration, and degree requirements that is available from the departmental office. A brief summary follows.

All students applying for admission must take the Graduate Record Examination. Results of this examination are used both for determining admittance and for initial academic counseling.

Entering students normally have completed at least 24 semester hours of basic courses in geological science and two semesters each of chemistry, physics, and calculus. In some cases, exceptional undergraduate preparation in other fields of science, mathematics, or engineering may substitute for part of the 24 hours in geological science.

Each student acquires a primary advisor and an advisory committee which provides guidance throughout the degree program.

**Master's Degree**

Candidates for the master's degree in geological sciences must complete at least 24 credit hours of graduate course work plus a thesis (Plan I), or 30 credit hours of graduate course work

without a thesis (Plan II). The Plan II program requires at least 3 hours of GEOL 6960 (Plan II Master's Research) under the supervision of the advisory committee. For both plans, at least 24 credit hours must be completed at the 5000 level or above. See Graduate School specifications for more information.

### Doctoral Degree

Candidates for the doctoral degree must complete at least 30 credit hours in course work numbered 5000 or above, of which at least 20 must be taken at CU-Boulder. In addition to course work, candidates must take a total of at least 30 hours of GEOL 8990 doctoral dissertation hours, with not more than 10 of these in any one semester and not more than 10 before the comprehensive examination is passed.

The Department of Geological Sciences participates in the interdepartmental PhD program in geophysics and hydrology. For more information about this program, see the Graduate School section.

## Germanic and Slavic Languages and Literatures

*Germanic Studies Degree*.....BA

*German Degree*.....MA

*Russian Studies Degree*.....BA

Undergraduate students may choose to major in either Germanic studies or Russian studies.

The major in Germanic studies is an interdisciplinary program focusing on study of the German language, its manifestations in history, and its usage in the current cultural and social context; the literary, artistic, and philosophical aspects of German culture in the past and the present; the major historical events and developments in Germany and its neighboring countries, and the current political institutions and dynamics in Germany within the broader European framework.

The undergraduate degree in Germanic studies emphasizes knowledge and awareness of:

- the fundamental outlines of German history and culture;
- the history of modern German literature from 1750 to the present; and
- cultural developments in modern German-speaking Central Europe, such as the arts, the cinema, and architecture; and
- central issues such as the Nazi era and the Holocaust, the roles of women, German attitudes toward non-Germans, German culture after reunification, and their reflection in German literature, arts, and media.

In addition, students completing the degree in Germanic studies are expected to acquire the ability and skills to:

- read German at a level at which critical literary and cultural analyses can be performed;
- write and speak German sufficiently to participate in critical discussions and write critical essays; and
- speak and comprehend German sufficiently for all situations in daily life, especially the business and professional sectors of German life.

The major in Russian studies is an interdisciplinary program focusing on study of the current cultural and social context, and the literary, artistic, and historical aspects of Russian culture in the past and present. The aim of the language curriculum is to equip students to read, write, speak, and understand Russian on a level allowing communication with natives and other users of the

language. Before registering for a course, students should consult with a departmental advisor concerning appropriate placement.

Students interested in Russian studies should consider a double major in order to increase their career opportunities. Prospective teachers might combine Russian studies with a major in another foreign language, while those preparing for a career in government, business, or social services should benefit from a combination of Russian studies and a social science or business major. Students structure their curriculum according to the departmental checklist for majors, in close consultation with a departmental advisor.

The undergraduate degree in Russian studies emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Russian literature and culture from the Middle Ages to the present day;
- the major Russian creative writers of the 19th and 20th centuries;
- the historical context of Russian literature and culture; and
- basic critical methodologies as they relate to the study of Russian literature.

In addition, students with a degree in Russian studies are expected to acquire the ability and skills to:

- comprehend contemporary Russian, written or spoken, to a degree permitting sophisticated analysis of cultural texts;
- analyze Russian literary texts and give a reasoned response to them in literate English; and
- write and converse in Russian at their own intellectual level.

## Bachelor's Degree Programs

### Germanic Studies

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

As of August 1, 1997, the major requirement in Germanic studies is 34 hours beyond GRMN 2010 (with grades of C- or above). Students who declared their major before August 1, 1997, will continue to fulfill the requirements that were in effect at the time they declared a major. Students design their own major in consultation with the undergraduate advisor and a faculty mentor. Completion of the following courses is required; only 3 of these courses may be lower level courses. Students who test out of GRMN 2020 are required to complete 33 hours.

#### A. German Language Courses, 13 semester hours

Completion of the following German language courses or demonstration of third-year proficiency (GRMN 4010 is required of all majors, and must be taken at CU-Boulder): GRMN 2020 Intermediate German 2; GRMN 3010 Advanced Conversation and Grammar; GRMN 3020 Professional German; GRMN 4010 Advanced Composition, Conversation, and Stylistics.

Students have the option of taking the exam *Zertifikat Deutsch* in GRMN 3010, the exam *Deutsch für den Beruf* in GRMN 3020, and the exam *Zentrale Mittelstufenprüfung* in GRMN 4010.

#### B. German Culture, Literature, and other Electives, 15 semester hours

Including GRMN 4550 Senior Seminar, which must be taken at CU-Boulder.

Any four courses from Groups I and/or II (courses may be taken entirely in either group or in any combination).

#### I. Courses Taught in German

GRMN 3110 German Literature from 1910 to Present; GRMN 3120 Modern German Literature from 1750 to 1910; GRMN 3140 Current Issues in German Literature; GRMN 3520 Open Topics in the Cultural Context; GRMN 3930 Internship; GRMN 4030 Business German (students in GRMN 4030 have the option of taking the exam *Prüfung Wirtschaftsdeutsch International*); GRMN 4100 Applied Linguistics; GRMN 4330 The Age of Goethe; GRMN 4340 Seminar in German Literature; GRMN 4370 Introduction to German Literary History 1; GRMN 4380 Introduction to German Literary History 2; GRMN 4450 Methods of Teaching German



## II. Courses Taught in English

GRMN 1601 Introduction to Modern German Culture and Civilization; GRMN 1602 Metropolis and Modernity; GRMN 1603 Should I or Shouldn't I: Ethical Dilemmas in the Modern World; GRMN 2501 20th Century German Short Story; GRMN 2502 Representing the Holocaust; GRMN/RUSS 3201 German and Russian Culture in Comparative Perspective; GRMN 3501 German-Jewish Writers; GRMN 3502 Literature in the Age of Goethe; GRMN 3503 German Film and Society 1; GRMN 3504 Topics in German Film; GRMN 3505 The Enlightenment: Tolerance and Emancipation; GRMN 3513 German Film and Society 2; GRMN 4501 Seminar: Literature in Cultural Context; GRMN 4502 Nietzsche: Literature and Values; GRMN 4503 Issues in German Thought; GRMN 4504 Goethe's *Faust*.

### C. Area Courses, 6 semester hours

If only one course is taken from Section C, another course from either Section A or B may be substituted.

ECON 4514 Economic History of Europe; FINE 4339 Modern Art 3; HIST 4312 19th Century Europe; HIST 4412 20th Century Europe; HIST 4413 German History to 1849; HIST 4423 German History since 1849; HIST 4433 Nazi Germany; HIST 4613 History of Eastern Europe to 1914; HIST 4623 History of Eastern Europe since 1914; HIST 4414 European Intellectual History, 1750–1870; HIST 4424 European Intellectual History, 1870–Present; HIST 4444 Topics in European Thought: 20th Century; INTB 6000 Introduction to International Business; INTB 6800 International Field Study German-related (INTB 6000 and 6800 are offered at CU-Denver; students admitted to the BA/MSI.B. program with CU-Denver may use these courses as area requirements); PHIL 4040 Studies in 20th Century Philosophy; PHIL 4250 Marxism; PSCI 4002 Advanced Comparative Politics—Western Europe; PSCI 4213 Europe in the International System; SCAN 2201 Introduction to Modern Scandinavian Culture and Society; SCAN 2202 The Vikings; SCAN 3202 Old Norse Mythology; SCAN 3203 Masterpieces of Modern Scandinavian Literature; SCAN 3204 Medieval Icelandic Saga; SCAN 3205 Scandinavian Folk Narrative; SCAN 3209 Contemporary Nordic Literature and Film; SCAN 3506 Scandinavian Drama

### D. Required for Students in the Secondary

#### Teacher Certification Program

GRMN 4100 Applied Linguistics; GRMN 4450 Methods of Teaching German; and GRMN 4460 High School German Teaching

Plus other requirements as stated by the School of Education

*Note: GRMN 4450 and 4460 can be taken only after full admission to the teacher education program in the School of Education.*

#### Minor Program

A minor is offered in Germanic Studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

#### Study Abroad

The department strongly recommends that all majors take part in study abroad. The university program in Regensburg provides a full year of study abroad. The fall or spring semester in Berlin provides study on culture, ethnicity, and nationalism. Kassel provides the opportunity for language study during the summer for a shorter period of time. Please consult with the major advisor. For more information on study abroad programs, see [www.colorado.edu/oie](http://www.colorado.edu/oie).

#### Russian Studies

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

Completion of 38 hours with grades of C- or better. (None may be taken as *pass/fail*.) *Note:* RUSS 1010 and 1020 will not be counted toward the 38 hours required for the bachelor's degree in Russian. Students are required to structure their curriculum in close consultation with a departmental advisor. Transfer credit must be approved by the department.

Students with advanced Russian language skills are strongly encouraged to meet with a departmental faculty advisor to discuss language placement. Students who have Russian language transfer credit and/or students who are Russian language native speakers may enter the program at the upper-division level, up to RUSS 4010. Students with previous knowledge of Russian must take the placement exam no later than the end of the first week of classes. Students who place out of Russian language courses required for the major must replace the credits with additional course work in Russian studies. To meet this requirement the student may take available Russian courses from either major track approved by the departmental faculty advisor. Any substitutions to major course work must be pre-approved by the Russian faculty advisor.

*Note: Beginning or middle-level language course requirements may be met by transfer credit or by testing out of the course. Students who enter the program at the third-year level must complete at least 18 credit hours in residence in courses numbered 3000 or above with grades of C- or better. (None may be taken pass/fail.) Students who enter at and enroll in Russian language courses at the 3000- or 4000-level may not receive credit for lower-division Russian language courses, unless lower-division language course work was completed prior to registration for 3000- and 4000-level Russian language courses.*

### Track A—Russian Language and Culture

<i>Required Courses</i>	<i>Semester Hours</i>
RUSS 2010 Second-Year Russian I	4
RUSS 2020 Second-Year Russian 2	4
RUSS 3010 Third-Year Russian 1	3
RUSS 3020 Third-Year Russian 2	3
RUSS 4010 Advanced Conversation and Composition 1	3
RUSS 4020 Advanced Conversation and Composition 2	3
RUSS 2211 Introduction to Russian Culture or RUSS 2221 Introduction to Modern Russian Culture, or RUSS 3601 Russian Culture Past and Present	3
RUSS 3000 Advanced Conversation or RUSS 3050 Business Russian or upper-division study abroad Russian language course	3
RUSS 4210 Open Topics: Russian Literature and Culture or RUSS 4230 Russian Cultural Idioms	3
RUSS 4811 19th Century Russian Literature	3
RUSS 4821 20th Century Russian Literature and Art	3
One 2000–4000-level Russian course	3

### Track B—Russian Culture and Literature

RUSS 2010 Second-Year Russian I	4
RUSS 2020 Second-Year Russian 2	4
RUSS 2211 Introduction to Russian Culture or RUSS 3601 Russian Culture Past and Present	3
RUSS 2221 Introduction to Modern Russian Culture or RUSS 3601 Russian Culture Past and Present	3
RUSS 3301 Contemporary Issues in Russian Film or RUSS 4471 Women in 20th Century Russian Culture	3
RUSS 3502 Ideals and Values in Modern Russia	3
RUSS 4811 19th Century Russian Literature	3
RUSS 4821 20th Century Russian Literature and Art	3
Any two of the following courses:	
RUSS 4421 Gogol	3
RUSS 4431 Dostoevsky	3
RUSS 4441 Tolstoy	3
RUSS 4451 Chekhov	3
RUSS 4831 Contemporary Russian Literature	3
One 3000-level Russian language course (3000, 3010, 3020, or 3050)	3
One 2000–4000-level RUSS course	3

### Language Placement

One year of high school Russian is usually considered equivalent to one semester of college Russian. Thus, a student with two years of high school Russian should enroll in RUSS 2010. Students who think that they should be placed at a level different from the normal one should consult the department for advice. Placement level is determined in consultation with the department and should be done before registration.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Germanic or Russian studies, students should meet the following requirements:

Begin to study the language in the freshman year, or have received AP credit. In consultation with the major program advisor before the end of the drop/add period in the first semester, plan a tentative schedule of courses to be taken over eight semesters.

Discuss progress toward the degree each semester with the major advisor.

*Note: Although these requirements apply only in cases in which students are seeking to graduate under the terms of the four-year guarantee, they are good advice for all majors. Consult the program advisor about the major at any time.*

### Minor Program

A minor is offered in Russian Studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

### Study Abroad

The department strongly recommends that all Russian majors take part in the university summer language program in St. Petersburg. For more information on CU Study Abroad programs, see [www.colorado.edu/oie](http://www.colorado.edu/oie).

### Courses Taught in English

A number of courses are offered in translation. These courses generally require no previous study in the language, history, or culture of the area involved, and are open to all interested students, regardless of major.

### Scandinavian

Courses are offered in English on Scandinavian culture and civilization. Courses are also offered in Norwegian and Swedish language. The language courses satisfy arts and sciences language requirements for the BA and BFA degrees. In addition, there is an exchange program with Uppsala University in Sweden. At least two semesters of Swedish are required for application to the program. A minor is offered in Scandinavian.

### Concurrent BA/MA Program in Germanic Studies

Highly motivated undergraduates majoring in Germanic studies at CU-Boulder have the opportunity to enter a BA/MA program, thereby earning both the BA and the MA in five years. The concurrent degree program offers a unique academic credential designed to produce skilled graduates for a variety of occupations. Students must make written application no later than April 1 of the sophomore year. A minimum GPA of 3.25 for all courses is required, as well as three letters of recommendation indicating strong potential for advanced, intensive work in Germanics. The recommended track requires a total of 58 hours of courses, with graduate courses in the fourth and fifth years only. Students should have completed most of their MAPS/core requirements (at least 30–37 hours) by the end of the sophomore year. Only CU-Boulder students may apply. For specific requirements please contact the department or see [www.colorado.edu/germslav/Department](http://www.colorado.edu/germslav/Department).

### Master's Degree in German

Students wishing to pursue the interdisciplinary master's in German should read carefully Requirements for Advanced Degrees in the Graduate School section. The following prerequisites and requirements apply: BA or equivalent in German or BA-level proficiency in German with a BA in a related field; general knowledge

of the German-speaking countries' literature, history, and culture; 24 hours of approved course work and a master's thesis (6 hours), or 30 hours of course work without thesis; and reading knowledge of one modern foreign language in addition to German and English, to be demonstrated by approved course work or by examination. For specific requirements please contact the department or see [www.colorado.edu/germslav/Department](http://www.colorado.edu/germslav/Department).

### Master's Degree in German/ Master's of Business Administration

Responding to marketplace demand and recognizing the national trend in higher education toward the professional master's degree, the University of Colorado at Boulder is pleased to announce the availability of a dual MA in German/MBA program. As of fall 2004, students pursuing a German MA can apply for the newly proposed MA in German/MBA dual degree program. Students earn both an MA in German and an MBA after three years of course work. Contact the department for further details.

### History

*Degrees.....BA, MA, PhD*

The undergraduate degree in history emphasizes knowledge and awareness of:

- the main topics in the political, social, cultural, and economic history of the United States, from its origins to the present;
- the main topics in the political, social, cultural, and economic history of western civilization, from its origins in antiquity to the present;
- the main topics in the political, social, cultural, and economic history of one or more geographic areas outside Europe and America; and
- methodology in historical studies.

In addition, students completing the degree in history are expected to acquire the ability and skills to:

- research and conduct an investigation, consulting appropriate works for developing a bibliography;
- distinguish between primary and secondary sources, analyze arguments and interpretations, and recognize interpretative conflicts;
- interpret evidence found in primary sources and develop an historical argument based on and sustained by the evidence available; and
- produce historical essays that are coherent, cogent, and grammatically correct.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

*(Note: These requirements took effect on June 1, 2003. Students who became history majors prior to that term may fall under previous major requirements and should consult the department's undergraduate advisor to determine which requirements to follow. Students should take no more than 45 hours in history without consulting the advisor to determine applicability toward the BA degree. Students completing an Honors Thesis may take up to 51 credit hours in history.)*

**Total Hours:** Students must complete 36 hours in history courses with grades of C- or better; of those 36 hours, 21 hours must be at the upper division.

**Geographic Distribution:** Complete at least six hours in each of three areas: World Areas History, European History, and United States History. In each area, at least three of those hours must be at the 1000-level, and at least three at the 3000- or 4000-level.

**Historical Period:** Complete at least six hours in courses whose focus falls principally before the year 1800, and at least six hours in courses whose focus falls principally after the year 1800. (The department maintains a list of courses that meet these requirements.)

Complete HIST 4020 (Capstone: Comparative History).

Complete a 3000-level Critical Thinking seminar.

Students may count *one* 2000-level history course towards the major requirements. This course may not, however, be used to satisfy the geographic distribution requirement.

### Graduating in Four Years

Students should consult the Four-Year Guarantee Requirements for further information on eligibility for the four-year guarantee. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in history, students must consult the history advisor each semester, but the following plan provides a rough outline of acceptable progress:

Declare the major no later than the second semester of the freshman year.

Recommended sequence of courses:

<i>Required Course</i>	<i>Semester Hours</i>
<b>Freshman year</b>	
Any two of the three required lower-division courses	6
<b>Sophomore year</b>	total: 6
The remaining required lower-division course	3
One lower- or upper-division course	3
(Only one 2000-level course may be applied to the major and it cannot be used for a geographical area)	
<b>Junior year</b>	total: 12
Four upper-division, or one lower- and three upper-division courses	12
<b>Senior year</b>	total: 12
2 upper-division courses	6
One 3000-level seminar	3
HIST 4020 Capstone: Comparative History	3
<b>Grand total all terms</b>	<b>36</b>

*Note: Under normal circumstances, no more than 45 credit hours in history may be used toward a student's total University of Colorado graduation requirements. Students must have a grade point average of at least 2.00 in the major in order to graduate. Students may receive credit for HIST 1010 & 1020 and/or HIST 1015 & 1025 by obtaining a score of four or better on the high school Advanced Placement history test(s). Some types of International Baccalaureate credit are acceptable; consult the major advisor to determine individual applicability. The CLEP Test is not accepted for credit.*

*Transfer students majoring in History must complete at least 12 credit hours of upper-division history courses taught by the University of Colorado at Boulder faculty. In addition, 3000-level critical thinking seminars and HIST 4020 must be taken on the CU-Boulder campus.*

### Minor Program

A minor is offered in history. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Graduate Degree Programs

Students wishing to pursue graduate work in history leading to candidacy for an advanced degree should read carefully requirements for advanced degrees in the Graduate School section. The following are special departmental requirements. Additional information should be obtained from the Department of History.

**Admission Requirements.** For purposes of admission to the graduate program, the general Graduate Record Examination is required and a score in the 85th percentile or above on the verbal component is generally expected.

### Master's Degree

**Prerequisites.** As general preparation for graduate work in history, a broad liberal arts education, as well as a major in history, are desirable, though not specifically required. Candidates for graduate degrees may be required to pursue such fundamental courses in history as the department deems necessary to provide a suitable historical background.

**Residence.** While it is possible to obtain the MA degree in two full semesters of residence, more time is generally necessary.

**Degree Requirements.** A total of 24 credit hours of course work plus 6 hours of MA thesis, or 30 credit hours of course work without a thesis, is required for the degree. A comprehensive examination must be passed in the field of study before the degree is granted.

### Doctoral Degree

**Prerequisites.** Students who wish to work toward the PhD degree in history must indicate knowledge of certain fields of history, acquaintance with the fundamental tools of historical scholarship, and the ability to do original work. The PhD program does not require the completion of a master's degree, but directly admits those qualified applicants who hold an undergraduate history degree or who have completed appropriate undergraduate history preparation and who have been recommended by the graduate admissions committee.

**Residence.** At least three years of graduate study, two of which must be spent in residence, are required for the PhD degree.

**Degree Requirements.** A total of 45 postbaccalaureate credit hours, at least 30 of which must be taken at this university, and a dissertation are required for the degree. A minimum of one foreign language is required; however, students must be able to use those languages essential to research and advanced study in their respective fields.

A comprehensive written and oral examination, a dissertation which is an original contribution to knowledge, and an oral examination on the dissertation must be successfully completed.

### Humanities

See *Comparative Literature and Humanities*.

### Integrative Physiology

Degrees.....BA, MS, PhD

Physiology is the science of function in living organisms. The academic foundation of the department is the knowledge of how humans and animals function at the level of cells, organs, and systems. Our multidisciplinary curriculum requires students to take foundational courses in anatomy, biochemistry, mathematics, physics, physiology, and statistics. With this basic knowledge, students can undertake a flexible curriculum that includes the study of biomechanics, cell physiology, comparative physiology, endocrinology, immunology, exercise physiology, and neurophysiology. The department also encourages student participation in research.

Students completing a degree in integrative physiology are expected to acquire the ability and skills to:

- Read, evaluate, and synthesize information from the research literature on integrative physiology;
- Observe living organisms and be able to understand the physiological principles underlying function;
- Be able to interpret movement and performance data from laboratory equipment; and

• Communicate the outcome of an investigation and its contribution to the body of knowledge on integrative physiology.

These goals are achieved by providing a curriculum that comprises required courses and elective experiences. The required courses establish the foundation of knowledge for the discipline, whereas the elective courses provide opportunities to extend this knowledge on selected topics. The elective courses include seminars, critical thinking classes, independent study, and research projects on such topics as the applied exercise science, biochemical basis of performance, cellular and systemic cardiovascular physiology, comparative physiology of exercise, developmental neurobiology, ecophysiology, environmental and comparative endocrinology, mechanics and neural control of locomotion, motor behavior, neural control of movement, neuroimmunophysiology, reproductive endocrinology, sleep and chronobiology, and vascular biology. More detailed information is available at [www.colorado.edu/intphys](http://www.colorado.edu/intphys).

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses below.

<i>Required Courses</i>	<i>Semester Hours</i>
IPHY 1010 Introduction to Integrative Physiology .....	3
IPHY 2800 Introduction to Statistics .....	3
IPHY 3410 Introduction to Human Anatomy .....	5
IPHY 3430 Human Physiology or IPHY 3450 Comparative Animal Physiology ...	5
EBIO 1210-1240 General Biology 1 and 2 with labs or MCDB 1150 and 1151 Introduction to Molecular Biology with lab and MCDB 2150 and 2151 Principles of Genetics with lab .....	8
CHEM 1111 and 1131 General Chemistry 1 and 2 or CHEM 1111 and 1071 General Chemistry 1 and Introduction to Organic and Biochemistry ...	9-10
PHYS 2010 and 2020 General Physics 1 and 2 .....	10
One of the following courses: MATH 1300 Analytic Geometry and Calculus 1, MATH 1310 Calculus 1 with Computer Applications, or APPM 1350 Calculus 1 for Engineers .....	4-5
Three of the following six courses: IPHY 3060 Cell Physiology, IPHY 3600 Immunology, IPHY 4440 Endocrinology, IPHY 4540 Biomechanics IPHY 4650 Exercise Physiology, and IPHY 4720 Neurophysiology.....	10-14

The number of major elective hours needed to reach the 30 hour major requirement will vary based on what major courses are taken. Students cannot apply more than 45 major hours toward the degree. Contact department for current elective choices.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in integrative physiology, students should meet the following requirements:

Declare the major by the first semester.

Complete the biology and chemistry requirements before the beginning of the fifth semester.

Complete the anatomy and physiology requirements by the end of the sixth semester.

Students must consult with a major advisor to determine adequate progress toward completion of major requirements.

## Concurrent BA/MS Program

The Department of Integrative Physiology has developed a curriculum that results in simultaneously conferring BA and MS degrees following a five-year course of study. The program has been designed to provide qualified undergraduate students with an opportunity to enhance their knowledge base in the discipline, to increase their opportunities for employment, and to make their applications to medical/allied health professional

schools more competitive. Candidates for the program are recruited from the undergraduate population of declared integrative physiology majors during the beginning of their junior year. All interested candidates must apply by October 15. Decisions regarding acceptance into the program will be made by December 15. To apply, students must have a minimum GPA of 3.30 and three letters of recommendation. Approximately fifteen to twenty of the applicants will be selected on a competitive basis to begin the program.

Once accepted into the program, a student must maintain a GPA of 3.00 in all course work undertaken. By the completion of their senior year, students must have completed the 114 undergraduate credits as outlined in the concurrent degree plan options. Continuing students must register for at least 5 graduate course credits per semester, beginning with the fall semester of their senior year. Students deciding to discontinue the program may do so at any time during their course of study. All credits completed toward the concurrent degree program will be counted toward the completion of the requirements for a BA degree in integrative physiology.

The curriculum for all students in the first year of the program is the same and is designed for students to complete their undergraduate requirements (114 credit hours) and 8 of their graduate credits. To complete the program in 5 years, students will be allowed to count 6 credits of their graduate work as electives for the undergraduate degree and 6 prespecified credits of undergraduate work toward the master's degree. See the section on Master of Science Degree below for more information.

## Graduate Degree Programs

To obtain materials for application and for any additional information, visit the departmental web site at [www.colorado.edu/intphys/grad](http://www.colorado.edu/intphys/grad).

Entering graduate students must have an undergraduate preparation equivalent to the basic core curriculum requirements in kinesiology at the University of Colorado or departmental approval of their academic preparation for graduate study.

All graduate applicants must have an introductory course in statistics or research design. In addition, students should have the knowledge base that would be obtained by completing the following courses: IPHY 4540 (Biomechanics), IPHY 4650 (Exercise Physiology), and IPHY 4720 (Neurophysiology). Satisfactory scores on the Graduate Record Examination tests (500 each, in verbal, quantitative, and analytical) are also required for admission to the department. These scores should be submitted at the time of application.

**Deficiencies.** If the undergraduate preparation of a prospective graduate student is not adequate, the student may be allowed to pursue graduate study with the understanding that identified deficiencies will be completed. The nature and extent of these deficiencies are determined by the graduate coordinator and the graduate committee of the department.

Deficiencies in any area of the undergraduate major may be met by completing approved course work in the subject or by satisfactory examination. All entering graduate students with deficiencies must satisfy at least one deficiency per semester until all deficiencies are satisfied. Graduate courses taken before removing deficiencies may be accepted for graduate degree credit only if prior approval of the graduate coordinator has been granted.

## Master of Science Degree

Master's candidates entering the graduate program may select Plan I (thesis—30 credit hours, including 4-6 thesis hours) or Plan II (nonthesis—30 credit hours including a 3-credit hour research project) for the degree program. During their first academic year

in the program, students should identify a graduate faculty member who will serve as their scholarly mentor for the development of a thesis or research project. The scholarly mentor assists the student in deciding upon the thesis and nonthesis options based upon a careful examination of the candidate's academic record, the goals of the candidate, and the availability of departmental resources. The comprehensive exam consists of an oral defense of the thesis or a written summary of the research project.

**Basic Requirements.** The following are required of all students for the master's of science degree: IPHY 5100 Colloquium in Integrative Physiology and IPHY 5800 Advanced Statistics and Research in Integrative Physiology, a minimum cumulative GPA of 3.00 in all graduate work undertaken, satisfactory performance on the comprehensive exam, and completion of the requirements for advanced degrees as stipulated by the Graduate School. For students enrolled in Plan I, IPHY 6950 Master's Thesis is required; for students enrolled in Plan II, IPHY 6840 Research Project is required.

**Comprehensive Examination.** All candidates are required to complete an oral examination covering the thesis or a written summary of the research project, as well as course work leading to the degree.

### Doctoral Degree

**Basic Requirements.** Doctoral students must complete 30 credit hours of course work at or above the 5000 level and 30 semester hours of dissertation research (IPHY 8990). The following are required of all doctoral degree students: IPHY 5100 Colloquium in Integrative Physiology (2 academic year semesters); IPHY 5800 Advanced Statistics and Research in Integrative Physiology; IPHY 6830 Professional Skills for the Research Scientist; satisfactory completion of the department preliminary review; and satisfactory completion of both the comprehensive and final examinations.

**Advisory Committee.** The advisory committee consists of the student's mentor, a faculty member in the student interest area, and either the department graduate coordinator or the department chair. The committee assists the student in planning a program of study.

**Preliminary Review.** After the first academic year, usually consisting of 18–20 hours of course work, the student completes the preliminary review process. This process is performed by the student's advisory committee. The preliminary evaluation includes an evaluation of the student's academic status (GPA of at least 3.0 required), a detailed proposal of the student's curriculum, written input from the student's mentor, and other pertinent materials deemed necessary by the committee.

The outcome of the preliminary review process can be one of three judgments: pass, fail, or probation. A student who passes may continue to pursue the doctoral degree. A student who fails may not continue in the doctoral program. A student on probation must complete any deficiencies determined by his or her committee before continuing to pursue the doctoral degree. Regardless of the outcome, the committee submits a written report to the graduate coordinator for filing.

**Comprehensive Examination.** The comprehensive exam will be administered to the student within four semesters of entry into the doctoral program. The format of the exam, and the composition of the comprehensive exam committee, will be determined by the mentor in consultation with the student. The examination will be based on a document that is about 20 pages in length and designed to demonstrate the student's comprehensive knowledge on a topic. The membership of the committee (a minimum of five members, with at least one member from outside the department) is submitted to the dean of the Graduate School for approval.

Students are given two opportunities to pass the comprehensive exam. The written portion of the exam is based upon the student course work and requires demonstration of broad-based knowledge in integrative physiology. Specific areas to be evaluated are determined by the mentor and the student.

**Dissertation.** Successful completion of the exam advances the student to doctoral candidate status, and the student may then begin a dissertation. All students must complete a formal written dissertation that conforms to the requirements established by the Graduate School at the University of Colorado at Boulder.

**Final Examination.** After completion of the dissertation, a final examination is scheduled. The exam consists of a written submission of the dissertation work and an oral defense. The final examination committee consists of at least five members, one of whom must be from outside the department. Three of the members must be Boulder campus resident faculty.

## International Affairs

### Degree .....BA

With the increasing importance of world issues to the United States, employment opportunities in government and in international organizations, agencies, and business have expanded enormously. Today there is an urgent need for college graduates with a strong background in international affairs. To meet this need the University of Colorado offers a comprehensive and flexible interdisciplinary program in international affairs leading to the BA degree.

The undergraduate degree in international affairs emphasizes knowledge and awareness of:

- the major political, economic, social, and cultural problems facing the international community, including international economic relations, world population, and resource utilization;
- the international political system in the broadest global context, international organizations and alliances, and foreign political systems and processes;
- the ethical issues involved in international relations;
- patterns of conflict and cooperation among nations;
- the chief historical factors that give rise to existing international institutions and processes; and
- the problems and issues in United States foreign policy.

In addition, students completing the degree in international affairs are expected to acquire the ability and skills to:

- analyze an international problem from a political, economic, historical, and cultural perspective;
- read, critically evaluate, and synthesize information obtained from international affairs literature;
- analyze international phenomena critically so as to separate the essential from the irrelevant and identify the probable; and
- communicate, orally and in writing, findings to other students of international affairs and to a broader audience.

Students interested in international affairs may want to consider the Smith Hall International Program offered through the residence halls. See Residential Academic Programs for information.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses in the three categories listed below.

### 1. Specific Courses.

Complete a minimum of 47 hours of specified courses with a grade of C- or better (none may be taken *pass/fail*), distributed as follows:

## Required Courses

## Semester Hours

**Lower Division, (14–18 hours)**

ECON 1000 Introduction to Economics <i>or</i> ECON 2010 Principles of Microeconomics and ECON 2020 Principles of Macroeconomics . . .	4-8
IAFS 1000 Global Issues and International Affairs . . . . .	4
PSCI 2012 Introduction to Comparative Politics . . . . .	3
PSCI 2223 Introduction to International Relations . . . . .	3

**Upper Division**

Complete the requirements listed below for general upper-division categories and the requirements for an area of concentration, senior seminar, and foreign language. There are two options.

**Option I.** Complete one course from each of the following seven categories and complete 9 hours of upper-division courses concentrating on a region outside the United States.

**Option II.** Complete one course from six of the following seven categories and complete 12 hours of upper-division courses concentrating on a region outside the United States.

No more than four courses out of the seven categories may be from one department. IAFS 3000 Special Topics in International Affairs could count for one upper-division category depending on the specific topic.

<b>Development and Culture</b> . . . . .	<b>3</b>
ANTH 4500 Cross-Cultural Aspects of Socioeconomic Development <i>or</i> ANTH 4510 Applied Cultural Anthropology <i>or</i> ECON 3545 Environmental Economics <i>or</i> ECON 4606 Introduction to Demography <i>or</i> ECON 4774 Economic Reform in Developing Countries <i>or</i> GEOG 3672 Gender and Global Economy <i>or</i> GEOG 3682 Geography of International Development <i>or</i> IAFS 4700 Global Perspectives and Political Philosophy, <i>or</i> LING 3545 World Language Policies <i>or</i> PSCI 4012 Global Development <i>or</i> PSCI 4732 Critical Thinking in Development	
<b>International Economics/Business</b> . . . . .	<b>3</b>
ECON 3403 International Economics and Policy <i>or</i> ECON 4413 International Trade <i>or</i> ECON 4423 International Finance <i>or</i> INBU 4200 International Financial Management	
<b>Political Economy</b> . . . . .	<b>3</b>
ECON 4433 Economics of the Pacific Area <i>or</i> ECON 4784 Economic Development <i>or</i> ECON 4999 Economics in Action (approved sections only) <i>or</i> MKTG 4400 International Business and Marketing <i>or</i> PSCI 4272 Political Economy of Industrialized Societies, <i>or</i> FNCE 4410 London Summer in International Finance	
<b>Political Geography</b> . . . . .	<b>3</b>
GEOG 4712 Political Geography	
<b>International Relations/Behavior</b> . . . . .	<b>3</b>
ANTH 4580 The Holocaust; <i>or</i> PSCI 3123 War, Peace, and Strategic Defense; <i>or</i> PSCI 3143 Problems in International Relations; <i>or</i> PSCI 3193 International Behavior	
<b>Foreign Policy</b> . . . . .	<b>3</b>
HIST 4050 The World War II Era <i>or</i> HIST 4126 U.S. Diplomatic History since 1940 <i>or</i> HIST 4166 The War in Vietnam and Its Legacy <i>or</i> PSCI 3191 National Security Organization and Policy Making <i>or</i> PSCI 3163 American Foreign Policy <i>or</i> RLST 4550 Religion, War, and Peace	
<b>Regimes, Norms, and Institutions</b> . . . . .	<b>3</b>
PHIL 3260 International Human Rights <i>or</i> PSCI 3062 Revolution and Political Violence <i>or</i> PSCI 4173 International Organization <i>or</i> PSCI 4183 International Law <i>or</i> PSCI 4213 Europe in the International System <i>or</i> PSCI 4703 Alternative World Futures <i>or</i> PSCI 4783 Global Issues	
<b>Critical Thinking Seminar</b> . . . . .	<b>3</b>
IAFS 4500 Post-Cold War World <i>or</i> IAFS 4800 Honors Seminar	

**2. Area of Concentration**

**General.** International affairs majors must declare an area of concentration, and a language appropriate to that area of concentration, no later than the beginning of their junior year. IAFS 4930 Internship in International Affairs could count for either an upper-division category or for an area of concentration course depending on the internship.

**Requirements.** International affairs majors are required to complete courses concentrating on the whole or part of a region outside the United States, including Africa south of the Sahara, Asia, Eurasia, Europe, Latin America, or Middle East.

**Option I.** Complete one course from each of the seven categories and complete 9 hours of upper-division courses in an area of concentration.

**Option II.** Complete one course from six of the seven categories and 12 hours of upper-division courses in an area of concentration.

While the area of concentration should be mainly in the social sciences, and must include one course in contemporary history, 3 hours of contemporary literature (taught in the foreign language) is also acceptable. Students wishing to use other areas of concentration must receive written approval from the director of the international affairs program.

**3. Language Requirement**

A third-year university-level proficiency in a foreign language appropriate to the area of concentration. This requirement may be met by completion of two third-year, university-level grammar courses in the language with a grade of C- or better, or by certification from the appropriate department of such competence.

**4. Recommendations**

- All international affairs majors should have a good command of the English language.
- Students should choose electives with a view to their relevance to this program.
- During the semester prior to graduation, each student must complete a statement of major status obtained from the office of the College of Arts and Sciences.
- Students in the international affairs program are encouraged to consider the possibility of participating in one of the study abroad programs directly or indirectly affiliated with the University of Colorado. Students wishing to participate in such a program should contact their advisor to work out an appropriate program. Some variation in the general requirements are permitted in these cases.

The specific courses that may be counted to meet the requirements in this program are determined by the committee on international affairs and the dean of the College of Arts and Sciences.

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in international affairs, students should meet the following requirements:

Declare the major by the beginning of the second semester.

Begin language study by the third semester.

Complete the lower-division requirements by the end of the sophomore year. Begin area of concentration courses in first semester of the junior year.

Begin upper-division general international affairs requirements in the junior year. Successfully complete any remaining major requirements by the end of the eighth semester.

**INVST Community Studies**

Consistent with the vision for a just and sustainable world, INVST Community Studies programs educate, equip, and inspire students for professions that benefit humanity and the environment. INVST innovatively operates as a community-based organization, practicing service learning and participatory education. In order to fulfill this mission, the program offers: 1) a comprehensive two-year Community Leadership Program (CLP) focused

on developing community leaders who are engaged in compassionate action as a lifetime commitment, 2) Community Studies electives that foster civic responsibility and leadership potential, and 3) a Youth Council for Public Policy to educate young people about the democratic process as a tool for positive social change.

The INVST CLP is the flagship program that offers a unique and transformational educational experience to all majors. Each year the INVST CLP admits up to 16 students who are committed to making a positive difference with their lives. The two-year program is designed to cultivate deep understanding about issues facing humanity and to provide skills and experiences for community leaders to fulfill progressive visions for change. Specifically, students participate in four theory classes, four skills-training classes, and two summer service-learning experiences, one domestic and one international. In addition, students intern six hours each week with community-based organizations during their first academic year, and collectively design, implement, and evaluate community leadership projects during their second academic year. Students learn and serve together in a small group environment throughout the program. For more information, call **303-492-8045**.

## Latin American Studies

The Latin American Studies Program is being discontinued. Students already enrolled in the program will continue to be served; however, no new students will be accepted. For more information, contact the director of the program at **303-492-1698**.

## Lesbian, Gay, Bisexual, and Transgender Studies

The Lesbian, Gay, Bisexual, and Transgender Studies (LGBT) certificate program encourages students to think critically about the function of sexuality and gender in the world around them. It asks philosophical questions such as why the social categories “homosexual” and “heterosexual” exist, and it asks historical questions about the specificity of lesbian, gay, bisexual and transgender lives.

Open to any student in the university, this interdisciplinary program consists of two required lower-division courses and a series of relevant courses in a number of different departments. Requiring 24 credit hours, the certificate is awarded upon completion of its requirements in addition to a bachelor’s degree in another field.

By developing an understanding of diverse sexual and gender identities, and the processes individuals move through in developing these identities, certificate program students apply the meaning and function of sexuality to a broad range of historical and contemporary institutions and societies.

For more information about the Lesbian, Gay, Bisexual, and Transgender Studies certificate program, contact the program directors at **303-492-3399** or **303-735-3113**.

## Linguistics

*Degrees.....BA, MA, PhD*

Linguistics is the study of all aspects of human language: how languages make it possible to transmit ideas and feelings; how we develop different styles and dialects; what will be required for computers to understand and produce spoken language; and how languages are used in everyday communication as well as in formal settings. Linguists try to figure out what it is that skilled speakers know and do by observing the structure of languages, the way children learn language, slips of the tongue,

conversations, storytelling, the acoustics of sound waves, and the way people’s brains react when they hear speech or read. Linguists also reconstruct prehistoric languages, and try to deduce the principles behind their evolution into the thousands of languages of the world today.

The major in linguistics is useful for careers involving cognitive science, computer science, psychology, international business, language teaching, advertising, publishing, law, and documentation. Double majors and minors are encouraged with language, computer science, psychology, communication, sociology, anthropology, international affairs, philosophy, and education.

The core of the major is a set of courses, taught in the Department of Linguistics, on the nature of language. In addition, the major requires language courses offered by other departments (except for fluent speakers of languages other than English).

The undergraduate degree in linguistics emphasizes knowledge and awareness of:

- the fundamental architecture of language in the domains of phonetics and phonology, morphology and syntax, and semantics and pragmatics;
- the general variety of structures by which diverse human languages realize this architecture;
- the main interactions between language, culture, and society, including the role of language as a cultural institution and the social functions of language diversity; and
- the approaches to the study of language that are used by a discipline other than linguistics.

In addition, students completing the degree in linguistics are expected to acquire the ability and skills to:

- demonstrate proficiency in a second language equivalent to the third-year university level;
- infer language structures from the analysis of data from unfamiliar languages; and
- give coherent general interpretations of common language phenomena in terms of language structure and language use.

## Bachelor’s Degree Program

Majors in linguistics must complete a total of 33 hours of study in general linguistics, including 9 in a natural language (for exceptions, see below). Language study is taken in other departments.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
Complete the following courses in general linguistics with grades of C or better:	
LING 2000 Introduction to Linguistics .....	3
LING 3100 Language Sound Structures .....	3
LING 3430 Semantics .....	3
LING 4420 Morphology and Syntax .....	3

**Natural Language.** Students must complete with a grade of C (2.00) or better a minimum of 9 credit hours of study of a natural language other than English (including signed languages used by deaf communities). At least 5 credit hours offered in satisfaction of this requirement must be at the 3000 level or above. The natural language requirement may be satisfied by examination or waived for foreign students whose native language is not English; in these cases, students must still meet the college minimum major requirement of 18 credit hours of upper-division course work and 30 credit hours overall in the major. Students who wish to have their language requirement waived must obtain the consent of the undergraduate advisor before registering for the fall term of the junior year.

**Electives.** A minimum of 9 elective hours must be completed with a grade of C (2.00) or better. Courses may be chosen from the following:

LING 1000 Language in U.S. Society  
 LING 1010 Study of Words  
 LING 2400 Language and Gender  
 LING 3005 Cognitive Science  
 LING 3220 American Indian Languages  
 LING 3500 Language/Public Interest  
 LING 3545 World Language Policies  
 LING 3810 Undergraduate Seminar (for 1 credit hour; may be repeated once for credit)  
 LING 4100 Perspectives on Language  
 LING 4220 Language and Mind  
 LING 4560 Language Development  
 LING 4610 English Structure for TESOL  
 LING 4800 Language and Culture

Other upper-division linguistics courses may also be chosen if available; graduate courses may be taken with permission of the department.

The department recommends that prospective majors complete LING 2000 and at least two 1000-level foreign language courses (in the same language) by the end of the sophomore year, unless the student's foreign language proficiency is already advanced.

Students whose preparation in grammar is weak should take LING 1500 Basic Traditional Grammar prior to enrolling in LING 2000. Note that LING 1500 does not count towards the 33 total credit hours needed for the major. The fall semester of the junior year should include LING 3430, a 2000-level foreign language course, and a linguistics elective or LING 4420. It must also include LING 2000 if that was not taken earlier. The spring semester of the junior year should include LING 3100, a linguistics elective, and a further 2000-level foreign language course (if needed to prepare the student for the required upper-division foreign language hours).

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in linguistics, students should meet the following requirements:

- Declare linguistics as a major by the beginning of the second semester.
- Complete two semesters of study of a natural (spoken or signed) language other than English by the end of the sophomore year (fourth semester) at the latest, continue study at the 2000 level during the junior year at the latest, and take 5 credit hours at the 3000 level during the senior year (seventh and eighth semesters) at the latest. The language requirement is waived for native speakers of a language other than English, but if it is waived, 6 additional upper-division credit hours in linguistics must be taken.
- Take LING 2000 (required) and LING 1000 or LING 2400 (electives) during the freshman or sophomore years and one or both of LING 3430 or 4420 during the fall of the junior year.
- Take LING 3100 and an upper-division linguistics elective in the spring of the junior year. Take the remaining courses as needed during the junior or senior year.

*Note: A linguistics major who has been excluded from any upper-division linguistics course due to enrollment limitations will be given first preference for a seat in that course the following year if the exclusion is made known to the department staff within two weeks after it occurs. No declared linguistics major who still needs LING 2000 for fall of the junior year and attempts to register for it during the regular registration period for continuing students (spring of the sophomore year) will be excluded from the course.*

### Minor Program

A minor is offered in linguistics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/minors/minors.html](http://www.colorado.edu/artssciences/minors/minors.html).

### Study Abroad

Language study and some courses in the major may be completed in university or university-affiliated study abroad programs, and such study is recommended. Students interested in doing part of their major work in a study abroad program should discuss the matter with their advisor before going abroad. For information on study abroad programs, consult the Office of International Education.

### Graduation with Honors

The honors program in linguistics offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study of linguistics than is provided by the regular BA curriculum. Linguistics majors with an overall grade point average of 3.30 or higher are eligible to participate in the program. Honors that may be earned are cum laude (with honors), magna cum laude (with high honors), and summa cum laude (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental undergraduate advisor by the beginning of their junior year to ensure that they will be able to meet the requirements for departmental honors before graduation.

### Concurrent BA/MA Degree Program

The department has a five-year concurrent bachelor's and master's degree program, which is recommended only for the most serious and able undergraduate students. For further information, see the undergraduate advisor in the spring of the sophomore year or during the first week of the fall semester of the junior year.

### Graduate Degree Programs

Students wishing to pursue graduate work in linguistics should carefully read Requirements for Advanced Degrees in the Graduate School chapter of this catalog and the detailed degree requirements available from the department office. A brief summary of MA and PhD requirements follow.

**Prerequisites.** Applicants should hold a recognized baccalaureate degree. They should have considerable knowledge of a language other than their native language. This knowledge may have been gained by formal study or by use of the language in a country, community, or institution where it is the usual means of communication. The department may require formal study of a foreign language by graduate students whose proficiency in this area is less than the equivalent of the college junior level. GRE scores are required from United States residents; scores are also required from native speakers of English who wish to be considered for fellowship aid. TOEFL scores are normally required from foreign applicants.

### Master's Degree

The master's degree calls for a minimum of three semesters of study, though four semesters is usual. Students must complete LING 5030 Linguistic Phonetics, LING 5410 Phonology, LING 5420 Morphology and Syntax, and LING 5430 Semantics and Pragmatics. The MA may be taken with a specialization in Teaching English as a Second Language (TESOL). Students who wish to earn the certificate in Teaching English to Speakers of East Asian Languages (TESEAL) also must complete LING 5610 Structure of English for TESOL. All others must complete LING 5570 Introduction to Diachronic Linguistics.

The remaining courses are normally taken at the 5000-level or above. Students in Plan I (thesis) must complete a total of 30 semester hours, including 4 to 6 thesis hours. Students in Plan II (nonthesis) must complete a total of 30 semester hours of course work. All students must pass a comprehensive written examination covering general topics in linguistics plus the thesis topic if any. The additional courses in linguistics may include two



courses offered by the University of Colorado at Denver School of Education: LLC 5820 Techniques of Teaching ESL and LLC 5910 Field Experience in Literacy and Language Teaching, which must be taken by concurrent registration.

### Doctoral Degree

To be admitted to the PhD program, students must have completed course work equivalent to LING 5030 Linguistic Phonetics, LING 5410 Phonology, LING 5420 Morphology and Syntax, LING 5430 Semantics and Pragmatics, LING 5570 Introduction to Diachronic Linguistics, and LING 5450 Introduction to Formal Syntax. Students who do not have this preparation will be initially admitted to the MA program and reconsidered for admission to the PhD program when these requirements are close to completion. Students may be admitted to the PhD program before finishing the MA.

In addition to phonology, syntax, semantics, and pragmatics, the department offers specializations in sociolinguistics, conversation analysis, historical linguistics, typological comparison, Amerindian linguistics, African linguistics, linguistic anthropology, psycholinguistics, neurolinguistics, language development, cognitive linguistics, and computational modeling of language knowledge. Students should select a specialization and begin their own research as early as possible.

Thirty-six hours of course work are normally required for the PhD. The four required core courses are LING 7420 Syntax 1; LING 7410 Phonology 1; LING 7100 Field Methods 1; and one course chosen from the following: LING 6300 Sociolinguistics, LING 7560 Language Acquisition, or LING 7570 Advanced Diachronic Linguistics. The remaining eight courses may include up to four courses in other departments appropriate to the specialization. All PhD students must demonstrate the ability to read linguistic literature in either French or German.

As a PhD preliminary examination, students submit a data-based research paper at the beginning of the second year in the PhD program. The University comprehensive examination requirement is completed in two steps: the completion of a synthesis paper or a synthesis examination, followed by the defense of a dissertation prospectus.

## Mathematics

### Degrees.....BA, MA, MS, PhD

The undergraduate degree in mathematics emphasizes knowledge and awareness of:

- basic real analysis of one variable;
- calculus of several variables and vector analysis;
- basic linear algebra and theory of vector spaces;
- the structure of mathematical proofs and definitions; and
- at least one additional specialized area of mathematics.

In addition, students completing a degree in mathematics are expected to acquire the ability and skills to:

- use techniques of differentiation and integration of one and several variables;
- solve problems using differentiation and integration;
- solve systems of linear equations;
- give direct proofs, proofs by contradiction, and proofs by induction;
- formulate definitions;
- read mathematics without supervision; and
- utilize mathematics.

## Bachelor's Degree Program

The department of mathematics offers two plans for earning a BA in mathematics. For each plan students must complete the general requirements of the College of Arts and Sciences as well as the required courses listed below.

To earn an undergraduate degree in mathematics plans I and II, students must take Calculus 1, 2, and 3 plus 24 credit hours of courses numbered 3000 or above with 9 credit hours at the 4000-level or above, with a grade of C- or better and with 2.00 (C) average for all attempted work in mathematics. The 24 credit hours must be fulfilled by a minimum of eight courses.

Before receiving a bachelor's degree in mathematics, students must pass a standardized major field achievement test administered by the Department of Mathematics.

*Note:* Any APPM course that is cross-listed as a MATH course is considered by the Department of Mathematics to be a mathematics course.

### Mathematics Plan I

<i>Required Courses</i>	<i>Semester Hours</i>
Calculus 1, 2, and 3 .....	12-14
MATH 3000 Introduction to Abstract Mathematics or MATH 3200 Introduction to Topology .....	3
MATH 3130 Introduction to Linear Algebra .....	3
MATH 3140 Abstract Algebra 1 .....	3
MATH 4310 Introduction to Analysis .....	3
A two-semester upper-division sequence approved by the Department of Mathematics and upper-division math electives .....	12

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics Plan I, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete Calculus 1, 2, and 3, and either MATH 3000, 3200, or 3130 by the end of the fourth semester.

Complete either MATH 3000 or 3200 and MATH 3130, 3140, and at least two optional upper-division 3-credit mathematics courses by the end of the sixth semester.

Complete MATH 4310, at least three optional upper-division 3-credit mathematics courses, and have begun an approved two-semester upper-division sequence by the end of the seventh semester.

Complete a total of eight upper-division 3-credit mathematics courses including an approved two-semester upper-division sequence by the end of the eighth semester.

*Note:* At least three of the eight courses must be at the 4000 level.

### Mathematics Plan II

<i>Required Courses</i>	<i>Semester Hours</i>
Calculus 1, 2, and 3 .....	12-14
MATH 3130 Introduction to Linear Algebra .....	3
MATH 4430 Ordinary Differential Equations .....	3
MATH 4650 Intermediate Numerical Analysis .....	3
One of the following courses: MATH 4510 Introduction to Probability, MATH 4470 Introduction to Partial Differential Equations, MATH 4450 Introduction to Complex Variables, MATH 4330 Fourier Analysis, or MATH 4120 Introduction to Operations Research .....	3
A two-semester upper-division sequence approved by the Department of Mathematics and upper-division math electives .....	12

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year

guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements:

- Declare the major by the beginning of the second semester.
- Complete Calculus 1, 2, and 3, and MATH 3130 by the end of the fourth semester.
- Complete MATH 4430 and 4650; at least one of the following: MATH 4330, 4450, 4470, or 4510; and at least one additional 3-credit hour upper-division elective by the end of the sixth semester.
- Complete at least three optional upper-division 3-credit mathematics courses and begin an approved two-semester upper-division sequence by the end of the seventh semester.
- Complete a total of eight upper-division 3-credit mathematics courses, including an approved two-semester upper-division sequence by the end of the eighth semester.

### *Secondary Licensure*

The program for obtaining a secondary teaching license is handled by the School of Education and this program has requirements in addition to those needed for a mathematics degree. Teacher licensure candidates should talk to an advisor in the School of Education.

### *Residency Requirement*

For the BA degree in mathematics, all students must have completed at least 12 credit hours of upper-division mathematics courses, with grades of C (2.00) or better, taken in the College of Arts and Sciences on the Boulder campus. Additional courses transferred from other universities or from other campuses of the University of Colorado that are used to meet the minimum 24-hour upper-division requirement must be approved by the Department of Mathematics. Courses accepted as mathematics credit but excluded from the minimum 24-hour upper-division requirement still count in the 45 maximum hours allowed in mathematics.

Undergraduate students planning to do graduate work in mathematics should take MATH 3140, 4310, and 4320, as well as fulfill the arts and sciences language requirement with German, French, or Russian.

### *Minor Program*

A minor is offered in mathematics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For minor information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

## Graduate Degree Programs

The Department of Mathematics offers programs leading to the degrees MA or PhD in mathematics and MS in applied mathematics. Students interested in any of these programs should read carefully the material describing the university requirements in the Graduate School chapter of this catalog.

The prerequisite for graduate work in mathematics is at least 30 credit hours in mathematics, including two semesters of advanced calculus (undergraduate real analysis, beyond calculus), a semester of linear algebra, and a semester of either modern algebra or differential equations, with a grade of B or better. GRE scores are required to be considered for financial support.

The basic requirements for the various degrees are summarized here, and full details are available in the department office. For fulfillment of all course requirements, mathematics courses must be numbered 5000 or higher excluding MATH 5800. No language is required of master's students.

To earn an MA degree under the thesis plan, a student must complete 24 credit hours of graduate course work at the 5000-level or above, including two courses that are approved full-year courses, and 6 credit hours of thesis work. For the nonthesis plan, 30 credit hours of course work, 24 of which

must be at the 5000-level or above, are required. Two of those courses must be approved full-year courses. No more than 6 credit hours of seminars or independent study may be included in the 30-hour requirement.

For the MS degree in applied mathematics, 30 credit hours of graduate course work, 24 of which must be at the 5000-level or above, are required. Of these, 6 to 12 credit hours must be in an approved minor program outside the mathematics department.

To earn an MA degree or an MS degree, a student must pass a master's examination based on the particular program of the student.

Before being admitted to candidacy for the PhD degree in mathematics, a student must pass examinations in real analysis, modern algebra, and a third topic chosen by the student and the student advisor. The basic requirements for a PhD degree in mathematics are as follows: demonstrate reading knowledge of French, German, or Russian (see departmental requirement sheet for language options); demonstrate competence in a modern scientific programming language; complete at least 30 credit hours of graduate course work and 30 credit hours of thesis; prepare a written thesis that contains substantial original contributions to mathematics; and successfully complete a final examination.

## Medieval and Early Modern Studies

To the Middle Ages, the modern world owes the preservation and transmission of Latin and Greek; the development of a host of vernaculars; the evolution of Judaism and Christianity, and the rise of Islam; the renewed study of Roman law; the growth of a mercantile class; the creation of musical notation; the erection of ecclesiastical monuments; the foundations of constitutional government; and the institution of universities. The early modern period inherited and elaborated all these institutions and inventions, adapting them to fit new conceptions of man (and woman), church, and state.

The Committee on Medieval and Early Modern Studies is founded on the convictions that the period from c. 400 to c. 1800, conceived in a global context, is a dynamic cultural continuum and ever-evolving system; that study of both periods in tandem sheds new light on each; and that the unity and diversity of the premodern world can be understood and appreciated only from an interdisciplinary perspective. Medieval and Early Modern Studies therefore crosses boundaries of period, nation, language, and discipline, and the committee's prime function is to facilitate and encourage interdepartmental study and teaching.

Courses throughout the curriculum are available to students whose area of specialization within a given department is the medieval and/or early modern period(s) and who wish to broaden their knowledge of the cultures of the period. With the approval of the major department, a coherent group of these courses may be accepted as a related program of study and as part of the requirements for an undergraduate degree. For additional details concerning these courses, see departmental listings.

For more information, and to inquire about the undergraduate certificate program, consult Professor Claire Farago, co-director, Committee on Medieval and Early Modern Studies, Department of Art and Art History, University of Colorado at Boulder, 318 UCB, Boulder, CO 80309-0318 or Professor Katherine Eggert, co-director, Committee on Medieval and Early Modern Studies, English Department, University of Colorado at Boulder, 226 UCB, Boulder, CO 80309-0226.

## Molecular, Cellular, and Developmental Biology

Degrees ..... BA, MA, PhD

The undergraduate degree in molecular, cellular, and developmental biology emphasizes knowledge and awareness of:

- the biological sciences in general and detailed understanding of currently important aspects of cellular biology, molecular biology, biochemistry, genetics, and developmental biology; and
- the relationship of the specialty area to broader areas of science and to society in general, including ethical issues raised by current biological research and by the rapid growth of biotechnology as an important shaping force for the future.

In addition, students completing the degree in molecular, cellular, and developmental biology are expected to acquire the ability and skills to:

- learn detailed laboratory procedures rapidly when the need arises;
- demonstrate a scientific vocabulary and an understanding of research methods that permits the comprehension of articles from current journals, extraction of pertinent information, and judgment of the quality of the work described;
- evaluate a biological problem, determine which aspects are understood, and apply basic research methods and techniques to the unknown aspects; and
- communicate scientific concepts and analytical arguments clearly and concisely, both orally and in writing.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
MCDB 1150 Introduction to Molecular Biology and 1151 Introduction to Molecular Biology Laboratory (Note 1) <i>or</i> MCDB 1111 Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life	4
MCDB 2150 Principles of Genetics and MCDB 2151 Principles of Genetics Laboratory	4
MCDB 3120 Cell Biology and MCDB 3140 Cell Biology Laboratory	5
MCDB 3500 Molecular Biology	3
MCDB 4620 Vertebrate Developmental Biology and MCDB 4630 Vertebrate Developmental Biology Lab <i>or</i> MCDB 4650 Developmental Biology and MCDB 4660 Developmental Biology Laboratory	5
Upper-division electives in MCDB. Must include at least two lecture courses. MCDB 3330, 3351, and 4400 may not be used. One non-MCDB course from the following list may be counted as an MCDB elective: CHEM 4731 or 4761; EBIO 4390 (formerly 3090 and 4190), 3400, 3420, 3430, 3700, or 3720, or KAPH 4720; and PSYC 4052 or 4072.	9
CHEM 1111 and 1131 General Chemistry 1 and 2 <i>or</i> CHEM 1151 and 1171 Honors General Chemistry 1 and 2	10-12
CHEM 3311 and 3331 Organic Chemistry 1 and 2 and CHEM 3321 and 3341 Laboratory in Organic Chemistry 1 and 2 <i>or</i> CHEM 3351 and 3371 Organic Chemistry 1 and 2 for Chemistry Majors and CHEM 3361 and 3381 Laboratory in Organic Chemistry 1 and 2 for Chemistry Majors	10-12
CHEM 4711 General Biochemistry 1	3
PHYS 1110 and 1120 General Physics 1 and 2 and PHYS 1140 Experimental Physics <i>or</i> PHYS 2010 and 2020 General Physics 1 and 2, <i>or</i> PHYS 1110 and PHYS 2020	9-10
MATH 1300 Analytic Geometry and Calculus 1 (Note 2)	5

It is strongly recommended that MCDB majors consult with a departmental advisor before applying AP or CLEP credit. Students majoring in MCDB who transfer biology credit from other institutions also must consult a departmental advisor.

### Curriculum Notes

1. EBIO 1210 and 1230 are acceptable alternatives.
2. APPM 1350 or MATH 1310 are acceptable alternatives.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in molecular, cellular, and developmental biology, students should meet the following requirements:

The MCDB major must be started in the first semester for a student to be eligible for guaranteed four-year graduation. Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Adequate progress is defined as cumulative completion of at least one-fourth of the required course work for the major during each academic year, including the following specific requirements:

Either general chemistry or the introductory MCDB sequence must be completed during the first year.

General chemistry and the introductory MCDB sequence must both be completed by the end of the second year.

Organic chemistry and the second-level sequence in MCDB (cell biology and molecular biology) must be completed by the end of the third year.

### Animal Use Policy

Biology is the science of life, and a major in it must include some hands-on experience with living organisms to be complete. Exercises involving the use of living animals or animal tissues are included, therefore, in MCDB laboratory courses. Majors with objections on moral grounds may arrange to limit their participation in these exercises, although their educational experience is compromised by doing so.

Nonmajors may take MCD biology lecture courses without the accompanying laboratories. Laboratory courses in which living vertebrate animals or tissues are used are identified both in the course description section of this catalog and in the *Registration Handbook and Schedule of Courses*. For additional information, please contact the department.

### Graduate Degree Programs

Opportunities for graduate study and original research, leading to the PhD degree, are available in a variety of areas.

**Molecular Biology.** Includes gene regulation, virology, nucleic acid-protein interactions, chromosome structure and function, chromosome replication, microbial diversity, human genome structure, RNA structure, and catalysis.

**Cell Biology.** Includes cytoskeleton, biophysical cytology, vacuole assembly, analysis of yeast spindle pole bodies and vertebrate centrosomes, synthesis and secretion of glycoproteins and polysaccharides, defense responses in plants, and 3-D high resolution reconstruction, biogenesis of mitochondria and chloroplasts, energy metabolism, assembly of membrane protein complexes, cell cycle regulation and checkpoints, and signal transduction.

**Developmental Biology.** Covers mechanisms and regulation of morphogenesis and cell growth, genetic control of development, molecular genetics of embryogenesis, sex determination, ras proteins and vulval development, and programmed cell death in nematodes, molecular genetics of *Drosophila* neurobiology, developmental genetics of *Drosophila* and *Caenorhabditis*, neural development in mice, transgenic mice, and muscle development and function.

**Genetics.** Includes genetics of human disease, complex traits, mouse development, and invertebrate development.

**Entrance Requirements and Prerequisites.** The graduate program of the Department of Molecular, Cellular, and Developmental Biology is sufficiently flexible to accommodate students with a wide

range of training. Students with bachelor's degrees in any of the biological, biochemical, or physical sciences are encouraged to apply. Background necessary for the program includes the equivalent of undergraduate courses in cell biology, developmental biology, genetics, organic chemistry, biochemistry, chemical thermodynamics, differential and integral calculus, and general physics. Students accepted with deficiencies may demonstrate mastery of the required areas by taking appropriate undergraduate courses, by passing advanced-standing examinations, or by successfully completing graduate-level courses that require the undergraduate courses as prerequisites. Students admitted generally have independent research experience.

**Areas of Study.** All students are expected to develop competence in five areas: biochemistry, genetics, cell structure and function, developmental systems and mechanisms, and current research techniques of experimental biology. Students also are expected to develop their abilities as independent investigators who identify important questions in biology and design experiments to address those questions.

### Doctoral Program

**Course of Study.** The faculty of the department offers a variety of courses to help graduate students acquire knowledge in the various areas of study. Further, students are required to work in at least three different laboratories to broaden their education and to help them identify the field of greatest interest for their thesis work.

**Examination Sequence.** At the time of entrance an advisory committee examines each student background and interests and recommends any necessary remedial work.

A preliminary evaluation is made at the end of the first year based on a series of examinations that are conducted throughout the year to determine eligibility for continued graduate study and to identify areas of weakness.

The comprehensive examination, which is normally scheduled during the second year, consists of two parts: a written research proposal and an oral examination designed to test the student ability to defend the proposal, the breadth and depth of knowledge in the field of concentration, and the ability to communicate information and engage in scientific discussion.

**Language.** The department does not have a language requirement.

**Thesis.** The principal elements in graduate training are defining a thesis problem, investigating this problem with a coherent piece of research that constitutes a substantial contribution to knowledge, and writing a report on this work in the form of peer-reviewed journal articles and a thesis submitted to a departmental committee for approval. After completion of the thesis, each candidate for the PhD degree is required to take a final oral examination on the thesis and related topics, and to present a public seminar.

**Teaching.** Generally, each candidate for the PhD degree does two semesters of apprentice teaching. This obligation is usually met during the student's first year of graduate study.

**Course Requirements.** A minimum of 30 credit hours of courses numbered 5000 and above, plus 30 hours of doctoral thesis, are required. Specific courses depend on the student background and field of specialization.

**Master's Program.** In view of the strong research orientation of the fields involved, the department does not accept applications from students seeking the MA as a terminal degree. The master's of arts degree, either with a thesis (Plan I) or without (Plan II), is awarded under special circumstances. Candidates must pass the preliminary examination and a comprehensive final examination. For Plan I a thesis based on original research must be submitted. Final determination of whether a student follows Plan I or Plan II is made by the department.

## Museum and Field Studies

*Degree* ..... MS

Museum courses listed in this catalog may be taken with the approval of the student major department and the course instructor, although no undergraduate major is offered in museum studies. A certificate in Museum and Field Studies is offered to graduate students in other disciplines.

Graduate training in anthropology, art history, history, botany, entomology, paleontology, and zoology is provided under the direction of museum faculty in cooperation with cognate departments and the museum and field studies program. Areas of study include, but are not limited to:

- anthropological interpretation
- southwestern archaeology and ethnology
- plant taxonomy, evolution, and phytogeography
- vertebrate paleontology and Cenozoic stratigraphy
- biology of aquatic invertebrates
- systematics and population biology of insects of the Rocky Mountain Region
- plant and insect interaction

Museum assistantships, research support from the Collier Walker Van Riper and William Henry Burt museum funds, and other financial assistance are available to selected students. Students interested in working toward advanced degrees under the direction of museum faculty should write the University of Colorado Museum, Museum and Field Studies, University of Colorado at Boulder, 265 UCB, Boulder, CO 80309-0265, e-mail [mfinfo@colorado.edu](mailto:mfinfo@colorado.edu), or visit [cumuseum.colorado.edu/MFS](http://cumuseum.colorado.edu/MFS).

### Graduate Degree Program

The University Museum offers a program leading to the degree of Master of Science, Museum and Field Studies. Please see Interdisciplinary Programs in the Graduate School section.

Applicants accepted for graduate work by museum faculty must be admitted to the Graduate School.

Courses offered by museum faculty through cooperating departments are listed below.

<i>Offered Courses</i>	<i>Semester Hours</i>
ANTH 4840 Independent Study .....	1-3
ANTH 5840 Guided Study .....	1-3
ANTH 6950 Master's Thesis .....	1-6
ANTH 7840 Independent Research .....	1-3
EBIO 4840 or 4870 Independent Study/Independent Research .....	1-6
EBIO 6950 Master's Thesis .....	1-6
GEOL 4470 or 5470 Paleontology of the Lower Vertebrates .....	4
GEOL 5610 Mammalian Micropaleontology .....	2
GEOL 5700 through 5790 Geological Topics Seminar .....	1-3
GEOL 6950 Master's Thesis .....	1-6

## Neuroscience

The neurosciences certificate program encourages undergraduate students interested in how the brain controls behavior to take courses in the basic sciences while providing the means to specialize in neuroscience. Since this subdiscipline of the biological sciences spans a number of departments at the university (e.g., integrative physiology, psychology, and MCD biology), students are encouraged to obtain greater academic breadth through interdepartmental course selection.

To obtain the certificate, a student must satisfy the requirements of a major and the certificate program, and maintain a grade point average of 3.20 or better.

For more information, see [www.colorado.edu/neuroscience-program](http://www.colorado.edu/neuroscience-program).

**Peace and Conflict Studies**

Peace and Conflict Studies is an interdisciplinary field that students can approach from any discipline.

The certificate program in Peace and Conflict Studies (PACS) is designed for students who have an intellectual or moral commitment to issues of conflict and peace at any level, from intrapersonal to global, with varying emphases on action and theory. The certificate is issued by the dean of Arts and Sciences, and is awarded in addition to a bachelor’s degree in another field.

The program is not a replacement for the core curriculum or the departmental major, but a way of enhancing students’ interdisciplinary education. Students work with PACS faculty advisors to design individual certificate programs.

The certificate program involves 24 hours of credit, including two courses specific to and offered by the Peace and Conflict Studies Program. Students select 9 credit hours from relevant courses in their major, together with 9 credit hours of relevant courses outside the major.

Students from any major in the university, not just arts and sciences, are eligible for the program. The two required courses for the certificate are PACS 2500 Introduction to Peace and Conflict Studies and PACS 4500 Senior Seminar in Peace and Conflict Studies. Some of the topics covered in the required courses are: conflict resolution, nonviolence, human rights, ethnonationalism and current conflicts, ecological security, and imaging sustainable futures.

Contact Dr. Dylan Clark at [dylan.clark@colorado.edu](mailto:dylan.clark@colorado.edu) and see [www.colorado.edu/peacestudies](http://www.colorado.edu/peacestudies) for more information about the program and participating faculty.

**Philosophy**

*Degrees.....BA, MA, PhD*

The undergraduate degree in philosophy emphasizes knowledge and awareness of:

- some of the principal philosophical texts in the history of western philosophy, from its beginnings in Greece to the late 19th century;
  - some of the main currents in 20th century philosophy, including some acquaintance with contemporary philosophical issues and modes of inquiry;
  - a single major author or a single philosophical movement; and
  - elementary formal logic.
- In addition, students completing the degree in philosophy are expected to acquire the ability and skills to:
- form reasoned opinions about the issues—moral, religious, political, etc.—that educated people debate;
  - understand, analyze, and evaluate complex arguments and theories;
  - distinguish between the main thrust of an argument or position and what is ancillary to it;
  - discover and critically examine the underlying presuppositions of major systems of ideas or programs for action;
  - see important connections between different systems of ideas or programs for action;
  - explain difficult ideas and concepts in an informed, effective, and coherent manner;
  - develop a thesis and present a coherent argument for it;
  - write a clear and coherent essay; and
  - engage in rational and productive discussion of issues and arguments.

**Bachelor’s Degree Program**

For the undergraduate degree in philosophy, students must take 33 to 45 credit hours in philosophy, earning 33 hours with a grade of C- or better in philosophy and 2.00 (C) average for all work attempted in philosophy. Also, students must take 18 hours of upper-division work in philosophy with a grade of C- or better. No more than 8 credit hours of independent study may count toward the minimum requirements. All students must complete a minimum of 12 credit hours of upper-division course work for the major on the CU-Boulder campus.

Students are advised to consult the current *Registration Handbook and Schedule of Courses* for the most accurate information on prerequisites, since these sometimes vary with instructors.

Courses may be taken in any order providing prerequisites, if any, are met. However, the department strongly recommends completion of PHIL 2440, PHIL 3000, PHIL 3010, and PHIL 3480 in the first year of the major program.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>History</b> (three courses) .....	9
PHIL 3000 History of Ancient Philosophy, Ancient and Medieval	
PHIL 3010 History of Modern Philosophy, Modern	
One course of the following:	
PHIL 4010 Single Philosopher	
PHIL 4020 Topics in the History of Philosophy	
PHIL4030 Medieval Philosophy	
PHIL4040 20th Century Philosophy	
PHIL 4070 Existentialist Philosophy	
PHIL 4080 Introduction to Phenomenology	
PHIL 4090 Philosophy of Kierkegaard	
PHIL 4250 Marxism	
<b>Logic</b> (one of the following courses) .....	3
PHIL 2440 Symbolic Logic	
PHIL 4440 Mathematical Logic	
<b>Philosophical Writing</b> (one course)	
PHIL 3480 Critical Thinking and Writing in Philosophy (prereq. or coreq., PHIL 2440 Symbolic Logic) .....	3
<b>Values</b>	
1. The following required course .....	3
PHIL 3100 Ethical Theory (prereq. or coreq., PHIL 3480 Critical Thinking and Writing in Philosophy)	
2. One of the following additional courses .....	3
PHIL 2140 Environmental Justice	
PHIL 2200 Major Social Theories	
PHIL 3110 Feminist Practical Ethics	
PHIL 3140 Environmental Ethics	
PHIL 3160 Bioethics	
PHIL 3190 War and Morality	
PHIL 3200 Social and Political Philosophy	
PHIL 3260 Philosophy and the International Order	
PHIL 4110 Contemporary Moral Theory	
PHIL 4200 Contemporary Political Philosophy	
PHIL 4250 Marxism	
<b>Metaphysics and Epistemology</b> (two courses)	
1. The following required course .....	3
PHIL 3340 Epistemology (prereq. or coreq. PHIL 3480 Critical Thinking)	
2. One of the following additional courses .....	3
PHIL 3600 Philosophy of Religion	
PHIL 4300 Philosophy of Mind	
PHIL 4360 Metaphysics	
PHIL 4400 Philosophy of Science	
PHIL 4490 Philosophy of Language	
<b>Electives</b> (two courses) (includes all courses that are at the 2000 level or above, and are not taken to satisfy any of the above requirements) ...	6

*Note: The department offers topically oriented majors that are interdisciplinary in nature, including law and society, and values and social policy. These majors require two semesters in the history of philosophy, as well as a series of core courses that vary according to the topic. A student intending to complete a topical major in philosophy should see either the appropriate advisor in the area or the departmental undergraduate advisor as soon as possible.*

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in philosophy, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete an average of 6.7 credit hours of required philosophy courses in each of the next five semesters.

Meet with the undergraduate advisor at the time the major is declared.

Complete PHIL 2440, PHIL 3000, and PHIL 3010 by the end of the fifth semester of study.

### Minor Program

A minor is offered in philosophy. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Graduate Degree Programs

Applicants for admission to the Graduate School for work toward a master’s or doctoral degree with a major in philosophy are expected to have had 18 or more credit hours in undergraduate courses in the subject.

Through its MA and PhD programs, the department offers three areas of concentration in graduate study: ancient philosophy, contemporary metaphysics, and values and social policy.

Beyond the required course work and examinations for the PhD, a diversified faculty provides opportunity for a wide range of specialization in the dissertation project. The department makes available a limited number of teaching assistantships and assists with job placement. Descriptions of all degree programs are available from the Department of Philosophy.

Students wishing to pursue graduate work in philosophy should note requirements for advanced degrees in the Graduate School chapter of this catalog and should obtain a copy of the *Graduate Study in Philosophy* from the department.

Descriptions of all degree programs are available from the Department of Philosophy.

### Physics

*Degrees.....BA, MS, PhD*

The undergraduate degree in physics emphasizes knowledge and awareness of:

- the basic subfields of physics (classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics, and thermodynamics), as well as at least one specialty area of application (e.g., solid state physics or optics);
- the major principles of physics, their historical development, and the roles they play in the various subfields of physics;
- the interrelations between theory and observation, the role of systematic and random experimental errors, and methods used to analyze experimental uncertainty and compare experiment with theory;
- physical phenomena and experience in the use of basic experimental apparatus and measuring instruments;

- mathematics sufficient to facilitate the acquisition and application of physical principles; and
- the importance of physics in other fields such as chemistry, biology, engineering, medicine, and in society at large.

In addition, students completing the degree in physics are expected to acquire the ability and skills to:

- apply physical principles to new situations;
- construct and assemble experimental apparatus, conduct and analyze measurements of physical phenomena, analyze properly experimental uncertainty, and make meaningful comparisons between experiment and theory; and
- communicate results of scientific inquiries verbally and in writing.

### Bachelor’s Degree Programs

Three different plans are available to students in physics. Because there is some flexibility within each plan, the department encourages students to pursue their own interests in setting up their curriculum. The final responsibility for fulfilling the requirements for the degree rests with the student.

Students who have declared physics as a major are required to consult with the departmental advisor at least once per semester. Even if first-year students are only considering physics as a major, they are strongly encouraged to visit the departmental advisor and discuss the situation. Because most of the advanced physics courses have various prerequisites, failure to settle on an appropriate plan of study early in the college career can result in delay and complications later.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

#### Plan I

Primarily for those planning graduate work in physics, this plan includes 45 credit hours of physics courses.

<i>Required Courses</i>	<i>Semester Hours</i>
PHYS 1110 and 1120 General Physics 1 and 2	8
PHYS 1140 Experimental Physics 1	1
PHYS 2140 Methods of Theoretical Physics	3
PHYS 2150 Experimental Physics 2	1
PHYS 2170 Foundations of Modern Physics	3
PHYS 3210 Analytical Mechanics	3
PHYS 3220 Quantum Mechanics and Atomic Physics I	3
PHYS 3310 and 3320 Principles of Electricity and Magnetism 1 and 2	6
PHYS 3330 Junior Laboratory	2
PHYS 4230 Thermodynamics and Statistical Mechanics	3
PHYS 4410 Quantum Mechanics and Atomic Physics 2	3
Electives in physics (chosen from the departmental list)	minimum 9

In addition, the following nonphysics courses are required:

MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers	4
APPM 2360 Introduction to Differential Equations with Linear Algebra, or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations	4-6
CHEM 1111 and 1131 General Chemistry 1 and 2 or CHEM 1151 and 1171 Honors General Chemistry 1 and 2	10-12

#### Plan II

For students desiring either an interdisciplinary or an applied physics program. The interdisciplinary program includes astrophysics, atmospheric physics, geophysics, or a combination of a physics major with work in another area such as applied math-

ematics, biophysics, chemical physics, environmental sciences, philosophy and history of science, or pre-medicine. The applied physics program includes biotechnology, optics, fluid dynamics, or electronic devices. For the interdisciplinary program, 33 hours of physics courses, plus 3 hours of physics electives, plus 12 hours of interdisciplinary courses are required. For the applied physics program, 33 hours of physics courses plus 15 hours of applied physics courses are required.

<i>Required Courses</i>	<i>Semester Hours</i>
PHYS 1110 and 1120 General Physics 1 and 2	8
PHYS 1140 Experimental Physics 1	1
PHYS 2140 Methods of Theoretical Physics	3
PHYS 2150 Experimental Physics 2	1
PHYS 2170 Foundations of Modern Physics	3
PHYS 3210 Analytical Mechanics	3
PHYS 3220 Quantum Mechanics and Atomic Physics 1	3
PHYS 3310 and 3320 Principles of Electricity and Magnetism 1 and 2	6
PHYS 3330 Junior Laboratory	2
PHYS 4230 Thermodynamics and Statistical Mechanics	3
Electives in physics (chosen from the departmental list)	minimum 3
In addition, the following nonphysics courses are required:	
MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers	4
APPM 2360 Introduction to Differential Equations with Linear Algebra, or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations	4-6
CHEM 1111 and 1131 General Chemistry 1 and 2 or CHEM 1151 and 1171 Honors General Chemistry 1 and 2	10-12

Courses in the interdisciplinary or applied physics subjects may not be double counted with the required 33 hours of physics courses. Interdisciplinary or applied physics courses must be approved by the physics department, either by the pre-approved existing list of courses in each discipline or by a physics department mentor on a course-by-course basis. It is therefore imperative that students in Plan II be in close contact with the physics department advisor.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in physics plans 1 and 2, students should meet the following requirements:

- Declare a major in physics in the first semester of the freshman year.
- Complete PHYS 1110, 1120, 1140, MATH 1300 or APPM 1350, and MATH 2300 or APPM 1360 during the freshman year.
- Complete PHYS 2140, 2150, 2170, CHEM 1111 or 1151, CHEM 1131 or 1171, MATH 2400 or APPM 2350, and APPM 2360 during the sophomore year. Either MATH 3130 or 4430 can substitute for APPM 2360.
- Complete PHYS 3210, 3220, 3310, 3320 and 3330 during the junior year.
- Students must meet with the physics advisor before the beginning of the junior year and get the fifth-semester approval for completion plan (FSACP). In addition to completing PHYS 4230 and 4410, plan I students must get approval to complete 9 credit hours in physics electives, with a research participation component. In addition to completing PHYS 4230, interdisciplinary Plan II students must complete 3 credit hours of physics electives and 12 credit hours of interdisciplinary courses. Applied physics students must complete 15 credit hours of applied physics courses.

*Note: Early in the first semester of the senior year, the student must meet with the physics advisor to have the statement of major status (a part of the graduation package provided by the College of Arts and Sciences) filled in. This includes a plan for completing the requirements of the major during the senior year and must be signed by the student and the advisor. Further details concerning the execution of the guarantee can be obtained from the department.*

### Plan III

For students intending to become elementary/secondary school teachers, this plan involves a minimum of 28–31 credit hours of physics and a minimum of 35 hours in education courses. An education student advisor, who should be consulted for updated requirements, is available by appointment at **303-492-2559**.

<i>Required Courses</i>	<i>Semester Hours</i>
PHYS 1110 and 1120 General Physics 1 and 2	8
PHYS 1140 Experimental Physics 1	1
PHYS 1150 Experimental Physics 2	1
PHYS 2130 General Physics 3	3
PHYS 2140 Methods of Theoretical Physics	3
PHYS 2150 Experimental Physics	1
PHYS 3210 Analytical Mechanics	3
PHYS 3310 Principles of Electricity and Magnetism 1	3
PHYS 3330 Junior Laboratory	2
PHYS 4450 History and Philosophy of Physics	3
ASTR 1030 Accelerated Introduction to Astronomy 1	4
An additional required course for teaching in secondary schools: PHYS 3220 Quantum Physics	3
In addition, the following nonphysics courses are required:	
CHEM 1011, 1031 Environmental Chemistry 1 and 2, or CHEM 1111 and 1131 General Chemistry 1 and 2, or CHEM 1151 and 1171 Honors General Chemistry 1 and 2	10-12
MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers	4
APPM 2360 Introduction to Differential Equations with Linear Algebra or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations	4-6

<i>Special Requirements</i>	<i>Semester Hours</i>
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### PLACE Basic Skills Assessment

Prior to or during the semester for which students are seeking admission to the Teacher Education Program, they must take the PLACE Basic Skills Assessment. A copy of the PLACE Registration Bulletin form is available in the Office of Teacher Education in Education 151. Students should read it carefully for specific information on the assessments and registration procedures. Students must successfully complete the Liberal Arts, Professional Knowledge, and Contents Fields portions of this examination.

### Liberal Arts

Humanities (i.e., from “Literature and the Arts” in the College of Arts and Sciences core curriculum)	6
Social sciences (i.e., from “Content Area Studies” in the College of Arts and Sciences core curriculum, except “Literature and the Arts” and “Natural Sciences”)	6

### Science

MATH 1300 Analytic Geometry and Calculus 1	5
Two courses (minimum of 3 semester hours) in each of biology, chemistry, earth science, and physics. The eight courses must include a course with attached laboratory work in three of the four subjects)	
EDUC 4312 The Nature of Science and Science Education	3
Science course work taken in the past five years	6

### Education

EDUC 3013 Proseminar 1: Becoming a Teacher	4
EDUC 3023 Proseminar 2: Schools, Culture, and Society	4
EDUC 4112-3 Educational Psychology and Adolescent Development (or PSYC 4205)	3
EDUC 4122-3 Principles and Methods of Secondary Education	3
EDUC 4232 Language and Literacy Across the Curriculum	3
EDUC 4382 Methods and Materials in Secondary Science (EDUC 4122 is a prerequisite and EDUC 4312 is a prerequisite or corequisite)	4
EDUC 4513 Proseminar 3: Education and Practice	2
EDUC 4712 Student Teaching—Secondary (must be taken concurrently with EDUC 4513)	12

### Minor Program

A minor is offered in physics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Graduate Degree Programs

Graduate study and opportunities for basic research are offered in the areas of nuclear physics, theoretical physics, condensed matter physics, elementary particle physics, plasma physics, atomic and molecular physics, optical science and engineering, laser physics, gravitational physics, fundamental measurements, and liquid crystal science and technology.

Doctoral programs in chemical physics and geophysics are offered jointly with the Department of Chemistry and with the other departments that participate in the interdepartmental geophysics program. For information on these programs, see Interdepartmental Programs in the Graduate School section.

### Departmental Requirements

Students wishing to pursue graduate work in physics leading to candidacy for an advanced degree should carefully read the requirements for advanced degrees in the Graduate School section. Following are special departmental requirements.

### Master's Degree

**Prerequisites.** Entering graduate students must have a thorough undergraduate preparation in physics, equivalent to an undergraduate physics major at a recognized college or university. This preparation includes courses in general physics, analytical mechanics, electricity and magnetism, thermodynamics, quantum mechanics, atomic physics, and mathematics through differential equations and complex variables.

**Language.** The department has no foreign language requirement.

**Course Requirements.** There are two separate plans for obtaining the master's degree. Plan I includes a thesis (4 credit hours), PHYS 5210 Theoretical Mechanics, 5250 Introduction to Quantum Mechanics 1, and 7310 and 7320 Electromagnetic Theory along with electives (5 credit hours) and mathematics (3 credit hours). The minimum requirement for the master's degree is 30 credit hours. At least 24 hours must be completed at the 5000 level or above. This may include 4–6 thesis hours.

Plan II (without thesis) includes PHYS 5210, 5250, 7310, 7320, and 5260 Introduction to Quantum Mechanics 2 or 7550 Atomic and Molecular Spectra along with mathematics (6 credit hours) and electives (6 credit hours).

All courses must be graduate courses numbered 5000 or above. A maximum of 6 credit hours may be completed at the 3000 or 4000 level as approved by the physics graduate committee for plans I and II.

**Qualifying Examination.** The Graduate Record Examination aptitude tests and advanced test in physics are normally used in place of a qualifying examination, and this examination is normally taken before the time of entry into the Graduate School.

**Comprehensive-Final Examination.** The physics department no longer offers a written qualifying exam. In spring of 2001, the faculty unanimously voted to replace the written exam with required course work. The associate chair may waive courses for students with graduate level equivalents. In addition to abolishing the written exam, the faculty modified the oral exam to better test skills used in professional research. The new examination includes a formal research paper and a formal presentation, followed by a question and answer session. Students usually present a thesis prospectus the semester following the exam.

### Doctoral Degree

**Prerequisites.** Same as for master's degree, above.

**Languages.** The department has no requirement in foreign languages.

**Qualifying Examination.** Same as for master's degree, above.

**Comprehensive Examination.** The comprehensive examination is divided into three parts. Part I consists of the six required courses outlined in the next section. Part II consists of a formal paper summarizing a broad research topic, an oral presentation on the research paper, and an oral exam on the topic and general physics. Part III consists of a thesis prospectus presented to the thesis committee.

Part I of the comprehensive examination must be taken within one year of successful completion of the six required courses described in the next section. Part III will take place early in the semester following Part II. Students with prior graduate education must take Part II in the spring semester following the first semester of course work in this department. Parts II and III of the comprehensive examination may be taken a second time, no more than one year after the first attempt. Students with insufficient preparation may petition for a one-year extension.

**Course Requirements.** To earn a PhD, candidates must complete 30 credit hours of course work and 30 hours of dissertation credit. As part of the course work, the following six courses are required: Theoretical Mechanics (PHYS 5210), Statistical Mechanics (PHYS 7230), Quantum Mechanics I and II (PHYS 5250 and 5260), and Electromagnetic Theory I and II (PHYS 7310 and 7320). In addition to satisfying the Comprehensive Examination requirements, candidates must complete these courses with a grade of B- or better in each in order to advance to candidacy. For a PhD, students with strong undergraduate preparation or previous graduate level work may petition to waive required courses.

At least 27 of the 30 credit hours of course work must be 5000-level or above physics courses, and the six required courses total 18 hours. All courses, required or otherwise, must be passed with a grade of B- or better, and a course may be repeated only once.

**Final Examination.** The final examination is oral and covers the thesis.

### Political Science

*Degrees.....BA, MA, PhD*

The Department of Political Science offers instruction and research in the art and science of politics. Work within the department is organized around seven basic fields: American government and politics, comparative politics, international relations, public policy, law and politics, political philosophy, and empirical theory and methodology. In addition to excellence in the traditional fields, the department is committed to a cross-field emphasis on globalization and democratic governance.

The department participates in the distributed studies program. Programs leading to the MA and PhD degree are offered.

At the most general level, the goal of the undergraduate curriculum in political science at the University of Colorado at Boulder is to offer students the opportunity to develop an appreciation of politics and government and of the students' roles within them.

The undergraduate degree in political science emphasizes knowledge and understanding of:

- the values and beliefs that constitute the Western political tradition, and alternative ideologies and belief systems;
- the institutions and processes of the American political system and its strengths and weaknesses as we enter the 21st century;



- other political systems, both Western and non-Western, which are members of the world community, our allies and competitors in international relations, and through comparative analysis a source of insight into American society and politics;

- the patterns of interaction among members of the world community, the causes of war and peace, and the sources of international conflict and cooperation; and

- the domestic and international policy issues facing the United States and the world community, and the ability to make reasoned judgments—integrating facts and values, means and ends—regarding policies to address those problems.

In addition, students completing the degree in political science are expected to acquire the ability and skills to:

- evaluate conflicting arguments, assemble and present empirical evidence, and make reasoned conclusions from the evidence available; and

- communicate effectively, both orally and in written form.

Students interested in political science may want to consider the Smith Hall International Program. See Residential Academic Programs in this section for more information.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
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Students in the regular political science major must complete 36 credit hours in the department, of which 21 hours must be in upper-division courses. All 36 hours must be completed with grades of C- or better and an overall grade point average of 2.00. None of the required hours may be taken *pass/fail*.

Twelve hours are required from the following lower-division fields:

**American**  
PSCI 1101 The American Political System .....3

**Comparative**  
PSCI 2012 Introduction to Comparative Politics .....3

**International**  
PSCI 2223 Introduction to International Relations .....3

**Theory**  
PSCI 2004 Survey of Western Political Thought .....3

Complete 15 hours of the required 21 upper-division hours from the following four primary fields:

American .....6

Comparative .....3

International .....3

Theory .....3

Nine hours of political science elective credit are required. Six of these hours must be upper division. Only 3 credit hours from PSCI 4938 Internship in Government can be used to fulfill the 6 credit hours required for upper-division course work in American politics.

Required courses in addition to political science courses:

ECON 2010 Principles of Microeconomics .....4

ECON 2020 Principles of Macroeconomics .....4

All undergraduate transfer students majoring in political science must accumulate a minimum of 42 grade points (grade points are equal to credit hours multiplied by letter grade as expressed numerically on a four-point scale) in upper-division political science courses at the University of Colorado at Boulder in order to qualify for the BA degree.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain

adequate progress in political science, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete PSCI 1101 and two of the following required courses by the end of the third semester: PSCI 2012, 2223, or 2004.

Complete the remaining lower-division political science course and the two ancillary courses, ECON 2010 and 2020, by the end of the fourth semester. Complete 12 upper-division credit hours of political science courses, including at least one course in three of the following fields by the end of the sixth semester: American, Comparative, International Relations, and Theory.

Complete 12 credit hours of political science courses, including at least 9 upper-division credit hours and all remaining upper-division field distribution requirements during the seventh and eighth semesters.

Students seeking to combine a political science major with a social science certification in education should consult an undergraduate advisor in political science.

### Minor Program

A minor is offered in political science. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

## Graduate Degree Programs

Applications for the MA and PhD degrees are accepted from qualified and motivated students wishing to probe deeply into the analysis of political life. Professional courses in the graduate curriculum range from problem definition in policy analysis to the study of the global political economy. The curriculum is structured to lead to the PhD degree and also offers several programs culminating in the MA degree. In addition to the regular master's degree in political science, special focus is placed on three professionally oriented MA degrees: one oriented toward entry into the public sector as a policy analyst; and one that prepares students for careers in global affairs.

Students wishing to pursue graduate work toward one of these degrees should read carefully the Graduate School requirements for admission and degrees in this catalog. In addition they should write to the departmental office for additional information on graduate programs.

### Departmental Admission Requirements

Applicants to the graduate program in political science should normally present evidence of at least 18 credit hours of course work in political science or in related fields, 9 of which should be at the upper-division level. In addition, the department requires applicants to present quantitative and verbal GRE scores that total at least 1100 and that show a score of at least 500 on the verbal section. Three letters of recommendation, an undergraduate grade point average of at least 3.00, official transcripts, and a short essay detailing interests and plans also are required to complete the application packet. Foreign applicants must supplement their application by presenting TOEFL scores or other proof of English proficiency. Applications should be filed with the department by January 15. Decisions regarding admission and financial aid are typically completed during March each year.

### Master of Arts in Political Science

Students shall concentrate in any one of seven political science fields and take 3 credit hours of work in regularly scheduled political science seminars in each of three areas defined as follows: American politics, public policy, law and politics, international politics, comparative politics, political philosophy, and empirical theory and methodology.

Students are responsible for familiarizing themselves with all degree requirements, some of which are outlined in the Graduate School section of this catalog. In brief, the degree requirements include a minimum of 31 credit hours of graduate credit, including at least 24 credit hours at the 5000 level or above (at least 15 credit hours of work must be in regularly scheduled political science seminars), and 4 credit hours for the MA thesis. Students may take up to 6 hours in political science graduate research topics, and up to 6 hours in a cognate discipline (senior undergraduate course, or independent study), but not more than a total of 9 hours combined. The 9 credit hours may not be substituted for required seminars. MA students on assistantship are required to take PSCI 5008 Teaching Political Science.

A thesis based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, is required.

Students select a faculty advisor from among the regular members of the department graduate faculty at the earliest possible date, but no later than the end of the second week of the second semester of residence. The faculty advisor must have general competence in the student primary field of emphasis and serves as the first reader of the MA thesis. The second reader, who likewise has general competence in the topic of the MA thesis, must be associated intimately with the thesis from its inception and in no case after the student begins writing. The completed draft of the thesis must be in the hands of the second and third readers at least four weeks prior to the comprehensive-final examination.

Each candidate for a master's degree is required to take a comprehensive-final examination *after* the other requirements for the degree have been completed. This examination may be given near the end of the last semester of residence while the candidate is still taking required courses for the degree, provided satisfactory progress is being made in those courses. The examination is oral and lasts approximately two hours. It concentrates on the student field of emphasis as well as the MA thesis. The comprehensive-final examination committee has three members, including the faculty advisor (the chair) and the second reader of the thesis. At least two committee members must be chosen from among regular members of the graduate faculty of this department, in consultation with the faculty advisor; the third committee member may be a graduate faculty representative from a cognate discipline. Satisfaction of the examination requires the affirmative vote of each of the three committee members.

### *Master of Arts in Political Science (International Affairs)*

The increased participation of the United States in world politics has opened a variety of new careers in international affairs. The master's program in international affairs of the Department of Political Science is designed to provide a well-rounded education in international affairs for students who are seeking careers of international service with the national government, with international organizations, with private business, with nongovernmental organizations, or in the fields of teaching and research. This MA program is also a logical step toward obtaining a PhD in political science at the University of Colorado or elsewhere.

Degree requirements include a minimum of 31 credit hours of graduate credit, 24 of which must be at the 5000 level or above. Of the required 31 credit hours, students desiring an MA in political science (international affairs) must include, in addition to the required seminars, 12 credit hours of work in the international area and 9 of the 12 credit hours must be in the field of international relations. It is advisable for the student to include the international relations core seminar in the 9 hours in the field of international relations. If a student plan of study so

indicates, and permission is granted by the student faculty advisor and the department chair, the student may substitute up to 6 hours of credit from another department for the 3 hours in each of the other two areas of study.

Each student in this program must pass a GSFLT proficiency test in a foreign language approved by the student advisors and/or present evidence of an advanced proficiency in social statistics or computer science. The latter proficiency may be achieved by obtaining a *B* or better in a sequence of courses to be identified by the student's advisory committee. A list of the course sequences that have been approved to meet this requirement is available in the departmental office. In exceptional cases, the graduate curriculum committee may accept other evidence that the student has acquired a good working knowledge of a foreign language or the advanced proficiency in social statistics or computer science.

### *Master of Arts in Political Science (Public Policy)*

The goal of the MA program in public policy is to train professional policy analysts for nonacademic careers. The curriculum is designed to provide the analytical skills necessary to participate responsibly and effectively in the policy process. The MA in political science (public policy) may be taken concurrently with the interdisciplinary graduate certificate program in environmental policy.

This is an MA with thesis, requiring 33 credit hours. It includes 27 hours of course work, 2 hours in an applied research internship, and 4 hours of thesis credit. Completion of these requirements normally takes two years and at least one summer.

The core curriculum consists of five required seminars in policy analysis, introduction to data analysis, and context-sensitive methods. Specific courses in economics are not required, but there is a strong expectation that all students should be familiar with the tools of economic analysis, particularly in the policy area in which they are interested. The remaining 12 hours of electives should be used to develop additional analytical skills and/or a specialization in the student's area of substantive interest. The certificate program in environmental policy provides one alternative for substantive specialization, drawing on courses in economics, philosophy, geography, and the law school. The internship is a supervised applied research project for a policy client, which should lead into the thesis project.

The thesis is a research report on a policy problem that provides concrete demonstration of the student analytical skills, intellectual perspective, and substantive knowledge. As a general rule, the policy thesis is somewhat shorter (but not less analytical) than a standard MA thesis.

### *Doctor of Philosophy*

For the PhD, the Department of Political Science requires at least 42 hours of course work (with a grade of *A* or *B*) beyond the bachelor's degree. Except for 3 credit hours that may be taken at the senior undergraduate level in a cognate field at this university, all 42 hours must be at the 5000 level or above. Not to be included in the 42 hours are dissertation and research hours, master's thesis hours, or those hours used to fulfill the language requirements.

The PhD candidate must present three fields of competence. The first two, labeled the major field and second field, are to be the subject of the PhD comprehensive examination. A minimum of three seminars must be presented in these fields. Additional course work is anticipated in the major and second fields. Competence in the third field may be demonstrated by completing two graduate seminars in that field with a GPA of 3.50 or higher, or through comprehensive examination. Each student shall select three course seminars from the following seven concentrations: American politics, public policy, law and politics,

international politics, comparative politics, political philosophy, and empirical theory and methodology.

Students taking comprehensive exams will have the option of offering a “thematic” cross-field topic for the second exam field for their written and oral comps, with the agreement of their advisor. To do so, students must still meet the three-course minimum for a second field from the seven designated fields before the last day of the semester prior to taking comps, submit to the director of graduate studies a written agreement with an advisor on a reading list appropriate for the cross-field examination and a list of names of political science faculty conversant with the topic who have also approved the reading list. Approval of the cross-field topic is at the discretion of the director of graduate studies; the minimum criteria includes bringing together two distinct fields of study. The director of graduate studies will select the committee for the written and oral exams in this cross-field exam, as for the other field exams.

Of the 42 required hours, 35 hours must be taken in political science. Of this 35, 32 must be in regularly scheduled seminars. Not more than 6 hours of political science graduate research topics combined are allowed toward the degree. The maximum amount of work that may be transferred to this university for the PhD is 21 semester hours.

**First-Year Requirements.** All graduate students in the PhD program are required to take PSCI 7008 and three core field seminars. At least two of the core seminars must be in the fields of American politics, comparative politics, and international relations. During the first year in residence, at least two core seminars must be completed. Also during the first year in residence, students enrolled in the PhD program must take PSCI 7075 (Introduction to Professional Political Science) and PSCI 7085 (Introductory Data Analysis).

**Qualifying PhD Research Paper.** Each PhD student is required to select a topic that leads to the formulation, execution, and written presentation of a piece of original research. This research paper is expected to be of potentially publishable quality.

The research paper is read by the student’s three-person advisory committee, in March of the student’s fourth semester, consisting of the student’s major advisor, a second major field reader, and a representative of the student’s second field of concentration. Following consideration of the written work, an oral examination is conducted by the advisory committee, in March of the student’s fourth semester, to test both the depth of the student research as well as the breadth of the student’s general training. Competence in core seminar materials is expected.

The oral examination committee is charged with the task of evaluating the potential of each PhD student. Students whose work is deemed inadequate are asked to leave the program.

Students who have not previously earned a master’s degree in political science are eligible for a plan II MA upon completion of 32 hours of graduate course work. The awarding of the Plan II MA is at the discretion of the examining committee. This decision is independent of the decision to encourage or discontinue the student in the PhD program.

**Advisory Committee.** The role of the advisory committee is crucial; its function is to guide students through their degree programs. Students select a chair for the committee no later than the end of the second semester in residence. If a student does not select a chair during the time specified, the departmental chair will designate such a chair for the purpose of administration and advising.

The advisory committee consists of three regular faculty members in residence who are members of the political science graduate faculty and who each represent one of the student fields of concentration. The second and third members of the advisory committee are selected by the student with the ap-

proval of the chair of the committee within two weeks after the selection of the advisory chair. The advisory committee meets with the student at least once during each academic year to review the student’s progress and to assist in planning the student’s future course of study.

**Research Competence.** Each PhD student must fulfill the research competence requirements as determined in conjunction with the advisory committee.

Methodological competence is demonstrated by completing PSCI 5095 or 7095 with a grade of *B* or better, and requires completion of at least two advanced methods courses *beyond* PSCI 5085 or 7085.

Language competence is evidenced by completion of a fourth-semester college-level language course of 3 or more credit hours with a grade of *B* or better, high GSFLT scores for the language, high scores on another standardized examination recognized by University of Colorado language departments, or other evidence of competence in the language. Advanced competence is demonstrated by completion of at least a fifth-semester language course or other work deemed appropriate by the advisory committee.

The competence requirement also may be met by demonstrating basic competence standards in both methodological and language skills (i.e., by completing PSCI 5095 or 7095 and fourth-semester foreign language skills).

Committees may set higher research competence standards for the student than those outlined above.

The competence standard must be communicated in writing to the Director of Graduate Studies by the end of the second year in residence. Both the principal advisor and the student must signify that they accept the committee determination of research competence standard. Required course work (or its surrogate) must be completed no later than the semester in which the PhD comprehensive examination is taken.

**Comprehensive Examination.** The comprehensive examination serves to demonstrate that students have acquired the skills and knowledge necessary to function as independent scholars in political science generally and in their chosen fields of specialization. Broad knowledge is expected as well as a critical understanding of the literature and the ability to apply that understanding to the central, enduring questions of politics and government.

The exam is divided into three parts: the written, the oral, and the dissertation prospectus defense. For the purposes of the examination, political science is divided into seven fields of concentration: American government, law and politics, public policy, comparative politics, international relations, political philosophy, and empirical theory and methodology. Both the written and the oral parts of the comprehensive exam cover two fields chosen by the student and provide a rigorous, comprehensive test of the student’s knowledge of the specialization field and of the relationships among these fields as well as their location in a broad context, spanning comparative, philosophical, historical, and methodological issues.

For students entering the PhD program after fall 2001, the exam will be administered in-house over a three-day period. Students will not have access to books, notes, and any kind of outside material during the examination.

Comprehensive examinations are administered once each semester. In the fall semester, the written examinations are normally given during the last week of September, and in the spring semester they are normally given during the first week of February. Oral examinations are scheduled individually, within three weeks of the completion of the written part of the examination.

The written examination is constructed by the graduate committee and the field examination committees. The written

examination in each field is comprised of two sections of questions. Questions in the first section emphasize breadth of knowledge and integration, while those in the second section focus more on the student's depth of knowledge on specific topics and issues in the field. The same exam format will be used for those taking a thematic cross-field exam for their second field.

A passing grade on the written part of the exam indicates that the student is prepared to proceed to the oral examination, which may hinge in part on the elaboration and exploration of the material in the written examination. Students who fail the written exams are provided a single opportunity to retake them, and are given an explanation of the failure by the readers.

The oral part of the comprehensive examination is conducted by a five-member committee, normally consisting of the student's advisory committee, the chair of which also chairs the examination committee, and the two-member examining committee from the student's major field. In addition to general questions in all chosen fields, the oral examinations probe the written examination answers, providing students the opportunity to amplify, elaborate, and explain their answers. Final grades in each field are assigned by the majority vote of the oral examination committee. A final grade of pass, or fail is assigned following the orals. Failing a field in the oral examination may, at the discretion of the examining committee, involve retaking both the written and the oral examinations at the next administration of the exam, regardless of whether the failure was announced following the written or the oral part of the examination. If a student fails the oral exam, the chair of the advisory committee provides a written explanation to the student.

**Dissertation Requirements and Final Examination.** A dissertation based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, is required. A candidate for the PhD selects a dissertation topic in consultation with a dissertation advisor who is rostered in the student's primary field of emphasis, a second reader who has general competence in the dissertation topic, and at least one additional faculty member rostered in the student's primary field of interest. The dissertation advisor submits the topic, along with the names of the second reader and other faculty consulted in its selection, to the director of graduate studies for approval. These steps must be completed at least eight months prior to the dissertation defense.

Once the dissertation has been accepted tentatively by the first two readers, a final oral examination is conducted by the dissertation committee. Approved by the dean of the Graduate School, the committee shall consist of not fewer than five representatives from those departments in which a student has worked, including at least one professor outside the political science department but who is a member of the University of Colorado graduate faculty.

The examination is open to the public. More than one dissenting vote from the committee disqualifies the candidate in the final examination.

## Psychology

*Degrees.....BA, MA, PhD*

Psychology is a biopsychosocial science that studies behavior from both biological and social perspectives. The major and elective requirements are designed to achieve a broad understanding of the contents, concepts, and research methods of contemporary psychology in the context of a quality liberal arts education. Note that no terminal master's degree is offered except for the concurrent BA/MA program in cognitive psychology.

Students contemplating postgraduate education, either in professional or in graduate school, are encouraged to participate in the departmental honors program, which provides special opportunities for individualized attention.

CU-Boulder Department of Psychology has been ranked by the National Academy of Sciences as one of the best in the country with respect to the quality of the faculty and their scholarly productivity. All of these faculty members are involved in undergraduate instruction. Moreover, the department offers undergraduates a wide range of opportunities for involvement in research.

The undergraduate degree in psychology emphasizes knowledge and awareness of:

- the social and biological background of human nature;
- the research bases necessary for understanding and predicting behavioral outcomes;
- descriptive and inferential statistics, including measures of central tendency, variance, and correlation;
- psychology as a laboratory science and of the interplay between theory and research;
- possible practical applications of research knowledge;
- the influences of interactions between attributes of the social situation and psychological attributes of a person in generating human behavior and subjective experience;
- the development and amelioration of abnormal thoughts, feelings, and behavior;
- the mechanics of heredity, neural transmission, plasticity, development, and aging;
- a reasonable integrated historical overview of modern psychology, including the major subdivisions of the discipline and their interrelations;
- major ideas and scholars in the discipline subfields and the relationship of ideas from one area to another; and
- the ethical issues germane to research investigation raised by the applications and practice of psychology as a profession.

In addition, students completing the degree in psychology are expected to acquire the ability and skills to:

- evaluate critically research designs, results, and interpretations;
- design and carry out research on their own;
- know when to use basic statistical tests, to formulate hypotheses, collect and analyze data, draw conclusions, and clearly communicate research findings;
- assess the characteristics of social situations and measure the psychological attributes of individuals;
- use the primary literature of biological and developmental psychology to prepare a clear written summary of a research topic; and
- place current psychological concerns into an appropriate overarching conceptual framework that encompasses the entire field.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. These requirements apply to all psychology majors who declare their major after May 16, 1998. Those majors who declared before that date have the option of completing their major under either the old rules or the new rules.

**Required Courses****Semester Hours**

In order to graduate with a degree in psychology, the department requires that students fulfill the following course requirements. Additional explanatory notes are available in the department advising office, Muenzinger D243.

The department recommends taking PSYC 1001, 2012, 2145, and 2606 during the initial year of the major program, and 3101 by the end of the sophomore year.

PSYC 1001 General Psychology	4
PSYC 2012 Biological Psychology	3
PSYC 2145 Cognition and Perception	3
PSYC 2606 Social Psychology	3
PSYC 3101 Statistics and Research Methods in Psychology	4

One of the following:

PSYC 3102 Behavioral Genetics	3
PSYC 3313 Psychopathology	4

At least one course from the following upper division laboratory and methods courses:

PSYC 4052 Behavioral Neuroscience, PSYC 4136 Human Judgment and Decision-Making Lab, PSYC 4145 Cognitive Psychology, 4155 Cognitive Neuroscience/Neuropsychology, PSYC 4165 Psychology of Perception, PSYC 4175 Computational Cognitive Neuroscience, PSYC 4205 Psychology of Learning, PSYC 4376 Research Methods in Social Psychology, or 4443 Research Methods in Clinical Psychology	4
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Additional electives to bring total hours in psychology to at least 31, but not more than 45, of which at least 18 must be upper division. (Students are encouraged to use independent study to gain field or laboratory experience. However, independent study hours are pass/fail credit only and cannot be used toward the 31 hours required for graduation.)

In addition to the course requirements listed above, and the minimum of 31 hours in psychology, the student is required to pass one of the following natural science sequences with a grade of C- or better:

CHEM 1011 and 1031 Environmental Chemistry 1 and 2
CHEM 1051 and 1071 Introduction to Chemistry and Introduction to Organic and Biochemistry
CHEM 1111 and 1071 General Chemistry 1 and Introduction to Organic and Biochemistry
CHEM 1111 and 1131 General Chemistry 1 and 2
EBIO 1210 and 1220 General Biology 1 and 2 (formerly EPOB 1210 and 1220)
MATH 1300 and 2300 Analytical Geometry and Calculus 1 and 2
MCDB 1150 and 2150 Introduction to MCD Biology 1 and Principles of Genetics
MCDB 1150 and EBIO 1220 Introduction to MCD Biology 1 and General Biology 2
PHYS 1110 and 1120 General Physics 1 and 2 (science and engineering majors only)
PHYS 2010 and 2020 General Physics 1 and 2

*Note: Transfer students must complete a minimum of 12 upper-division hours of psychology course work on the Boulder campus with a C- or better. Of those 12 hours, one laboratory and methods course and either PSYC 3102 or PSYC 3313 must be included.*

In order to graduate in psychology, all students are required to complete an assessment test.

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in psychology, students should meet the following requirements:

- Declare the major by the beginning of the second semester.
- Complete PSYC 1001, 2012, 2145, 2606, 3101, and the natural science sequence during the first two years of study.
- Complete PSYC 3313 or 3102, the laboratory and methods course, and at least two upper-division PSYC electives during the junior (3rd) year. (If students are unable to enroll in these courses due to oversubscription during the junior year, they will have top enrollment priority the senior year.)
- Complete remaining elective requirements during the senior year.

**Concurrent BA/MA Program with Specialization in Cognitive Psychology**

A concurrent BA/MA in psychology, with specialization in cognitive psychology, is offered. Both the BA and MA degree must be completed within a five-year period. In recent years, both basic and applied research in cognitive psychology have come to rely increasingly on related findings, theories, and methods in other cognitive science disciplines, including philosophy, computer science, and linguistics.

The purpose of this degree program is to provide training that prepares students either for continuing doctoral study in cognitive psychology or for technical careers involving cognitive psychology in government and industry. Students complete the requirements for an undergraduate major in psychology, an interdisciplinary undergraduate certificate in cognitive science, and a master's degree in the cognitive psychology graduate training program. Because of the demanding nature of this program, only highly qualified students are admitted.

**Graduate Degree Programs****PhD Programs**

Students are admitted for graduate studies leading to the PhD in one of five fields: behavioral genetics, behavioral neuroscience (including learning and motivation), clinical, cognitive, and social psychology. Note that no terminal master's degree program is offered. The behavioral genetics program focuses on the study of genetic contributions to individual differences in behavior. The fundamental tenet of the behavioral neuroscience program is that a complete understanding of behavior entails unraveling mechanisms and principles at any and all levels of organization (i.e., behavior, neuroanatomy, neurophysiology, neurochemistry). The major training goals of the clinical psychology program follow the Boulder model in that the preparation of scientist-practitioner is stressed. The cognitive psychology program includes course work and research in the following areas of cognition: problem solving, thinking, human learning and memory, judgment and decision making, language, artificial intelligence, reading, attention and performance, perception, and information processing. The program in social psychology trains students to conduct research, either applied or basic, in the fields of social cognition, self-concept development, close relationships, and health. Additional courses in the department offer graduate training in the knowledge, theory, and research methodology relating to cultural influences on behavior.

**Requirements for the PhD Degree**

All students are admitted with the expectation that they will work toward the PhD degree. Many students receive a master of arts degree in the course of working toward the PhD. Students who receive the PhD degree must demonstrate that they are proficient in some broad subject of learning and that they can critically evaluate work in this field; furthermore, they must show the ability to work independently in their chosen field and must make an original contribution of significance to the advancement of knowledge.

In the first year of graduate study, all psychology graduate students enroll in a two-semester graduate statistical sequence. There is a first-year research requirement that starts the student on an active program of research. The student also must enroll in a sequence of courses designed to give exposure to various research topics and methods.

Before admission to candidacy for the PhD degree, the student must pass a comprehensive examination in the field of concentration and related fields. This examination tests the student mastery of a broad field of knowledge, not merely the formal course work completed.

A variety of advanced research seminars are taught on a regular basis. Students are required to be enrolled in at least one substantive course in the department each semester until the comprehensive examinations have been successfully completed. Upon completing the comprehensives, students engage in the dissertation research, culminating in a public oral defense.

## Religious Studies

*Degrees* .....BA, MA

The curriculum in religious studies includes the study of traditions such as Buddhism, Hinduism, Taoism, Confucianism, Judaism, Islam, Christianity, and Native American and other traditional religions. The program examines topics such as ritual studies, peace studies, dance, religion and literature, women and religion, and religion and psychology.

The undergraduate degree in religious studies emphasizes knowledge and awareness of:

- the beliefs, practices, and institutions of Asian, Western, and Native American/traditional religious traditions;
- one major religious tradition in-depth; and
- different theoretical and methodological approaches to the study of religion.

In addition, students with a degree in religious studies are expected to acquire the ability and skills to:

- identify textual, performative, and artifactual data relevant to the study of religion;
- draw connections between different historical and/or cultural contexts of religion; and
- communicate data analysis and interpretation competently in written form.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Major Requirements

Students must complete at least 36 hours of religious studies courses, including at least three of the lower-division offerings (9 credit hours, preferably completed before upper-division work) and at least one course (at either the upper- or lower-division level) in each of the following four areas: western religions, Asian religions, Native American/ traditional religions, and thematic approaches to religion. At least 18 hours of upper-division work (including RLST 3830 and 4830) must be taken on the Boulder campus.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in religious studies, students should meet the following requirements:

Declare the major at the beginning of the second semester of study.  
Complete two religious studies courses each semester.  
Take the senior seminar the last spring semester in residence.

### Minor Program

A minor is offered in religious studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/Arts\\_Sciences/minors/minors.html](http://www.colorado.edu/Arts_Sciences/minors/minors.html).

## Graduation with Honors

The honors program in religious studies offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study than is provided by the regular BA curriculum and to earn an honors designation on their diploma. Religious studies majors with at least a 3.30 overall grade point average and 3.50 in the major are eligible to participate in the program. Honors that may be earned are cum laude (with honors), magna cum laude (with high honors), and summa cum laude (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental undergraduate advisor by the beginning of their junior year.

## Graduate Degree Program

### Master's Degree

**Admission Requirements.** A student who has not completed at least 12 credit hours (or the equivalent) of undergraduate academic course work directly related to the study of religion will be required to do remedial work to make up the deficit before beginning graduate study.

A student who has not completed at least 3 credit hours of undergraduate course work in western religion and 3 credit hours in Asian religion will be required to make up this deficit during the first year of graduate study by attaining a grade of *B* in course work at the 2000- or 3000-level. Remedial courses may not be counted toward the degree.

**Minimum Degree Requirements.** The minimum requirement for the master's degree is 30 credit hours. The student must successfully complete 30 semester hours of academic work, including at least 4, but no more than 6, hours of thesis research. Course work must include RLST 6830 and two core seminars in comparative religion (RLST 6850), and at least one course in three different traditions or culture areas (including Western and Asian). All courses taken within the department must be at the 5000 level or higher. A maximum of 3 credit hours at the 3000 or 4000 level may be taken outside the department, provided they are taught by a member of the graduate faculty. Up to 9 credit hours of course work may be taken outside the department or transferred from another institution, independent study hours shall not exceed 6 credit hours.

The student must have a satisfactory reading knowledge of a language other than English, which will be employed in a significant way during the student course of study.

An acceptable thesis must be written and, after approval of the final draft of the thesis, a comprehensive final examination must be passed. Students should consult the *Graduate Student Handbook* of the Department of Religious Studies for a comprehensive, detailed presentation.

## Sociology

*Degrees* .....BA, MA, PhD

The undergraduate degree in sociology emphasizes knowledge and awareness of:

- the basic data, concepts, theories, and modes of explanation appropriate to the understanding of human societies;
- the structure of modern American society, its social stratification, its ethnic, racial, religious, and gender differentiation, and its main social institutions—family, polity, economy, and religion;
- the basic social processes that maintain and alter social structure, especially the processes of integration, organization, and conflict; and

- the diversity of human societies, including the differences between major historical types such as foraging, agricultural, industrial, and post-industrial societies.

In addition, students completing the degree in sociology are expected to acquire the ability to:

- locate and consult works relevant to a sociological investigation and write a sociological paper that is coherent, cogent, and grammatically correct;
- understand the basic procedures of sociological research and analyze sociological data;
- understand and interpret the results of sociological research; and
- integrate and evaluate sociological writings.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. A minimum of 36 credit hours in sociology is required for the degree. Of the 36 semester hours, 21 must be upper division with a minimum of 15 upper-division credit hours of course work in the major taken on the Boulder campus. All required major courses must be completed with a grade of C- or better. The cumulative GPA required in sociology courses is 2.50.

<i>Required Courses</i>	<i>Semester Hours</i>
SOCY 1001 Analyzing Society .....	3
SOCY 2001 Introduction to Sociological Theory <i>or</i> SOCY 3001 Classical Theory <i>or</i> SOCY 3011 Contemporary Theory .....	3
SOCY 2061 Introduction to Social Statistics <i>or</i> SOCY 4061 Social Statistics .....	3
SOCY 3301 Survey Methods <i>or</i> SOCY 3401 Field Methods .....	3
Electives .....	24

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in sociology, students should meet the following requirements:

- Declare the major by the beginning of the second semester.
- Complete SOCY 1001; 2001 or 3001 or 3011; and 6 credit hours of sociology electives by the end of the fourth semester.
- Complete SOCY 2061 or 4061 and either 3301 or 3401 and 15 credit hours, with a minimum of 9 upper-division credit hours of sociology electives, by the end of the sixth semester.
- Complete 36 credit hours ( but not more than 45), in sociology with at least 21 credit hours in upper-division courses by the end of the eighth semester.

## Graduate Degree Program

Students wishing to pursue graduate work in sociology leading to candidacy for an advanced degree should carefully read the requirements for advanced degrees in the Graduate School section.

The following are additional requirements for admission to the graduate degree programs of the department:

1. A combined grade point average of at least 3.00 (*B*) for all courses in sociology undertaken as an undergraduate or graduate student prior to admission.
2. Satisfactory scores (as determined by the department) on the Graduate Record Examination, including both the verbal and quantitative sections.
3. Proficiency in statistics or registration in SOCY 4061.

The deadline for applications is January 15 for the academic year.

## Master's Degree

The department does not operate a graduate program leading to an MA degree. Doctoral students who wish to obtain an MA degree en route to the PhD may do so by completing 24 credit hours of course work at or above the 5000 level, plus preparation and completion of an MA thesis and 6 thesis hours. The MA thesis must be defended at an oral examination.

## Doctoral Degree

The main requirements for the doctoral degree are:

1. A minimum of 45 credit hours at or above the 5000 level. At least 24 of these 45 hours must be taken in the sociology department at CU-Boulder.
2. The following required courses must be included in the 45 hour minimum: 6 hours of sociological theory (including SOCY 5001); 6 hours of research methods and statistics (SOCY 5021 and 5031); and two 1-hour proseminars (SOCY 6821 and 6831).
3. A student must have passed all first-year work with a 3.50 GPA and no grade lower than a *B* to continue into the second year.
4. A student must pass the comprehensive examination, having become eligible to take this examination only after having satisfied requirements 1, 2, and 3 above.
5. A student must write a PhD dissertation and defend this dissertation in an oral examination.

A detailed description of the PhD program is given in the graduate handbook available from the graduate secretary of the sociology department. All inquiries about graduate programs should be addressed to the Graduate Secretary, Department of Sociology, University of Colorado at Boulder, 327 UCB, Boulder, CO 80309-0327.

## Spanish and Portuguese

### Degrees.....BA, MA, PhD

The department has identified the following as educational outcomes for the three tracks within the Spanish major.

The undergraduate degree in Spanish language and literature emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Spanish literature or of Spanish American literature;
- the major creative writers in either Spanish or Spanish American literature;
- basic critical methodologies in the study of poetry, drama, narrative fiction, and the essay; and
- the social and historical contexts in which particular literary traditions developed.

In addition, students completing the degree in Spanish language and literature are expected to acquire the ability and skills to:

- read sophisticated Spanish texts at a level at which literary analysis can be performed;
- write and speak Spanish sufficiently to participate in critical discussions and write critical essays;
- analyze and interpret literary texts in terms of themes, characters, structure, style, and overall textual strategies;
- relate analysis and interpretations of different texts to one another; and
- communicate such interpretations competently in written form in Spanish.

The undergraduate degree in Spanish and Portuguese Language and Culture emphasizes knowledge and awareness of the same topics listed in the degree in Spanish Language and Literature, but specifies electives and related field courses, focusing on the Luso-Brazilian culture and adding knowledge of the Portuguese language.

The undergraduate degree in international Spanish for the professions emphasizes knowledge and awareness of:

- modern business practices as applied to the Spanish-speaking world;
- the theories of economics, business law, and international trade and finance;
- fundamental business Spanish terminology;
- the cultural environment in which business is conducted in the Spanish-speaking world;
- basic business according to the canons of this discipline; and
- international relationships.

In addition, students completing the degree in international Spanish for the professions are expected to acquire the ability and skills to:

- read and interpret in cultural and business-related terms sophisticated Spanish texts concerning business transactions;
- write and speak Spanish sufficiently to communicate effectively on business-related issues, be involved in critical discussions, and write critical essays on the subject;
- analyze a particular business problem to place it in a relevant context and formulate an appropriate response; and
- adequately translate business-related documents.

## Bachelor's Degree Programs

Students must complete the required courses of the College of Arts and Sciences and the required courses listed below. All Spanish majors are encouraged to consult with their designated departmental advisor before they register each semester.

### Language and Literature Option

<i>Required Courses</i>	<i>Semester Hours</i>
SPAN 3000 Advanced Spanish Language Skills, SPAN 3100 Literary Analysis in Spanish, and SPAN 3120 Advanced Spanish Grammar. . . . .	11
Hispanic linguistics requirement. Of the total 32 credit hours required for the degree, at least 3 credit hours must be in Hispanic linguistics (SPAN 3050, 4430, or 4450).	
At least 9 credit hours in upper-division literature, culture, and/or language (may include the Hispanic linguistics requirement) . . . . .	9
At least 12 credit hours in courses at the 4000 level or above, with at least 9 credit hours devoted to literature (3 credit hours must come from either SPAN 4150 or 4160, and 3 credit hours must come from either SPAN 4170 or 4180). (Twelve credit hours may include the Hispanic linguistics requirement.) . . . . .	12
In addition to the 32 credit hours in the Department of Spanish and Portuguese, 6 credit hours in courses from outside the Spanish department in one of the following areas are required: courses listed in the Chicano Studies program; linguistics; upper-division courses in another foreign language or comparative literature; or Portuguese 2110 and 2120 or 2150 . . . . .	6

### Spanish and Portuguese Language and Culture Option

Students must complete the required courses of the College of Arts and Sciences and the required courses listed below. All majors are encouraged to consult with their designated departmental advisor before they register each semester.

Note that prerequisites for the program include sufficient Spanish knowledge to be admitted to 3000-level courses and sufficient knowledge of Portuguese to be admitted to 2000-level courses.

### Required Courses *Semester Hours*

PORT 2110 and 2120 Second Year Portuguese. (Students can take PORT 2150 instead; the missing 1 credit hour doesn't have to be made up.) . . . 6/5

#### Upper-division

PORT 3220 Latin American Culture: Spanish Americas and Brazil . . . . . 3  
 4000-level PORT course . . . . . 3  
 SPAN 3000 Advanced Spanish Language Skills, SPAN 3100 Literary Analysis in Spanish, and SPAN 3120 Advanced Spanish Grammar . . . 11

#### Hispanic Linguistic Requirement.

Of the total 32 upper-division credit hours required for the degree, at least 3 hours must be in Hispanic Linguistics (SPAN 3050, 4430, or 4440).  
 Upper-division SPAN or PORT literature, culture, and/or language (may include Hispanic Linguistics requirement). . . . . 6  
 "Masterpieces" courses. Three of these credit hours must come from either SPAN 4150 or 4160, and 3 credit hours must come from either SPAN 4170 or 4180 . . . . . 6  
 SPAN or PORT 4000-level course . . . . . 3

*Note: Directly-related courses outside of the department, such as ANTH 4730, may satisfy this requirement. These course must be preapproved by the department.*

Native speakers of Portuguese, and in general, all students whose Portuguese skills are beyond the PORT 2120 or 2150 level, are not required to take these courses. However, students have to make up these credit hours by taking 6 hours of upper-division SPAN or PORT courses or any related courses outside the department. Related courses must be approved by the department.

*Note: To fulfill the requirements for a Spanish Language and Literature or a Spanish and Portuguese Language and Culture major, students must complete 32 credit hours in courses at the 3000 level or above and at least 12 upper-division credits at CU-Boulder, 6 of which must be from the masterpiece courses listed previously (SPAN 4150 or 4160, and SPAN 4170 or 4180).*

No more than 3 independent study credit hours may count toward the major.

No grade lower than C- in a Spanish course will be counted in the major requirement.

Students seeking teaching certification in Spanish must take SPAN 3050, 3120, and 3200 or 3210.

Students who want certification for teaching at the secondary level should note that the School of Education requires SPAN 4650 and 4660. Students who major in Spanish are expected to meet with their departmental advisor before registration. Failure to do so may delay graduation. Students considering entering graduate school for an advanced degree in Spanish, either at CU-Boulder or any other institution, should see a departmental advisor as early as possible.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Spanish, students should consult with the department associate chair for undergraduate studies to obtain detailed guidelines.

### International Spanish for the Professions Option

In cooperation with the Leeds School of Business, the department offers an interdisciplinary major in international Spanish for the professions. It offers students numerous career possibilities, both in government and private industry, at home and abroad. Those choosing this major are not able to enter the Boulder graduate program in Spanish without fulfilling the requirements in the language and literature major. Only a limited number of students may enroll in the international Spanish for the professions major. Courses within the major normally are completed in the student's junior and senior years. Declaration of the major should be completed as early as possible in the student's academic career, but no later than the second semester of the sophomore year.



*Note:* Prerequisites for the program include sufficient Spanish to be admitted to 3000-level courses and ECON 2010 and 2020. SPAN 3040, and 4070 must be taken at CU-Boulder.

<i>Required Courses</i>	<i>Semester Hours</i>
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### Professional Spanish Courses

(No substitutions permitted.)

15 credit hours

SPAN 3030 Professional Spanish for Business 1	.3
SPAN 3040 Professional Spanish for Business 2	.3
SPAN 3200 Spanish Culture or SPAN 3210 The Cultural Heritage of Latin America	.3
SPAN 4060 Problems of Business Translation in Spanish 1	.3
SPAN 4070 Problems of Business Translation in Spanish 2	.3

### Spanish Language Courses

17 credit hours

SPAN 3000 Advanced Spanish Language Skills	.5
SPAN 3100 Literary Analysis in Spanish	.3
SPAN 3120 Advanced Spanish Grammar	.3
Any SPAN 4000-level course	.3
Elective (recommended: SPAN 3001, 3310, 3340, or 4930)	.3

### Courses in the Leeds School of Business

(No substitutions permitted.)

16 credit hours

#### Fall/Sophomore Year, or Junior Year

BCOR 2000 Accounting and Financial Analysis 1	.4
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#### Fall or Spring, Junior Year

BCOR 2050 Adding Value with Management and Marketing 1 (Prereq., ECON 2010 or 2020)	.3
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#### Fall or Spring, Senior Year

BCOR 3000 Business Law, Ethics, and Public Policy (formerly BSLW 3000)	.3
ECON 3403 International Economics and Policy	.3
BCOR 2150 Adding Value with Management and Marketing 2 (Prereq., BCOR 2050)	.3

*Note: These courses must be taken in sequence during the sophomore/junior and senior years as indicated, unless taken in summer school, at another University of Colorado campus, another university, or study abroad.*

*Completion of the above sequence does not fulfill all requirements for a minor in the Leeds School of Business. Majors interested in this option must consult with the Spanish department advisor.*

### Area Courses

12 credit hours

Six credit hours may be taken in lower-division courses. Students are required to take courses outside the Spanish department in a field related to their professional interests or a second major or degree. These may include courses in business, economics, computer science, linguistics, another foreign language, Chicano studies, Latin American studies and international affairs, and any course dealing with the Hispanic world from anthropology, history, political science, and geography. Courses meeting this requirement must be approved by an advisor.

*Note: The College of Arts and Sciences does not allow more than 45 credit hours in any one discipline to be counted toward the 120 credit hours required for a BA degree. This rule does not mean that a student may not take more than 45 credit hours in Spanish, but rather that one must have at least 75 credit hours in courses other than Spanish. PORT 2110 and 2120 or 2150 will be accepted as partially fulfilling upper-division courses in other foreign languages. No grade lower than a C- in a Spanish course will be counted in the major requirement.*

### Concurrent BA/MSIB

This program is designed for exceptional students who wish to combine their BA in international Spanish for the professions with an MS in international business (MSIB) from the University of Colorado at Denver. Students are able to complete both degrees in five years, including two summer sessions, because 15 credit hours of the undergraduate major can be used to waive the common body of knowledge requirement of the MS program.

Students who wish to pursue the joint degree will need to take the following undergraduate business courses:

<i>Required Courses</i>	<i>Semester Hours</i>
BCOR 2000 Accounting and Financial Analysis 1	.4
BCOR 2050 Adding Value with Management and Marketing	.3
BCOR 3000 Business Law, Ethics and Public Policy	.3
ECON 3403 International Economics and Policy	.3
BCOR 2010 Business Statistics	.3

**Admission Procedures.** Students apply for the MSIB program in their third year, by declaring their intention to the Spanish for the Professions advisor, submitting the standard MSIB application forms, and completing admissions requirements, which include the GMAT (Graduate Management Admissions Test). Students are notified of acceptance to the program before the start of their fourth year. Students must have at least a 3.00 GPA to be considered for admission.

### Study Abroad

The department strongly recommends that all majors include some study in a Spanish-speaking country in their major program. The department co-sponsors with the University of Kansas a program in Santiago de Compostela, Spain. The university cooperates with full-year and semester programs in Argentina, Bolivia, Chile, Costa Rica, Dominican Republic, Ecuador, Mexico, Nicaragua, and Spain. There is also a program in Brazil for Portuguese speakers. Credit earned normally counts toward satisfaction of the major requirements, but the student should see the associate chair for undergraduate studies before enrolling in a foreign program to discuss transfer of credit. Credit for work done in special programs offered by foreign universities is evaluated on an individual basis. It should be noted that courses taken abroad and designated as Spanish are also subject to the 45-hour maximum rule of the College of Arts and Sciences.

Students interested in study abroad should see International Education in the first chapter of this catalog for more information.

Students who present transfer work or credit earned in CU study abroad programs to satisfy major requirements are expected to complete at least 12 upper-division credits, including at least 6 from the 4000-level masterpiece courses listed above, on the Boulder campus. As an exception, one of the masterpiece courses can be taken in the program at Santiago de Compostela, Spain.

### Portuguese

Although no major in Portuguese alone is offered, the department offers a combined Spanish and Portuguese Language and Culture degree option (see the Spanish Majors section). Language courses at the elementary and intermediate levels are also available, as well as senior and graduate courses in Luso-Brazilian civilization and literature.

### Graduate Degree Programs

Students wishing to pursue graduate work in Spanish leading to candidacy for advanced degree should read carefully requirements for advanced degrees in the Graduate School section.

### Master's Degree

**Language Requirement.** Students must demonstrate, as early as possible and before taking the comprehensive examination, a communication knowledge (as defined by the Graduate School) of a foreign language other than Spanish. They also must be able to speak, read, and write English well.

**Areas of Concentration.** The MA in Spanish is offered in three areas of concentration: one with an emphasis on literature, one with an emphasis on linguistics, and one with an emphasis on

education applied to Spanish teaching. (Contact the department for further information.)

### Doctoral Degree

**Residence Requirement.** PhD students must complete a minimum of one academic year in residence on the Boulder campus (excluding summer) within the four years immediately preceding the date on which they present themselves for the PhD comprehensive examination.

**Language Requirement.** The student must demonstrate as early as possible, but at least one full semester before taking the comprehensive examination, a communication knowledge (as defined by the Graduate School) of one foreign language and a reading knowledge of a second language in addition to Spanish. The languages are chosen by the student in consultation with the advisory committee.

**Areas of Concentration.** The PhD in Spanish is offered in six literary periods of concentration: medieval, golden age, 18th and/or 19th century peninsular, 20th century peninsular, colonial and 19th century Spanish American, and 20th century Spanish American. For further information on these options, please contact the department.

## Speech, Language, and Hearing Sciences

*Degrees..... BA, MA, PhD*

The undergraduate program in speech, language, and hearing sciences (SLHS) introduces concepts basic to human communication, and provides opportunities for students to acquire an understanding of normal and disordered speech, language, and hearing processes. The curriculum for the undergraduate degree in SLHS has been designed to fulfill the prerequisite requirements for entrance into accredited graduate programs in speech-language pathology and audiology, but also provides a strong academic foundation for students with other professional goals.

The undergraduate degree in speech, language, and hearing sciences emphasizes knowledge and awareness of:

- the anatomy of the speech and hearing mechanisms, as well as the processes of speech production, transmission, and reception;
- the development of language;
- scientific methods used in investigating speech/language/learning and hearing processes;
- the etiologies, manifestations, and treatments of the speech/language/learning and hearing disorders; and
- the role of the professional speech-language pathologist and audiologist, including the history and development of the profession, the scientific traditions of the discipline, and the ethical issues in providing service to individuals with communication disorders.

In addition, students completing the degree in speech, language, and hearing sciences are expected to acquire the ability and skills to:

- express themselves effectively both orally and in written scientific and clinical discipline-specific reports;
- critically evaluate literature in the discipline; and
- analyze the acoustic output of the speech production process auditorily and/or instrumentally.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Required Courses

### Semester Hours

Majors must present a minimum of 37 credit hours of course work in the recommended sequence below.

#### Sophomore Year

##### Fall Semester

IPHY 3420 Human Anatomy (or PSYC 2012 and 2022) ..... 5-6

##### Spring Semester

SLHS 4560 Language Development ..... 3

#### Junior Year

##### Fall Semester

SLHS 4522 Clinical Phonetics and Phonological Disorders ..... 2

SLHS 2100 Statistics for Research in Human Communication Sciences

or PSYC 3101 Statistics and Research Methods in Psychology ..... 3-4

Psychology elective ..... 3-4

##### Spring Semester

SLHS 3136 Speech and Hearing Science ..... 5

#### Senior Year

##### Fall Semester

SLHS 4502 Language Disorders: Child and Adult ..... 2

SLHS 4704 Audiological Evaluation ..... 3

SLHS 4918 Introduction to Clinical Practice ..... 2

PSYC 4072 Clinical Neuroscience ..... 3

##### Spring Semester

SLHS 4512 Speech Disorders: Voice, Cleft Palate, Motor Disorders, Stuttering ..... 3

SLHS 4714 Audiology Rehabilitation ..... 3

SLHS 4918 Introduction to Clinical Practice ..... 2

(Only one semester of SLHS 4918 is required and may be taken in either the fall or spring.)

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in speech, language, and hearing sciences, students should meet the following requirements:

Declare the major by the beginning of the second semester.

Complete the prerequisite biology courses (EBIO 1210 and 1220) before the fall of the junior year and complete Human Anatomy (IPHY 3420 or PSYC 2012 and 2022) by the fall of the junior year. This is the latest date that IPHY 3420 can be taken in order to meet prerequisites for junior and senior year SLHS courses.

Complete the required courses in the sequence listed above.

## Graduate Degree Programs

The graduate curriculum in speech, language, and hearing sciences leads to either a master's or a doctoral degree. The programs in speech-language pathology and audiology are accredited by the American Speech-Language-Hearing Association (ASHA) and the Colorado State Department of Education.

Prospective students should read requirements for advanced degrees in the Graduate School section and request additional information from this department.

### Master's Degree

The master's program in speech, language, and hearing sciences emphasizes both the scientific and theoretical bases as well as the clinical education of speech-language pathology. The program leads to certification by ASHA and licensure for the Colorado State Department of Education in speech-language pathology. Within departmental and ASHA guidelines, master's students

with a focus in speech-language pathology devise individualized programs of academic and clinical study that allow them to develop clinical specialities of their choosing. (Students may experience four out of seven possible clinical specialities in depth while completing requisite clinical and academic experience for ASHA certification.) Clinical assignments are initiated in the department on-site Speech, Language, and Hearing Center; later, student input is obtained in making off-campus clinical assignments in educational and medical settings.

Students with an undergraduate degree in speech-language pathology and audiology can expect to complete the program in two calendar years. Those without such a background are required to make up undergraduate deficiencies, which normally require at least an additional 28 credit hours of courses in speech, language, and hearing sciences and related disciplines. Students must meet standards for both academic and clinical competence, as well as professional conduct. Full-time graduate study is required. Students not seeking clinical certification may place major emphasis on speech-hearing science.

### Doctoral Degree

The doctoral program is grounded in research and demands demonstrated expertise beyond the academic knowledge and clinical skills required for clinical certification in speech-language pathology and/or audiology. Supervisory, administrative, instructional, and research activities are provided to acquaint students with problems and concepts at a higher level of professional activity and responsibility.

Wide latitude prevails in planning individual programs. It is expected that students have some professional experience before entering the program, and that they have specific academic or professional goals in mind. PhD candidates must take a four-course sequence in statistics and computer science and four core courses within Speech, Language, and Hearing Sciences (SLHS). Beyond that, student degree plans are individually prepared through the joint efforts of the student and an advisory committee.

Students may be admitted to the doctoral program with a focus area in clinical research and practice in audiology. Students pursuing this track of the doctoral program take advanced seminars in hearing science, clinical audiology, statistics, and research methods. Students also undertake practica in clinical practice and research. This track of the doctoral program leads to clinical certification in audiology and culminates in a clinical research dissertation.

## Theatre and Dance

*Degrees in Theatre* .....BA, BFA, MA, PhD

*Degrees in Dance* .....BA, BFA, MFA

The Department of Theatre and Dance offers undergraduate and graduate degrees in both theatre and dance. These programs combine traditional studies with practical training. Ambitious seasons of theatre productions and dance concerts feature student performers and student designers, directors, and choreographers. Guest artists of national and international fame often participate in curricular and extracurricular activities. Recent guests have included David Dorfman, Joe Goode, Chuck Davis, Alan Sener, Dana Reitz, Jane Comfort and Co., and Liz Lerman in dance; Jim Moody, Holly Hughes, Alexander Galin, Karen Finley, Mark Medoff, and Anatoly Smelyansky in theatre.

Students interested in theatre and dance are urged to consult with an advisor in the appropriate field to obtain both advice and the most current information concerning program opportunities and expectations.

## Bachelor's Degree Programs in Theatre

The undergraduate degrees in theatre emphasize knowledge and awareness of:

- the major works of dramatic literature that are representative of the most important eras in the development of theatre and drama in the western world;
- the history of theatrical production—its styles, conventions, and socially related mores—from the ancient Greeks to the present time;
- the various means through which a theatrical concept is realized; and
- the aesthetic and intellectual relationship between theatre in its various 20th century modes and contemporary society.

In addition, students completing a degree in theatre are expected to acquire the ability and skills to:

- analyze and interpret plays and literature with particular attention to acting and performance of literature, designing, directing, and/or playwriting and criticism;
- use, with safety and efficiency, the tools and equipment basic to theatre production technology;
- communicate to an audience through at least one of the components of theatrical art—acting, directing, designing, playwriting, or criticism; and
- function effectively as a member of a production team in the preparation of regularly scheduled public productions.

### BA Degree in Theatre

The BA degree program in theatre requires 40 credit hours in theatre, 3 in dance, and 6 in dramatic literature outside the department. It is a broadly based program of theatre practice and study for the student who may wish to pursue in-depth studies in another area as well. It also serves as the core of studies for a student who wishes to pursue further theatre training in one of the BFA areas of concentration. A grade of C- or better is needed in each required course toward the BA degree.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
THTR 1011 Development of Theatre 1 .....	3
THTR 1019 Theatre Foundations 1 .....	3
THTR 1065 Stagecraft .....	3
THTR 1075 Stagecraft Lab .....	2
THTR 2003 Acting 1 or THTR 2043 Voice for the Stage .....	3
THTR 2021 Development of Theatre 2 .....	3
THTR 3031 Development of Theatre 3 or THTR 4021 Development of Theatre 4 .....	3
THTR 3033 Production Research and Practicum: Acting .....	1
THTR 3035 Production Practicum .....	4
THTR 4081 Senior Seminar .....	3
Upper division electives in theatre .....	12
Electives in dance .....	3
Electives in dramatic literature, outside the Department of Theatre and Dance, including at least 3 upper division .....	6

#### Curriculum Notes

1. THTR 1065 and 1075 must be taken concurrently
2. Choices must be advisor approved; BFAs do not have the same options as BAs
3. BFA Performance students must elect to take all 6 credits in Shakespeare (ENGL 3563 and 3573)
4. THTR 3035 must be taken in at least two different semesters

Recommended sequence of courses during the initial year of theatre major program, BA and BFA:

THTR 1011 Development of Theatre 1 .....	3
THTR 1019 Theatre Foundations 1 .....	3

THTR 1065 Stagecraft .....	3
THTR 1075 Stagecraft Lab .....	2
THTR 2003 Acting 1 .....	3

### Graduating in Four Years with a BA in Theatre

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in theatre, students should meet the following requirements:

- Complete THTR 1011, 2003, or 2043, 1019, 1065, 1075, and 2021 by the end of the fourth semester
- Complete 6 upper division credit hours plus 2 credits of THTR 3035 by the end of the fifth semester
- Complete 9 additional upper division credit hours, including all practicum requirements by the end of the sixth semester
- Complete 6 additional upper division credit hours, plus all 3 credits in dance by the end of the seventh semester
- Complete THTR 4081 by the end of the eighth semester

### BFA Degree in Theatre

The BFA degree program in theatre offers preprofessional training to a limited number of highly motivated and talented students aiming at professional careers. The BFA student pursues one of three possible areas of concentration: performance, theatre design and technology, or musical theatre.

Admission is limited not only in terms of student capacity, but also to ensure the type of individual attention necessary for effective training. Interested students should identify themselves as early as possible.

Formal application to the musical theatre concentration should be made concurrent with application to the university. Auditions/interviews will be held at the regular spring auditions for the College of Music. Formal application to the performance and design/technology concentrations should be made at the beginning of the third semester.

A student may apply for all three areas of concentration, but can be admitted to only one. Counseling in advance is recommended. Admission is based on talent, academic record, motivation, and audition-interviews. Auditions are held each fall semester for the performance and design/technology concentrations, and each spring for the musical theatre concentration.

The college counts only 67 credit hours of THTR credits toward the total hours required for graduation. A grade of C- or higher is needed in each course required to fulfill the requirements of the BFA degree.

In addition to the general College of Arts and Sciences requirements for the BA degree, requirements for the BFA degree are as follows. (Courses taken as part of a student BFA concentration cannot also be counted towards fulfillment of the BA electives.)

### I. Concentration in Performance

62 credit hours are required in THTR, plus 12 in other disciplines. Students accepted into the performance concentration each year constitute an ensemble and as a group follow the required sequence of courses. Specific details about this sequence are available from the department. Students in this concentration must fulfill BA requirements in theatre and are required to audition for major season productions each semester.

Required Courses	Semester Hours
THTR 3013 Studio 1: Acting Process—Technique .....	4
THTR 3023 Studio 2: Acting Process—Scene Study .....	4
THTR 3043 Advanced Voice for the Stage .....	3
THTR 4013 Studio 3: Shakespeare .....	4
THTR 4083 Studio 4: Contemporary British and American Theatre .....	3
THTR 4093 Studio 5: Ibsen, Shaw, and Chekhov .....	4
Electives in DNCE .....	6

### II. Concentration in Theatre Design and Technology

67 credit hours are required in THTR, plus 18 in other disciplines. Students in the design and technology concentration must fulfill BA requirements in theatre and should use the electives in the BA requirements to fulfill prerequisites for the following.

Required Courses	Semester Hours
THTR 2035 Design Fundamentals .....	3
THTR 4065 Advanced Design Projects .....	3
THTR 4075 Advanced Technical Projects .....	3
THTR 4085 Theatre Management .....	3
THTR 4025 Costume Construction or THTR 4035 Scene Painting or THTR 4135 Technical Direction .....	3
THTR 4145 Colloquium in Advanced Design .....	3
Electives in Design and Technical Theatre .....	9

#### Curriculum Notes

THTR 1065 and 1075 are to be taken concurrently

As advised, courses in other departments in drawing, painting, drafting, sculpture, and/or environmental design .....

### III. Concentration in Musical Theatre

60 credit hours are required: 27 in THTR courses, 3 in DNCE courses, and 30 in the College of Music.

Required Courses	Semester Hours
<b>Theatre/Dance</b>	
THTR 1019 Theatre Foundations 1 .....	3
THTR 1065 Stagecraft .....	3
THTR 1075 Stagecraft Lab .....	2
THTR 2003 Acting 1 .....	3
THTR 3011 Development of American Musical Theatre .....	3
THTR 3035 Production Practicum (2 semesters) .....	4
THTR 3053 Acting 2 or THTR 2043 Voice for the Stage .....	3
THTR 4039 Musical Theatre Repertory .....	3
Electives in Dance Technique .....	3
Elective in Theatre .....	3

#### Music

EMUS 1184 Class Voice (6 semesters) .....	6
(MUSC 1081 Basic Music Theory/aural if needed) .....	(3)
MUSC 1101 Music Theory .....	2
MUSC 1111 Music Theory .....	2
MUSC 1121 Aural Skills .....	1
MUSC 1131 Aural Skills .....	1
MUSC 1802 Introduction to Music History .....	3
MUSC 3193 Vocal Pedagogy .....	2
PMUS 1105 Piano Class (2 semesters) .....	2
PMUS 1205 Piano Class .....	1
PMUS 4137 Opera Theatre 1 .....	1
PMUS 4147 Opera Theatre 2 .....	2
PMUS 4157 Opera Practicum .....	2
Non-Western Music History (2000/4000 level) .....	3
Western Music History (2000–4000 level) .....	3

#### Curriculum Note:

THTR 1065 and 1075 are taken concurrently

### Graduating in Four Years with a BFA in Theatre

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in theatre, students should meet the following requirements:

All potential BFA students in the performance and design/technology concentrations must declare, in writing, at the beginning of their first semester, the intention to audition for formal entrance. Actual auditions and interviews for the performance and design/technology concentrations must take place during the third semester of study. Students who are accepted into a major in these BFA concentrations must declare their major immediately upon acceptance in the third semester. In addition to the specific course

requirements listed for completing a BFA degree in the performance and design/technology concentrations, students must fulfill all requirements for the BA degree in theatre.

As part of the first two years of study, all students who intend to enter the BFA programs in performance and design/technology must complete the following courses within theatre: THTR 1011, 1019, 1065, 1075, 2003, and 3035.

### I. Performance Concentration

Upon acceptance to the performance concentration, students must meet immediately with a departmental advisor to confirm, in writing, specific courses to be completed within the remaining semesters of study. All BFA performance majors must complete the following courses in the prescribed order: THTR 3013, 3023, 3043, 4013, 4083, 4093. Students are also encouraged to complete EMUS 1184 (voice).

All students in this concentration must audition for all main stage departmental productions.

### II. Theatre Design and Technology Concentration

Upon acceptance to the theatre design and technology concentration, students must meet immediately with a departmental advisor to confirm, in writing, specific courses to be completed within the remaining semesters of study.

Students in this concentration must take THTR 2085 History of Fashion as well as complete a design course in their chosen area by the end of the sophomore year.

### III. Musical Theatre Concentration

All potential BFA musical theatre students must declare in writing, during the application process, their intention to audition. They must also audition at the regular spring auditions for the College of Music before matriculating. Students who are accepted into the BFA musical theatre concentration must declare their major immediately upon acceptance following the audition. They must also meet immediately with a departmental advisor to confirm, in writing, specific courses to be completed within the remaining semesters of study.

## Bachelor's Degree Programs in Dance

The following areas of knowledge are central to the undergraduate degrees in dance:

- knowledge of the major works of dance literature that are representative of the most important eras in the development of dance in the western world;
- knowledge of the history of dance, from early eras to the present and dance in cultures around the world;
- knowledge of the various means through which a dance performance is realized; and
- knowledge of the aesthetic and intellectual relationship between dance and other disciplines in the 20th century.

In addition, students completing a degree in dance are expected to acquire the ability and skills to:

- communicate to an audience through at least one of the components of modern dance—performance, choreography, or criticism;
- function effectively as a member of a dance ensemble in the preparation of regularly scheduled public productions;
- analyze and evaluate dance as an art form with particular attention to at least one of the areas of dance, choreography, dance production, and criticism; and
- understand and use the anatomy and physiology of the body so that choreography is creative and not damaging to the body.

### I. Concentration in Modern Dance

<i>Required Courses</i>	<i>Semester Hours</i>
Ballet courses, any level	3
Dance technique elective(s)	2

Jazz course, any level	1
DNCE 1005 Movement Awareness and Injury Prevention for the Dancer	3
DNCE 1012 and 3022 Production 1 and 2	4
DNCE 1029 Introduction to World Dance and Culture	3
DNCE 1900 or 2900 Technique Practicum <i>or</i> DNCE 2500 African Dance	2
DNCE 2013 Dance Improvisation	2
DNCE 2014 Rhythmic Analysis and Accompaniment <i>or</i> DNCE 3024 Musical Resources for Dance	2
DNCE 2021 Beginning Modern Dance for Majors <i>or</i> DNCE 3041 Intermediate Modern Dance for Majors <i>or</i> DNCE 4061 Advanced Modern Dance for Majors (Note 1)	6
DNCE 2033 Beginning Composition	3
DNCE 4015 Movement Analysis	3
DNCE 4016 Creative Dance for Children <i>or</i> DNCE 4036 Methods of Teaching Dance	3
DNCE 4017 History and Philosophy of Dance	3
DNCE 4027 Dance in the 20th Century	3
DNCE 4939 Senior Project: Dance Internship	2
THTR 1065 Stagecraft	3
THTR 1075 Stagecraft Lab	1
THTR 4081 Senior Seminar	3

#### Curriculum Note:

1. Students are placed at the appropriate level based on audition. Modern dance courses listed as nonmajor technique courses do not normally count toward the major.

### II. Concentration in Ballet

DNCE 1005 Movement Awareness and Injury Prevention for the Dancer	3
DNCE 1012 and 3022 Production 1 and 2	4
DNCE 1029 Introduction to World Dance and Culture	3
DNCE 1200 Beginning Jazz, DNCE 1220 Beginning Jazz with Experience, DNCE 1900 or 2900 Technique Practicum, DNCE 2240 Intermediate Jazz, DNCE 2500 African Dance, DNCE 3190 Ballet Practicum (Note 2), DNCE 3601 Alexander Technique, DNCE 4013 Contact Improvisation, <i>or</i> DNCE 4260 Advanced Jazz (Note 2)	4
DNCE 2013 Improvisation	2
DNCE 2014 Rhythmic Analysis and Accompaniment <i>or</i> DNCE 3024 Musical Resources	2
DNCE 2021 Beginning Modern Dance for Majors, DNCE 3041 Intermediate Modern Dance for Majors, <i>or</i> DNCE 4061 Advanced Modern Dance for Majors (Note 1)	4
DNCE 2033 Beginning Composition	3
DNCE 2140 Low Intermediate Ballet, DNCE 3160 Intermediate Ballet (Note 2), <i>or</i> DNCE 4180 Advanced Ballet (Note 2)	6
DNCE 4016 Creative Dance for Children <i>or</i> DNCE 4036 Methods of Dance	3
DNCE 4017 History and Philosophy of Dance	3
DNCE 4038 Dance Repertory (Note 2)	3
DNCE 4128 Pointe and Variation (Note 2)	2
DNCE 4939 Senior Project: Dance Internship	2
Dance electives	1
THTR 1065 Stagecraft	3
THTR 1075 Stagecraft Lab	1
THTR 4081 Senior Seminar	3

#### Curriculum Notes:

1. Students are placed at the appropriate level based on audition. Modern dance courses listed as nonmajor technique courses do not normally count toward the major.
2. Students are admitted based on an audition.

### III. Concentration in World Dance and Culture

DNCE 1000 Beginning Modern Dance, DNCE 1220 Beginning Modern Dance with Experience, DNCE 2040 Intermediate/Advanced Modern Dance, DNCE 2021 Beginning Modern Dance for Majors (Note 1), DNCE 3041 Intermediate Modern Dance for Majors (Note 1), <i>or</i> DNCE 4061 Advanced Modern Dance for Majors (Note 1)	2
DNCE 1029 Introduction to World Dance and Culture	3
DNCE 1900 or 2900 Technique Practicum <i>or</i> DNCE 2500 African Dance	6
DNCE 4016 Creative Dance for Children <i>or</i> DNCE 4036 Methods of Teaching Dance	3
DNCE 4017 History and Philosophy of Dance <i>or</i> DNCE 4027 Dance in the 20th Century	3
EMUS 2772 World Musics: Asia, Americas, Africa, Europe	6
RLST 2220 Religion and Dance	3

RLST 2230 Religion and Dance .....	3
Religious Studies, anthropology, or ethnic studies electives .....	7
THTR 4081 Senior Seminar .....	3
Technique electives .....	4
Upper-division elective in religious studies, anthropology, or ethnic studies .....	3

**Curriculum Note:**

1. Students are admitted based on audition.

**Graduating in Four Years with a BA in Dance**

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in dance, students should meet the following requirements:

**I. Concentration in Modern Dance**

Declare the major by the end of the second semester.

Complete by the end of the sophomore year: 4 credit hours of modern dance technique at the major level (based on placement audition); 1 credit hour of ballet; 2 credit hours from DNCE 1900, 2900, or 2500; 1 credit hour of jazz; and 2 credit hours of technique electives at the appropriate time with the advice of the academic advisor.

Complete by the end of the sophomore year: DNCE 1005, 1012, 1029, 2013, 2033, and THTR 1065 and 1075.

Complete during the junior and senior years: 2 credit hours of modern dance technique at the major level (based on placement audition); 2 credit hours of ballet; DNCE 3022, DNCE 2014 or 3024; DNCE 4015; DNCE 4016 or 4036; DNCE 4017; DNCE 4027; DNCE 4939; and THTR 4081 during the spring of the senior year.

*Note: To receive sufficient upper-division credit, students must take at least 2 credit hours of 3000- or 4000-level technique if they take DNCE 2014.*

**II. Concentration in Ballet**

Declare the major by the end of the second semester.

Complete by the end of the sophomore year: 2 credit hours of DNCE 2021, 3041, 4061 (based on placement audition); 3 credit hours of DNCE 2140, 3160, or 4180 (DNCE 3160 and 4180 based on placement audition), 2 credit hours from DNCE 1200, 1220, 1900, 2900, 2240, 2500, 3190, 3601, 4013, or 4260 (DNCE 3190 and 4260 based on placement audition).

Complete by the end of the sophomore year: DNCE 1005, 1012, 1029, 2013, THTR 1065 and 1075.

Complete 1 credit hour of dance electives at the appropriate time with the advice of the advisor.

Complete during junior and senior years: 2 credit hours of DNCE 2021, 3041, 4061 (based on placement audition), 3 credit hours of DNCE 2140, 3160, or 4180 (DNCE 3160 and 4180 based on placement audition), 2 credit hours from DNCE 1200, 1220, 1900, 2240, 2500, 3190, 3601, 4013, or 4260 (DNCE 3190 and 4260 based on placement audition).

Complete during junior and senior years: DNCE 3022; 2014 or 3024; 2033, 4016, or 4036; 4017; 4038 (based on audition); and 4128 (taken two times, based on audition).

Complete during senior year: DNCE 4939 and THTR 4081.

*Note: To receive sufficient upper-division credit, students must take at least 3 credit hours of 3000- or 4000-level technique if they take DNCE 2014.*

**III. Concentration in World Dance and Culture**

Declare the major by the end of the second semester.

Complete by the end of the sophomore year: DNCE 1029; RLST 2220 and 2230; EMUS 2772; and 3 credits from DNCE 1900, 2500, or 2900.

Complete at the appropriate time with the advice of the academic advisor:

4 credits of dance technique electives; 7 credits of appropriate religious studies, anthropology, or ethnic studies electives; and 2 credits of DNCE 1000, 1020, 2040, 2021, 3041, or 4061 (DNCE 2021, 3041, 4061 based on audition).

Complete during the junior and senior years: DNCE 4016 or 4036; 4017 or 4027; and 3 credits from DNCE 1900, 2500, or 2900; and 3 upper division credits in anthropology, ethnic studies, or religious studies.

During the senior year complete DNCE 4939 and THTR 4081.

**BFA Degree in Dance**

The BFA in dance is designed to meet the needs of highly talented students interested in preparing for a professional dance career while in an academic setting. The degree requires 67 credit hours in dance and 16 hours in theatre. Admission is limited by faculty consent to ensure the type of individual attention necessary for effective training. Students apply during the third semester while taking DNCE 2033. Students should be advised that 9 or 10 semesters are often needed to complete the BFA program. More than 120 hours may be needed for graduation.

**Required Courses****Semester Hours**

DNCE 1005 Movement Awareness and Injury Prevention for the Dancer ..	3
DNCE 1012 and 3022 Production 1 and 2 .....	4
DNCE 1029 Introduction to World Dance and Culture .....	3
DNCE 1900 or 2900 Technique Practicum, DNCE 2500 African Dance .....	2
DNCE 2013 Dance Improvisation .....	2
DNCE 2014 Rhythmic Analysis and Accompaniment .....	2
DNCE 2021 Beginning Modern Dance for Majors, DNCE 3041 Intermediate Modern Dance for Majors, and DNCE 4061 Advanced Modern Dance (Note 1) .....	12
DNCE 2033 Beginning Composition .....	3
DNCE 3024 Musical Resources for Dance .....	2
DNCE 3043 Intermediate Dance Composition .....	3
DNCE 3160 Intermediate Ballet or DNCE 4180 Advanced Ballet (Note 1) ..	6
DNCE 3601 Alexander Technique .....	2
Dance technique electives .....	2
DNCE 4015 Movement Analysis .....	3
DNCE 4016 Creative Dance for Children or DNCE 4036 Methods of Teaching Dance .....	3
DNCE 4027 Dance in the 20th Century .....	3
DNCE 4038 Dance Repertory (Note 2) .....	3
DNCE 4053 Advanced Dance Composition .....	3
DNCE 4260 Advanced Jazz (Note 2) .....	1
DNCE 5052 Studio Concert .....	3
Dance electives .....	2
THTR 1003 Beginning Acting or 2003 Beginning Acting with Experience ..	3
THTR 1065 Stagecraft .....	3
THTR 1075 Stagecraft Lab .....	1
THTR 4029 Touring Theatre Dance .....	6
THTR 4081 Senior Seminar .....	3

**Curriculum Notes:**

1. Students are placed at the appropriate technique level based on audition.
2. Students are admitted based on an audition.

**Graduating in Four Years with a BFA in Dance**

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in dance, students should meet the following requirements:

Acceptance into the BFA by the end of the third semester with consent of dance faculty.

Complete 6 credit hours of DNCE 2021, 3041, 4061 by the end of the sophomore year (based on placement audition): DNCE 1005, 1012, 1029, 2013, 2014, 2033, and 3 credit hours of DNCE 3160 or 4180 (based on placement audition), and THTR 1065 and 1075.

Complete 2 credit hours of dance electives, 2 credits of technique electives; DNCE 1900, 2500, or 2900; 4260 (based on audition); 3601; THTR 1003 or 2003; and 4029 at the appropriate time with the advice of the academic advisor.

Complete THTR 4081 in the spring of the senior year.

Show choreographic work in the informal showcase and Student Dance Concert in the sophomore and junior years.

Complete, during the junior and senior years, DNCE 3022, 3024, 3043, 4015, 4016 or 4036, 4027, 4038, 4053, 3 credit hours of DNCE 3160 or 4180 (based on placement audition), and 6 credit hours of DNCE 2021, 3041, or 4061 (based on placement audition).

Complete DNCE 5052 Studio Concert, including presentation of choreography in a formal setting and submission of an evaluative paper during fall of the senior year.

Maintain a 3.00 GPA overall and a 3.20 GPA in dance courses. A grade of C- (1.70) or higher is needed in each dance course.

Perform in at least one formal concert other than the BFA concert.

### Minor Programs

Minor programs in dance are offered. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

## Graduate Degree Programs

The MA and PhD degrees are offered in theatre. The MFA degree is offered in dance.

### Departmental Requirements

Students wishing to pursue graduate work in theatre and in dance should carefully read both requirements for advanced degrees in the Graduate School chapter of this catalog and the following departmental requirements. Students should note that departmental requirements are sometimes more comprehensive than those minimums established by the Graduate School.

**Prerequisites.** Applicants are admitted to the graduate program in theatre and in dance on the basis of their academic records and recommendations. Students admitted who are unable to offer a substantial number of credit hours of work in the area of their intended specialization or allied fields must expect that a significant number of additional courses and credit hours are required of them in order to make up deficiencies. Applicants for the MFA program in dance must audition in person; foreign students may audition by video tape. Applicants are expected to be at an advanced level in modern dance technique and an intermediate level in ballet. Contact the dance office for specific audition dates; auditions are usually held in February or March for admission the following fall. The deadline for applications from U.S. citizens is February 1; from non-U.S. citizens, it is December 1.

**Diagnostic Examination.** Every student must take a diagnostic examination upon entrance. This examination and all other information available are employed to design the best possible course of study for the student. For dance students the exam may indicate course work as necessary above and beyond the 60 required hours.

**Advisor and Graduate Committee.** For every student who declares an intention to work toward an advanced degree, an advisor and committee are designated so that a degree plan may be designed before the end of the first semester of residence.

All candidates for a degree have the responsibility of making certain that the appropriate persons or committees have been appointed to supervise the various steps in their graduate programs. Detailed instructions are available from the department.

### MA Degree in Theatre

**Course Requirements.** All master's degree students in theatre are required to complete THTR 5011, 6009, and two of the following: THTR 6011, 6021, 6031, or 6041. Students can choose either a thesis or nonthesis track program.

After any undergraduate deficiencies have been removed, students must earn 30 semester hours, at least 16 of which must be in THTR courses at the 5000 level or above. Four to six thesis credit hours may be counted toward the 30-hour requirement. At least 24 of the 30 hours must be at the 5000-level or above.

### PhD Degree in Theatre

Doctoral students in theatre are normally expected to earn 30 credit hours of course work beyond the master's degree at the 5000-level or above. When approved by the student advisory committee, credits from other departments on campus may count, provided the course is taught by a member of the graduate faculty in that department.

Doctoral study in theatre is based on the following core of required advanced courses.

THTR 5011 Theory and Criticism

THTR 6009 Research Strategies and Techniques

Plus three of the following:

THTR 6011 On-Stage Studies: Classical and Neoclassical Drama

THTR 6021 On-Stage Studies: Elizabethan and Jacobean Drama

THTR 6031 On-Stage Studies: American Theatre and Drama

THTR 6041 On-Stage Studies: Modern European Drama

Beyond the core courses, studies are determined by students and their advisors, consistent with Graduate School and departmental requirements. Doctoral students are required to demonstrate proficiency in a foreign language at a second-semester college level before taking the comprehensive exam. In addition to the 30 hours of course work, 30 dissertation credits (THTR 8999) are required.

### MFA Degree in Dance

**Course Requirements.** The three-year program requires a minimum of 60 credit hours, at least 30 of which must be taken in dance at the 5000 level or above. The program focuses on performance/choreography and secondary areas of specialization. At least 6 credit hours must be taken outside of dance in an approved allied field. The program is designed to accommodate recent BA or BFA graduates and practicing professionals desiring a graduate degree.

The MFA in dance is based on a required core of courses including modern dance, ballet, non-Western dance, Alexander technique, choreography, readings in dance, seminars in dance and music, research strategies, pedagogy, and a creative project or thesis. Contact the department for detailed information.

**Project or Thesis.** One year before completion of the thesis or project, a written proposal for a creative project or thesis must be presented and approved. Upon its completion, a defense of the project or thesis is required in an oral examination, which also requires a demonstration of the student's knowledge of dance.

**Examinations.** A written comprehensive examination covering the student's graduate studies must be taken and passed prior to the oral examination.

**Technical Proficiency.** For completion of the degree, technical proficiency must be demonstrated at the advanced level in modern dance and at the intermediate level in ballet.

## Western American Studies

The Center of the American West offers an undergraduate certificate program in Western American Studies for students who have an intellectual commitment to any of a broad range of issues and aspects of the American West, including history and literature, culture and society, and economic and environmental challenges facing western communities. Courses involve students in an exploration of the past, an appreciation for traditional and contemporary stories and art in the region, and an understanding of western landscapes, ecosystems, and the factors that affect them.

The certificate program is interdisciplinary, drawing on courses and expertise from over a dozen departments spanning the humanities, natural sciences, and social sciences. Course work may be taken concurrently with undergraduate studies. Students complete 24 credit hours of C or better course work, of which a minimum of 15 are upper division and a minimum of 12 are from outside the student's major. Contact the Center of the American West at 303-735-1399 or visit [www.centerwest.org/certificate.html](http://www.centerwest.org/certificate.html) for program details.

## Women's Studies

*Degree* .....BA

Students may earn a bachelor of arts degree in women studies or may earn a women's studies minor to supplement study in their major field.

Since 1974, the women's studies program has offered an interdisciplinary curriculum encompassing social sciences and humanities. Courses reflect the new scholarship on women: they focus on the interface of the public and private spheres of women's lives; on the intersection of gender, race, ethnicity, and class; and on feminist studies of gender identity and theories of inequality. The curriculum is multicultural, offering courses in women and development as well as global feminism. The program houses a library and sponsors colloquia, workshops, and other cultural and educational events.

An understanding of the ways gender is socially constructed and simultaneously mediated by other axes of power such as race/ethnicity, class, and sexuality develops the framework for this program.

The undergraduate degree in women's studies emphasizes knowledge and awareness of:

- gender in national and global contexts;
- women's participation in, contribution to, and transformation of areas of social life including culture, society, politics, economy, and religion;
- institutionalized discrimination and violence against women;
- historical forms of resistance and activism; and
- feminist research methods, including the relationship between theory and practice.

In addition, students completing the program in women's studies are expected to acquire the ability and skills to:

- express ideas clearly in spoken form;
- analyze texts and information critically;
- articulate clearly complex ideas in written form; and
- participate in teamwork successfully.

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### *Required Courses* *Semester Hours*

Students must complete a minimum of 36 credit hours with grades of C- or better in women's studies courses, a minimum of 18 credits of which must be upper division. These 36 credit hours should be distributed as follows:

#### I. Required Courses (15 hours)

WMST 2000 Introduction to Feminist Studies .....	3
WMST 2400 History of Women and Social Activism .....	3
WMST 2600 Gender, Race, and Class in Contemporary U.S. Society .....	3
WMST 3100 Feminist Theories .....	3
WMST 4800 Capstone Seminar .....	3

#### II. Global Studies (6 hours)

Choose two courses from the following:

WMST 3012 Women, Development, and Fertility .....	3
WMST 3500 Global Gender Issues .....	3
WMST 3672 Gender and Global Economy .....	3
WMST 3710 Topics in Global Studies .....	3
WMST 3730 Third World Women and the Politics of Development .....	3
WMST 4300 International Sex Trade .....	3

#### III. WMST Upper-Division Courses (9 hours)

Choose three courses from the following:

WMST 3200 Religion and Feminist Thought .....	3
WMST 3210 American Indian Women .....	3
WMST 3300 Women and the Legal System .....	3
WMST 3314 Violence Against Women and Girls .....	3
WMST 3400 Gender, Culture, and Personality .....	3
WMST 3505 Historical and Contemporary Issues of Black Women .....	3
WMST 3600 History of Latinas: Social Movements and Art Activism .....	3
WMST 3700 Topics in Women Studies .....	3
WMST 3710 Topics in Global Studies .....	3
WMST 3900 Asian-American Women .....	3
WMST 3930 Internship .....	3
WMST 4000 Senior Seminar .....	3
WMST 4636 Lesbian and Gay History: Culture, Politics, and Social Change in the United States .....	3

#### IV. Electives (6 hours)

Elective hours may be satisfied by any WMST courses that are not applied to the above requirements or by WMST courses that are cross-listed with other departments.

**Note: Major requirements are under review by the faculty in Women's Studies and may be subject to revision. For more information, contact the program office.**

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in women's studies, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete WMST 2000 and 12 additional credit hours of major requirements by the end of the fourth semester.

Complete WMST 3100 and 27 total credit hours of major requirements by the end of the sixth semester.

Complete WMST 4800 and one additional 3-credit course of the major requirements by the end of the eighth semester.

### *Minor Program*

A minor program in women's studies is offered. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).



## Writing and Rhetoric, Program for

The Program for Writing and Rhetoric (PWR) is a free-standing unit in the College of Arts and Sciences responsible for campus-wide instruction in expository writing. The program has replaced the former University Writing Program (UWRP) and also coordinates and oversees all writing curricula and instruction intended to meet college and campus requirements, including efforts in specific disciplines and targeted campus programs.

The program is committed to training students to think critically about the texts they read and the writing they produce, and to enable them to shape and express ideas with clarity and grace in any context: academic, professional, or civic. Classes are generally conducted as intensive writing workshops, placing a premium on thoughtful, substantive revision.

The program offers both lower-division and upper-division courses, as well as some graduate seminars. Certain undergraduate courses fulfill the College of Arts and Sciences written communication requirement, and some also fulfill graduation requirements in other colleges. Students should check with their advisors to be sure that they are taking the right course to fulfill their requirement.

For information about specific classes and their instructors, students should consult the *Registration Handbook and Schedule of Courses* or visit [www.colorado.edu/pwr](http://www.colorado.edu/pwr).

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VINCENT BARLETTA, assistant professor. MA, PhD, University of California, Los Angeles.

YVONNE GUILLON BARRETT, associate professor emerita.

ANNE BECHER, instructor. BA, Carleton College; MA, University of Colorado.

ESTHER L. BROWN, assistant professor. MA, Pennsylvania State University; PhD, University of New Mexico.

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JUAN PABLO DABOVE, assistant professor. MA, PhD, University of Pittsburgh.

PETER ELMORE, associate professor. Licenciatura, Pontificia Universidad Católica del Perú; PhD, University of Texas, Austin.

VIVIAN ELMORE, instructor. BA, Pontificia Universidad Católica del Perú.

JAVIER GARCES, instructor. BA, University de Nariño.



LUIS T. GONZALEZ-DEL-VALLE, professor. BA, University of North Carolina; MA, University of Massachusetts, Amherst; PhD, Five-College Cooperation Program: Amherst College, Hampshire College, Mount Holyoke College, Smith College, and University of Massachusetts, Amherst.

ANTONIA GREEN, instructor. BA, MA, University of Missouri.

WILLIAM J. GRUPP, professor emeritus.

SUSAN R. HALLSTEAD, instructor. MA, University of Pittsburg.

ELLEN S. HAYNES, senior instructor. BA, University of Oregon; BS, Regis College; MA, Portland State University; PhD, University of Colorado at Boulder.

ASUNCION HORNO DELGADO, associate professor. Licenciatura, Universidad Complutense de Madrid; MA, University of New Hampshire; PhD, University of Massachusetts, Amherst.

CHARLES L. KING, professor emeritus.

RICARDO LANDEIRA, professor. BA, MA, Arizona State University; PhD, Indiana University.

LEILA M. LEHNEN, assistant professor. MA, PhD, Vanderbilt University.

ANTHONY GIRARD LOZANO, professor emeritus.

MARY K. LONG, senior instructor. BA, Colorado State University; MA, PhD, Princeton University.

KAREN MALCOLM, instructor. BA, University of Arkansas; MA, University of Nebraska.

NINA L. MOLINARO, associate professor. BA, Scripps College; MA, PhD, University of Kansas.

ISIDORO MONTIEL, professor emeritus.

MARIA MORENO, instructor. BA, MA, Eastern Michigan University.

CRISTINA PIRAS, instructor. BA, Richard Palma University; MA, University of Colorado at Boulder.

DIANE E. SIEBER, associate professor. BA, University of Virginia; MA, PhD, Princeton University.

ALICIA TABLER, instructor. BA, MA, University of Wyoming.

## Speech, Language, and Hearing Sciences

JOHN HANSEN, department chair; associate professor. BS, Rutgers University; MS, PhD, Georgia Institute of Technology.

KATHRYN H. AREHART, associate professor. BS, Stanford University; MS, PhD, University of Washington.

NED W. BOWLER, professor emeritus.

DONALD S. FINAN, assistant professor. BS, MS, Eastern Illinois University; PhD, Indiana University.

NATALIE L. HEDBERG, professor emerita.

YOSHIYUKI HORII, professor emeritus.

ELIZABETH G. JANCOSK, senior instructor emerita.

RICHARD F. KRUG, professor emeritus.

SUSAN M. MOORE, director of clinical education and services. BA, College of New Rochelle; MA, JD, University of Denver.

LORRAINE OLSON RAMIG, professor. BS, University of Wisconsin, Oshkosh; MS, University of Wisconsin, Madison; PhD, Purdue University.

PETER R. RAMIG, professor. BS, MS, University of Wisconsin; PhD, Purdue University.

GAIL RAMSBERGER, associate professor. BS, MA, University of Colorado; Sc.D., Boston University.

BRENDA SCHICK, associate professor. BS, Purdue University; MS, Washington University; PhD, Purdue University.

ALLISON L. SEDEY, assistant professor. BA, MA, California State University, Northridge; PhD, University of Wisconsin, Madison.

LYNN SNYDER, professor. BA, College of New Rochelle; MA, Seton Hall University; PhD, University of Colorado at Boulder.

RICHARD H. SWEETMAN, professor emeritus.

RITA S. WEISS, professor emerita.

CHRISTINE YOSHINAGA-ITANO, professor. BA, University of Southern California; MA, PhD, Northwestern University.

## Theatre and Dance

BUD COLEMAN, department chair; associate professor. BFA, Texas Christian University; MFA, University of Utah; PhD, University of Texas, Austin.

BRUCE BERGNER, assistant professor. BA, University of Minnesota; MFA, University of Illinois.

DAVID CAPPS, director of dance; associate chair; associate professor. BA, Towson State College; MFA, New York University.

MARTIN T. COBIN, professor emeritus.

KERRY M. CRIPE, senior instructor. BFA, University of Evansville; MFA, Florida State University.

RICHARD DEVIN, director, Colorado Shakespeare Festival; professor. BA, University of Northern Iowa; MFA, Yale University.

NADA DIACHENKO, professor. BS, University of Maryland; MA, New York University.

MICHELLE ELLSWORTH, instructor. BA, New York University; MFA, University of Colorado at Boulder.

OLIVER GERLAND, associate professor. BA, Swarthmore College; PhD, Stanford University.

ROBIN HAIG, senior instructor. RAD, Advanced, London.

TOBY R. HANKIN, associate professor. BA, Barnard College; MA, Mills College.

CATHY HARTENSTEIN, assistant professor. BA, Colorado College; MFA, University of Texas, Austin.

CHARLOTTE YORK IREY, professor emerita.

MERRILL J. LESSLEY, associate chair; director of theatre; professor. BFA, University of Utah; MA, University of Minnesota; PhD, University of Utah.

JESSE MANNO, instructor, BA, University of Colorado.

STEVE McDONALD, senior instructor. BA, University of Colorado at Boulder; MFA, University of California, Irvine.

LYNN NICHOLS, general manager of Colorado Shakespeare Festival; senior instructor. BA, University of the South; MA, Emporia State College; PhD, University of Colorado at Boulder.

ONYE OZUZU, assistant professor. BA, MFA, Florida State University.

CECILIA J. PANG, assistant professor. BA, University of Guelph, Ontario, Canada; MA, San Francisco State University; PhD, University of California, Berkeley.

MARGARET LEE POTTS, associate professor emerita.

ROBERT J. SHANNON, senior instructor.

NANCY L. SPANIER, professor emerita.

THEODORE STARK, instructor. BA, College of William and Mary; MFA, Boston University.

JAMES M. SYMONS, professor. BA, Illinois College; MA, Southern Illinois University; PhD, Cornell University.

DANIEL YANG, professor emeritus.

## Western American Studies

TOM PRECOURT, executive director, Center of the American West. BA, University of Colorado at Boulder.

PATRICIA NELSON LIMERICK, faculty director, Center of the American West; professor, Department of History. BA, University of California, Santa Cruz; MA, MPhil, PhD, Yale University.

## Women's Studies

POLLY E. McLEAN, director; associate professor. BA, Richmond College, City University of New York; MS, Columbia University; PhD, University of Texas.

NAN ALAMILLA BOYD, associate professor. BA, University of California, Berkeley; MA, PhD, Brown University.

MARY C. CHURCHILL, assistant professor. BA, University of California, Berkeley; MA, PhD, University of California, Santa Barbara.

MICHIKO HASE, assistant professor. BA, MA, University of Tokyo; PhD, University of Minnesota.

ALISON M. JAGGAR, professor of women studies and philosophy. BA, University of London; MLitt, University of Edinburgh; PhD, State University of New York, Buffalo.

SUSAN K. KENT, associate vice chancellor for academic affairs, professor. BS, Suffolk University; MA, PhD, Brandeis University.

ANNE MARIE POIS, senior instructor. BA, State University of New York, Stony Brook; MA, PhD, University of Colorado.

JOANNA E. STAREK, instructor. BA, Colgate University; MS, University of Colorado at Boulder; PhD, Colorado State University.

MARCIA C. WESKOTT, professor emerita.

LINDA E. WHITE, instructor. BA, Michigan State University; MA, Cornell University; MA, PhD, University of Colorado.

## Writing and Rhetoric, Program for

PATRICIA SULLIVAN, director. BA, MA, University of Utah; PhD, The Ohio State University.

PIPER MURRAY, associate director. BA, DePaul University; MA, Purdue University; PhD, University of Wisconsin, Milwaukee.

ANNE BLISS, senior instructor. BA, Seattle University; MA, PhD, University of Colorado.

ANGELA S. BUCHANAN, instructor. BS, MA, Ball State University.

FRANCIS CHARTERIS, senior instructor. BFA, School of Visual Arts, New York; MFA, University of California, San Diego.

REBECCA J. DICKSON, instructor. BA, Colorado State University; MA, PhD, University of Colorado.

JANE ELIZABETH DOUGHERTY, instructor. BA, Coe College; MA, PhD, Tufts University.

DAMIAN DOYLE, instructor. BA, Central Connecticut State University; MA, University College Dublin; PhD, University of Colorado.

JAY ELLIS, instructor. BA, Berklee College of Music; MA, University of Texas; PhD, New York University.

DON ERON, senior instructor. BA, University of Colorado; MFA, University of Iowa.

ANDREA FELDMAN, instructor. BA, Cornell University; MA, PhD, University of Colorado.

HARDY FREDRICKSMEYER, instructor. BA, University of Colorado; MA, Columbia University; MA, PhD, University of Texas, Austin.

KAREN GASSER, instructor. BA, Colorado Women's College; MA, University of Denver; MA, St. John's College; PhD, University of Denver.

H. LYNN GINGRASS, instructor. BA, New York University; MA, Temple University.

SALLY GREEN, instructor. BA, University of Illinois at Urbana-Champaign; MA, University of Colorado.

JOAN LORD HALL, instructor. BA, University College, London; MLitt, Girton College, Cambridge.

SUZANN HUDSON, instructor. BA, MA, University of Colorado.

JUDY HUSSIE-TAYLOR, instructor. BA, MA, Maharishi International University.

GINGER KNOWLTON, instructor. BA, Kenyon College; MA, University of Colorado; PhD, University of Denver.

PETER KRATZKE, instructor. BA, MA, University of Washington; PhD, University of Kentucky.

CATHERINE KUNCE, instructor. BA, Colorado College; MA, PhD, University of Denver.

JUDITH LAVINSKY, senior instructor. BA, MA, University of Chicago.

TIM LYONS, instructor. BA, Occidental College; MA, Johns Hopkins University.

CHRISTINE MACDONALD, instructor. BA, Pomona College; MA, PhD, University of Colorado.

NANCY D. MANN, senior instructor. BA, Eckerd College; MA, PhD, Stanford University.

SUSAN McARTHUR, instructor. BA, San Jose State University; MA, University of Colorado.

LYNDA McNEIL, instructor. BA, Syracuse University; MA, Pennsylvania State University; PhD, University of Maryland.

PAUL T. MURPHY, senior instructor. BA, Boston College; MA, McGill University; PhD, University of Colorado.

LINDA NICITA, instructor. BA, State University of New York; MA, Ohio University; PhD, University of Colorado.

ROLF NORGAARD, senior instructor. BA, Wesleyan University; MA, PhD, Stanford University.

KATHRYN PIEFLOW, instructor. BA, Augustana College; JD, University of South Dakota.

JOHN PIIRTO, senior instructor. BS, MS, University of Wisconsin; MFA, University of California.

ESTHER QUINLAN, instructor. BA, Simmons College; MA, University of Colorado.

KAREN RAMIREZ, instructor. BA, Swarthmore College; MA, PhD, University of Illinois at Urbana-Champaign.

KERRY REILLY, instructor. BA, Providence College; MA, University of New Hampshire; MFA, University of Iowa.

KATHERINE ROBINSON, instructor. BA, West Virginia University; MA, Catholic University of America; PhD, Texas Women's University.

PETGER SCHABERG, instructor. BA, DePaul University; MA, University of Colorado.

MARGARET TILTON, instructor. BA, Williams College; MFA, University of Montana.

TOBIN VON DER NUELL, instructor. BA, San Diego State University; MA, University of Colorado.

PAULA WENGER, instructor. BA, University of Northern Colorado; MA, University of Denver; MA, Miami University.

DONALD H. WILKERSON, instructor. BA, MA, University of Colorado.

STEVEN WINGATE, instructor. BA, University of Massachusetts; MFA, Florida State University.

JULIET WITTMAN, instructor. BA, University of Delaware; MA, University of Colorado.

# Leeds School of Business

*Steven Manaster, dean*

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**T**HE LEEDS SCHOOL OF BUSINESS develops people who are knowledgeable in the best business practice, can think critically, communicate effectively, adapt to and lead change, act ethically, value diversity, and are competitive in the global economy. The school promotes academic excellence, fosters strong relationships with the surrounding business community, and emphasizes ongoing business research.

The school awards four degrees: the bachelor of science in business administration (BS), the master of science in business administration (MS), the master of business administration (MBA), and the doctor of philosophy in business administration (PhD). To maintain high standards of academic excellence, the school reviews, changes, and enhances the programs and curricula to coincide with a rapidly advancing business environment.

Strong historical ties to the business community enable the school to provide students with the most practical educational experience during their academic careers. The Business Advisory Council (BAC) is composed of high-level executives who provide advice, counsel, and an outside perspective to the dean and his administration while advocating for the school within the external community. Council members spearhead major parts of development programs, strengthen the school's nationwide network in business and political arenas, and provide significant input to curriculum design.

Each year, nationally recognized business executives visit the school to share their working-world experience, their expertise, and often their reflections on life outside of business. Since 1999, the school has sponsored a national Entrepreneur of the Year award day that enables students to participate in intimate discussions and receptions. Past winners include Joe Kraus, founder of the Internet portal Excite, and Jeff Bezos, founder of Amazon.com. Visiting executives are present in the classroom settings, informal luncheons, and after-hours meetings, and often hold office hours to meet with students individually. Students enjoy conversations with these professionals, which cover a range of subjects including: the types of courses students are taking, career planning, steps to success, their own successes and failures, and corporate and personal strategies.

The faculty of the school is made up of talented men and women who offer a diverse range of expertise and research activities. A number of professors are frequently published and recognized internationally as top researchers. In addition, many maintain strong ties within the business community and bring a current business perspective to the classroom. Business faculty members strive to deliver the most effective teaching in management theory and real-world applications to ensure a quality learning experience for business graduates.

## Facilities and Research Activities

The Leeds School of Business houses several resources for the specific needs of business students. The facilities include: the William M. White Business Library, the Douglas H. Buck Electronic Media Center, computerized classrooms, technology team rooms equipped with multimedia Pentium computers and software, a large computer lab and teaching lab, the MBA Business Center, a student lounge, faculty and administrative offices, the Business Research Division, the Deming Center for Entrepreneurship, the Real Estate Center, and the Burridge Center for Securities Analysis and Valuation.

The William M. White Business Library provides students a wealth of information pertaining to the business world. Students have access to business library databases, campus-network databases, and the university libraries online catalog. A variety of other databases, both CD- and web-based, contain a myriad of full-text magazines and journals; business periodical indexes; corporate annuals, 10-K, and proxy reports of all the public companies in the United States; short profiles of both American and international companies; demographic and business statistics; and investment reports written by Wall Street analysts. Twenty computers provide access to the World Wide Web. Knowledgeable librarians are always available to help navigate the search for information.

The White Business Library is part of the University of Colorado library system, which includes more than two million volumes, more than five million microforms, and more than 24,000 periodicals and serials. The system is also a full depository for United States government, international, and state documents.

All classrooms in the Leeds School of Business are electronic and equipped with Pentium Pro computers; Microsoft Office XP applications including Excel, PowerPoint, Word, and Access; state-of-the-art projection systems; and multimedia capabilities including video, cable, and Internet connections. Technology is often incorporated in class assignments, professors' post-course information, PowerPoint presentations, and Excel spreadsheets. The Leeds School of Business home page is at [leeds.colorado.edu](http://leeds.colorado.edu).

## Bureau of Business Research

Established in 1915, the Bureau of Business Research is one of the earliest organized state service-oriented bureaus in the country. The bureau houses the Business Research Division and three centers, which serve various outreach functions of the college.

The primary functions of the Business Research Division are to provide business executives, city managers, planners, association executives, and others with information useful in the operation of their organizations; to compile, present, and interpret information on current business and economic developments in the state and nation; to conduct business and economic studies that contribute to the most efficient use of Colorado's resources;

to encourage and assist faculty and students in research that will contribute to general knowledge in the areas of business, economics, and the related social sciences; to obtain and hold copyrights; and to publish research results.

In addition to the Business Research Division, the bureau houses four focused centers—the Rocky Mountain Trade Adjustment Assistance Center, the Mid-America Manufacturing and Technology Center, the CU Business Advancement Center, and the Center for Sustainable Tourism. Funding for center activities comes from the Leeds School of Business, the university, state agencies, the federal government, state and local business firms, and from the sale of research products and services.

The centers provide a variety of services, including services to the state, publications, contract research, and support for faculty research, both theoretical and applied. In addition, the centers provide outreach and community service activities and consulting support to small and medium-sized businesses in Colorado.

Research results are distributed through a combination of presentations and seminars and a wide variety of pamphlets, reports, proceedings, and books. Through its annual Business Economic Outlook Forum and bimonthly newsletter, the *Colorado Business Review*, the division provides basic business information concerning Colorado.

The **Rocky Mountain Trade Adjustment Assistance Center (RMTAAC)** is one of 12 centers across the nation funded by the Department of Commerce to assist U.S. manufacturers that have been hurt by foreign competition. The assistance is provided on a cost-share basis where RMTAAC typically pays more than 50 percent of the cost.

The purpose of the Trade Adjustment Assistance program is to retain and create U.S. manufacturing jobs. From its location in Boulder, RMTAAC assists manufacturers in the Rocky Mountain region. A typical client has \$10 million in annual sales and 100 employees.

Once a firm has been certified as eligible for assistance, a strategic business plan is developed to improve the firm's competitiveness. Necessary technical expertise is then brought in to implement the recommendations in the plan. Assistance, which normally takes two to three years, can be provided in all the functional areas.

The **Mid-America Manufacturing and Technology Center—Colorado (MAMTC—Colorado)** is a not-for-profit organization designed to help manufacturers improve quality, productivity, and marketing while reducing costs. MAMTC's mission is to provide business solutions that give manufacturers a competitive edge. Partial funding is provided by the NIST Manufacturing Extension Program and state resources, making some services available at no cost. Services include hands-on consulting, project management, seminars, industry roundtables, and equipment demonstrations. MAMTC professionals have expertise in business and engineering, and also provide access to a network of service providers.

The **CU Business Advancement Center (CU-BAC)** is an external outreach service to Colorado business and industry specializing in technology and new product commercialization. Services include database searches for technologies to provide licensure, technical reports, patents, and market information; market assessment for new technologies and products; and identification of expertise and research partnerships with CU and federal laboratories.

The **Center for Tourism Research and Center for Sustainable Tourism** is dedicated to research and program development in tourism throughout Colorado and the nation. Faculty and students from the university participate in funded research efforts that contribute to both technical and scholarly publications. The

center continues its original efforts to assist rural communities in recreation and tourism development.

Ongoing research is being conducted on the social, environmental, and economic impacts of recreation and tourism development on community life.

The center supports and facilitates the dissemination of tourism information through journals, proceedings, and other vehicles in printed and electronic media that advance the fields of travel, tourism, hospitality, and recreation.

## Academic Centers

In addition to the Bureau of Business Research, the college has two centers linking academic programs and the business community—the endowed Robert H. and Beverly A. Deming Center for Entrepreneurship and the Center for Real Estate.

The **Deming Center for Entrepreneurship** is a joint program of the Leeds School of Business and the College of Engineering and Applied Science. With CU-Boulder located in one of the leading entrepreneurial centers in the country, the program's mission is to ensure that undergraduate and graduate students receive a thorough grounding in entrepreneurial management skills via an integrated entrepreneurship course curriculum and in-company experiences. These uniquely focused courses and programs enable students to expand both their academic and career horizons as they view business from an entrepreneur's perspective. Students practice the creative thinking required to launch, develop, and effectively manage new and unstructured ventures.

To achieve the experiential aspects of the program, leading entrepreneurs are invited into the classroom as topical guest speakers throughout the year. Real-life encounters with professionals are supplemented by student field projects and internships with entrepreneurially oriented companies.

In 2003 the Deming Center was ranked 17th among national entrepreneurship programs by *U.S. News and World Report*. This is the fourth consecutive year the program was ranked among the top 20 nationally by this survey. Additionally in 2003, *Entrepreneurship* magazine conducted its first survey of the top 100 entrepreneurship programs and the Leeds School of Business Deming Center for Entrepreneurship was ranked 10th nationally by faculty.

Numerous entrepreneurship fellowships are available to undergraduate and graduate students each year. Via its courses and programs, the center provides students the opportunity to not only prepare themselves academically but also to have an edge in gaining employment and contributing in a meaningful way to the exciting new enterprises and emerging-growth companies that are an essential part of the nation's economy.

The **Real Estate Center**, founded in 1995, is supported by an industry council with the goal of advancing academic excellence in real estate education and scholarship. The center oversees the school's real estate teaching programs and advises the faculty in designing an integrated curriculum at both the graduate and undergraduate levels. Course work is drawn from the law school, the colleges of architecture and engineering, construction management, and others.

The center creates real-world experiences for students by providing project course work and being a resource for securing internships and mentors. It also provides support for faculty teaching and research activities in real estate and assists the university with its real estate portfolio.

The **Burridge Center for Securities Analysis and Valuation** is dedicated to encouraging and supporting the creation and dissemination of new knowledge about the world financial markets with an emphasis on the U.S. financial markets by:

- facilitating the exchange of ideas and knowledge between professional investment managers, finance scholars, policy makers, and the investing public;
- identifying critical research issues in the theory and practice of security analysis and valuation; and
- encouraging and supporting rigorous qualitative and quantitative research on topics relevant and useful to money managers, valuation experts, and finance academics.

## Career Opportunities

Leeds School of Business graduates are prepared for positions in the following fields:

Accounting—public, private, nonprofit, and governmental  
 Banking and other financial institutions  
 Consulting  
 Corporate financial management  
 Entrepreneurship and small business management  
 Financial analysis  
 Human resources management  
 Information systems  
 International business  
 Investment management  
 Management consulting and organization management  
 Marketing and sales management  
 Nonprofit management  
 Operations management  
 Real estate  
 Recreation and tourism management  
 Retailing  
 Taxation  
 Technology management  
 Transportation  
 Venture capital

Other graduates hold positions in fields as diverse as business journalism, public relations, city planning, chamber of commerce and trade association management, college administration, and government. The entrepreneurial area of application prepares students to start their own business ventures to take positions in emerging growth companies and the venture capital industry.

## Study Abroad

Study abroad programs are available for students interested in international business or in cultural experiences abroad. The college-sponsored London Seminar in International Finance and Business is a month-long program held each summer in the financial district of London and is open to juniors, seniors, and graduate students.

## Student Organizations

Listed below are organizations that promote professional interests and provide recognition of scholastic attainment:

AIESEC, international business association  
 Beta Alpha Psi, national honorary and professional accounting society  
 Beta Gamma Sigma, national honorary scholastic society in business  
 BSC (Business Students of Color)  
 CEO (Collegiate Entrepreneurs Organization)  
 CUAMA, student chapter of the American Marketing Association  
 CU Entrepreneurship Organization  
 CUFMA (CU Financial Management Association)  
 Delta Nu Alpha, honorary transportation society  
 Delta Sigma Pi, professional business society  
 Doctoral Business Student Association  
 Graduate School of Business Association  
 ISO (Information Systems Organization)  
 Leadership Council

MBA Entrepreneurship Solutions LLC  
 Phi Chi Theta, professional business and economics society  
 Real Estate Club  
 SAM (Student Association of Management)  
 Sigma Iota Epsilon, professional and honorary management society  
 Student Business Board  
 Women in Business

## Leeds School of Business Student Government

As the student governing body of the Leeds School of Business, the Business Board functions as a liaison between the students and the administration. The board helps formulate policies and represents students' interests in many different areas. Thirteen representatives are elected from the student body and serve for two semesters. Three board members, usually officers, are required to serve on the Leeds School of Business Academic Ethics Committee.

## Graduation Recognition Ceremony

Every December and May, the Office of the Dean and the Business Board sponsor a recognition ceremony honoring the graduating class, in addition to the university-wide commencement. Graduates and their families are invited to attend.

## Undergraduate Academic Excellence

### Honors

In recognition of high scholastic achievement, upon recommendation of the faculty, the designation "With High Distinction" or "With Distinction" will be awarded at graduation. To qualify for the "With High Distinction" designation, the student's cumulative University of Colorado GPA must be at least 3.90. For the "With Distinction" designation, the student's cumulative GPA must be at least 3.75 but less than 3.90. In addition, for these designations, at least 60 semester hours must have been earned at CU-Boulder.

In addition to the distinction of honors, Leeds School of Business students also may participate in the Latin honors granted by the College of Arts and Sciences. Qualified students are encouraged to participate in this program, which coordinates the offering of a variety of honors seminars as well as the granting of Latin honors (cum laude, magna cum laude, summa cum laude) at graduation. Granting of these honors is determined by the Honors Council based on several criteria, including the quality of original scholarly work (generally reported in the form of a thesis). Latin honors are not conferred on a graduate entering in the summer of 1995 and thereafter simply by virtue of high grades. Interested students should consult the Honors Program listing in the College of Arts and Sciences section or contact the Honors Program in Norlin Library.

### Dean's List

Students in the Leeds School of Business who complete at least 12 semester hours of graded work in the fall or spring semester and earn a GPA of 3.50 or better on the Boulder campus (excluding Continuing Education) are included on the dean's list, which is posted outside the Office of Undergraduate Studies.

### Beta Gamma Sigma

Membership in Beta Gamma Sigma is an honor that must be earned through outstanding scholastic achievement. Such membership is the highest scholastic honor that a student in a school of business or management can attain.

To be eligible for Beta Gamma Sigma membership, students must rank in the top seven percent of their junior class, the top 10 percent of their senior class, or be among the top 20 percent of those students receiving master's degrees. Also, students completing all requirements for the doctoral degree conferred by a business school are eligible for Beta Gamma Sigma. It should be noted that Beta Gamma Sigma chapters may be chartered only in those schools of business and management accredited by AACSB, the International Association for Management Education.

## Scholarships

Each year the college awards a number of divisional and general scholarships. Business scholarships are generally for students who have completed business course work at the university. The amount and number of the awards vary each year. For additional information, students may contact the Office of Undergraduate Studies.

## Undergraduate Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery or falsification of official records, and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university. Any reported act of academic dishonesty may be referred to the Leeds School of Business Academic Ethics and Appeals Committee at the discretion of the associate dean, a member of the instructional staff, or another appropriate university representative.

Students are advised that plagiarism consists of any act involving the offering of someone else's work as the student's own. It is recommended that students consult with instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Official college procedures concerning academic ethics are maintained in the Office of Undergraduate Studies.

### Standards of Performance

Students are held to basic standards of performance with respect to attendance, active participation in course work, promptness in completion of assignments, correct English usage both in writing and speech, accuracy in calculations, and general quality of scholastic workmanship.

In general, examinations are required in all courses and for all students.

To be in good standing, students must have an overall grade point average of 2.00 or better for all course work taken, and a 2.00 or better for all business courses taken. Students must earn a passing grade for all required courses. These requirements apply to courses taken at all university campuses. Physical education activity courses, repeated courses, and remedial course work are not included in the overall grade point average.

Any student earning all failing grades or no academic credit for a semester is not permitted to register without the dean's approval.

Official double-degree students are required to maintain the same standards of performance as Leeds School of Business students in order to continue in their program.

When semester grades become available, students below the acceptable standard are placed on probation or suspension. Students are responsible for being aware of their academic status at all times. School rules governing probation and suspension are as follows:

**Probation.** Students whose cumulative grade point average or cumulative business GPA falls below 2.00 will be placed on probation immediately. Those students who enroll in any term in the calendar year, excluding summers, after being placed on probation are expected to raise their cumulative or business GPA to at least a 2.00. CU-Boulder's summer session or enrollment through Boulder evening courses does not count as a probationary semester.

*Note:* Suspended Leeds School of Business students who transfer into another school or college of the university will not be eligible to register for business courses or for readmission to the Leeds School of Business.

**Suspension.** Suspended students may attend summer session at any University of Colorado campus, take correspondence courses, and/or take Continuing Education Boulder evening credit classes in order to improve their GPA in the area of deficiency. They may also return as transfer students by overcoming their deficiencies at another institution (i.e., by achieving an overall 2.00 GPA in their University of Colorado work and all work taken elsewhere since dismissal; these transfer grades [nonbusiness courses only] are only used for the purpose of readmission and do not remain in the University of Colorado GPA). Dismissed students pursuing this latter option have two semesters after readmission to raise their University of Colorado GPA to 2.00 or they will be permanently suspended.

A student who has been under suspension for one calendar year and elected none of the above may apply for readmission to the Leeds School of Business. Students have two semesters to raise their cumulative or business GPA to at least 2.00.

Students who make up their grade deficiencies prior to the expiration of the one-year suspension and desire to be readmitted must reapply to the university through the Office of Admissions. Readmission is subject to enrollment limitations.

Students who have been suspended once and then readmitted by the Leeds School of Business will be permanently suspended if their overall grade point average, or business grade point average, again falls below a 2.00.

Any student who is placed on suspension more than once will be permanently suspended from the Leeds School of Business and may not attend any campus of the University of Colorado as a business student.

## Undergraduate Admission and Enrollment Policies

All students are responsible for knowing and following the provisions set forth below. Any questions concerning these provisions should be directed to the college. The college cannot assume responsibility for problems resulting from a student's failure to follow the policies stated here or from incorrect advice given by those outside the Office of Undergraduate Studies. Similarly, students are responsible for all deadlines, rules, and regulations stated in the *Registration Handbook and Schedule of Courses*. All rules and regulations are subject to change. Any questions should be directed to the Leeds School of Business, Office of Undergraduate Studies, room 227, **303-492-6515**.

### Admission to the Business Program

Prospective freshman students are encouraged to complete strong academic programs in high school. A minimum of four academic units should be completed each year with special emphasis given to writing, mathematics, and science skills. For a detailed explanation of the high school preparation desired, see Undergraduate Admission in the General Information section.

Transfer students are expected to demonstrate proficiency in writing and mathematics. Prospective transfer students should

complete courses equivalent to those taken by University of Colorado business freshmen and sophomores.

### *Intrauniversity Transfer*

An undergraduate student who is enrolled on the Boulder campus and wishes to transfer to the Leeds School of Business and Administration may submit a completed application for the fall or spring semester. For assured admission, students must have a 3.00 CU cumulative GPA; a 2.00 cumulative GPA in business courses; 24 completed semester hours, 12 of which must be graded work at CU-Boulder; 6 credit hours of math, including MATH 1071 or ECON 1078, and MATH 1081 or ECON 1088 or a calculus course; and microeconomics and macroeconomics. Intrauniversity transfer students must take a minimum of 30 hours of business courses, including their area of emphasis, in residence after admission to the college. The deadline is October 1 for spring admission and March 1 for fall admission. Students must attend an IUT meeting to obtain an application.

### *Diversity*

In addition to grade point average requirements, hours taken, and nonbusiness course requirements completed, the college considers other factors that contribute to diversity in the student body. Factors contributing to a more diverse student body are race and ethnic background; economic or physical limitations; and unique situations.

### Registration for Business Courses

Students may register only for those courses for which they have the stated prerequisites. Priority is given to students officially in the business program.

### *Administrative Drops*

Instructors may recommend to the Office of Undergraduate Studies that students who fail to meet expected course attendance or prerequisites be dropped from their courses.

### *Attendance Regulations*

Classroom attendance is left to the discretion of the instructor. Students are responsible for understanding each instructor's policy on attendance.

Students enrolled in one section of a business course who attend a different section will receive a final grade of *F* for nonattendance. Students attending classes for which they are not enrolled will not be added after the final schedule adjustment period is over.

### *Concurrent Registration*

Concurrent registration is for graduating seniors who must be enrolled on two campuses of the University of Colorado at the same time in order to fulfill graduation requirements.

Students enrolled in the Leeds School of Business may only exercise the concurrent registration option if they are in their graduating semester; students who are two semesters from graduating and cannot obtain a course necessary to complete a prerequisite sequence may also use this option. The course must be required for graduation and must not be offered on the Boulder campus, or the course must conflict with another required course in which the student is enrolled. Students from other colleges and schools who wish to take business courses must have the approval of their own college or school before submitting the concurrent registration form.

### *Scholastic Load*

The normal scholastic load of an undergraduate student in the college is 15 semester hours, with a maximum of 18 hours

during the fall and spring semesters. A maximum of 6 hours may be taken during a five-week summer term, with no more than 12 hours total during the 10-week summer session.

### Credit Policies

To receive credit, all courses must be listed on the student's official transcript by the Office of the Registrar. Credit is then evaluated by the Leeds School of Business to determine degree acceptability.

#### *Cooperative Education Credit*

No credit is given for work experience or cooperative education programs.

#### *Correspondence Credit*

No business courses can be taken by correspondence. All non-business correspondence courses must have prior approval and be evaluated to determine their acceptability.

#### *Credit by Examination*

**Advanced Placement (College Board).** For students who earn scores of 3, 4, or 5 on Advanced Placement exams, college credit will be given where appropriate. See the General Information section for a comprehensive chart on AP credit.

**College-Level Examination Program (CLEP).** College credit for approved CLEP subject examinations may be considered, providing the scores are at the 67th percentile or above. Specific information is available in the Office of the Dean.

CLEP credit is only appropriate for prebusiness requirements and nonbusiness electives. A maximum of 6 hours of credit in any one course area is allowed. CLEP may not be used in course areas where credit has already been allowed. General examinations are not acceptable.

Before a CLEP examination can be taken, students must have prior approval in writing by the Office of Undergraduate Studies.

#### *No Credit*

Because of enrollment limitations, business classes may not be taken on a no-credit basis.

#### *ROTC Credit*

Students who are enrolled in and complete the ROTC program may apply a maximum of 12 semester hours of advanced ROTC credit toward nonbusiness elective requirements and toward the 120-semester-hour degree requirement for the BS degree in business administration. Students must be enrolled as official ROTC students in order to receive degree credit for ROTC courses. No credit toward degree requirements is granted for basic (freshman and sophomore) ROTC courses. The ROTC advisor can provide more detailed information.

#### *Special Sources of Credit*

The college reserves the right to accept or reject all special sources of credit that do not have prior approval of the dean.

#### *Independent Study*

A maximum of 6 hours of independent study will be accepted as degree credit. Prior approval is required if the work is to be applied as degree credit. A maximum of 3 hours may be taken in any one semester.

#### *Study Abroad Credit*

Transfer credit from study abroad programs is applied as business or nonbusiness elective credit. Students planning to attend study abroad programs must meet with an undergraduate advisor and have their course selections approved before leaving campus.

More specific information about these opportunities is available from the Office of International Education.

### Transfer Credit

The school reserves the right to disallow any credit that it deems inappropriate degree credit.

Credits in business subjects transferred from other institutions will be limited to the number of credit hours given for equivalent work in the regular offerings of the university. Only work from regionally accredited institutions will transfer to the college. A maximum of 60 semester hours of credit may be accepted from a two-year school.

Actual equivalent courses may be substituted for required courses. Students must submit a carefully checked catalog description and course syllabus for course equivalency determination, since a course given at another institution may have the same name and same textbook as a required business course and still be taught with a nonbusiness emphasis or other variations that give it little value for business.

Business students desiring to apply course work from another institution or University of Colorado campus toward the BS degree in business administration must have prior approval of the Leeds School of Business. Only nonbusiness requirements or elective credit is acceptable in transfer from other institutions once the student has enrolled in the college.

All courses in the area of emphasis must be taken at the University of Colorado at Boulder unless written approval is given by the associate dean of undergraduate studies. Transfer students must take a minimum of 30 hours of business courses, including the area of emphasis, in residence after admission to the college. For more information on transfer of credit policies, see Transfer of College-Level Credit in the Admission section.

### Grading Policies

In addition to the campuswide grading system and pass/fail policy listed under Registration in the General Information section, the Leeds School of Business enforces the following policies.

#### Pass/Fail

Students in the Leeds School of Business may not use courses taken on a *pass/fail* basis to satisfy required business, required nonbusiness, or elective business courses. Only nonbusiness electives may be taken on a *pass/fail* basis. A maximum of 16 hours of *pass/fail* credit may be applied toward the BS degree in business administration; transfer students may take 1 hour of *pass/fail* for every 8 hours successfully completed at this institution. *Pass/fail* determination must be made within the first two weeks of the semester and is irreversible. A maximum of 6 hours designated *pass/fail* may be taken in any one semester.

**Failed Courses.** Failed courses may be repeated, but the *F* will be included in the grade point average.

#### Incomplete Grades

The *only* incomplete grade given in the college is *IF*. An *IF* grade is given only when documented circumstances clearly beyond the student's control prevent the student from completing the course. Generally, students should make up the missing work and not retake the entire course. Students should not register for the class a second time, and the work should be made up with the instructor giving the *IF*. All *IF* grades must be made up within one year or the *IF* will be changed to a grade of *F*.

#### Grade Changes

Final grades as reported by instructors are considered permanent and final. Grade changes will be considered only in cases

of documented clerical errors, and must be approved by the associate dean.

### Withdrawal

Students may withdraw any time before the beginning of the final examination period.

Students who withdraw during the semester are not assured admission the following semester but will be considered on an individual basis, if space is available.

## Undergraduate Degree Requirements

### Knowledge and Abilities of Business Students

The following areas of knowledge are central to the undergraduate degree in business administration:

- knowledge of core business concepts that provides students with a comprehensive understanding of the basic functional areas of the discipline;
- knowledge in one or more of the five areas of emphasis, in which students are exposed to in-depth study that provides them with the tools necessary to solve complex business problems;
- awareness of the interrelations between academic theory and practice in order for students to be fully equipped to make effective decisions;
- strong verbal and written communication skills, proficiency in business computer applications, and knowledge of international business environments;
- knowledge of mathematics sufficient to facilitate the application of quantitative principles; and
- awareness of the importance of academic fields in the area of arts and sciences, with special emphasis placed on the study of economics, political science, and other related fields.

In addition, students completing a degree in business administration are expected to acquire:

- the ability to apply basic business principles to solve problems in new and recurring situations;
- the ability to conceptualize and analyze decision-making situations to facilitate solutions in an effective and timely manner; and
- the ability to effectively communicate the results of problem-solving situations, both verbally and in writing.

Having acquired these skills and knowledge, students are able to conceptualize and analyze the concept of business and problem solving as a system. They have the ability to present solutions to business problems in an understandable and useful form. Their education provides them with excellent working knowledge, not only in the field of business, but also in related academic disciplines.

### Advising and Records

Business students receive academic counseling from a staff of advisors in the Office of Undergraduate Student Services. During the semester, advisors are available Monday through Friday from 9:00 A.M. to noon and 1:00 P.M. to 4:00 P.M. During registration periods, advisors are available to answer registration questions. Individual advising and scheduling are not possible during registration periods; rather, they should be obtained throughout the semester.

Students may look at their individual progress sheet any time during advising hours, and a copy will be provided upon request.



Students are expected to assume responsibility for planning their program in accordance with college rules and policies.

Students are encouraged to discuss the various emphases available as well as career opportunities with the faculty of the college.

### Requirements for the BS (Business Administration) Degree

The bachelor of science degree requires:

**Total Credits.** A minimum of 120 acceptable semester hours of credit, as follows:

<i>Required Courses</i>	<i>Semester Hours</i>
Business core requirements	28
Business area of emphasis requirements	15
Business electives	18
Nonbusiness course requirements	39
Nonbusiness electives	20

The school reserves the right to disallow any credit that it determines is not appropriate academic credit.

**Residence.** Students must complete 30 hours of business courses in residence on the Boulder campus after admission to the college, including the 15 hours in the area of emphasis and the 9 hours in the area of application (included in the business electives). Students must be in residence at CU-Boulder, and must be registered as business degree students during the term of graduation.

**Grade Point Average.** A minimum scholastic cumulative grade point average of 2.00 is required for all courses attempted at the university, including 2.00 cumulative for all business courses, 2.00 cumulative in the required areas of emphasis courses, and 2.00 cumulative in the area of application courses.

### General Requirements

#### Business Core Requirements (28 semester hours)

<i>Required Courses</i>	<i>Semester Hours</i>
BCOR 1000 Business Computing Skills	3
BCOR 1100 Profiles in American Enterprise	3
BCOR 2000 Accounting and Financial Analysis 1	4
BCOR 2010 Business Statistics	3
BCOR 2050 Fundamentals of Marketing	3
BCOR 2100 Introductory Finance	3
BCOR 2150 Adding Value with Management	3
BCOR 3000 Business Law, Ethics, and Public Policy	3
BCOR 4000 Business Senior Seminar	3

#### Business Area of Emphasis (15 semester hours)

Students must choose an area of emphasis in accounting, finance, systems, management, or marketing. Areas of emphasis consist of 15 semester hours beyond any business core courses.

#### Business Electives (18 semester hours)

Business courses required for areas of application are included in business electives.

Business courses required by specific areas in excess of the 15 hours listed under areas of emphasis are included in business electives.

#### Nonbusiness Requirements (39 semester hours)

Mathematical skills (Note 1)	6
Written communication (upper division)	3
Historical context	3
Cultural and gender diversity	3
United States context	3
Literature and the arts (3 semester hours must be upper-division)	6
Natural sciences	6
Contemporary societies (Note 2)	6
Ideals and values	3

A list of courses that fulfill specific requirements for each area can be found on the CU web site at [www.colorado.edu/artsscience/students/undergraduate/core.html](http://www.colorado.edu/artsscience/students/undergraduate/core.html).

#### Curriculum Notes

1. Students may complete the math requirements by taking MATH 1071 and 1081. A college-level calculus course may be substituted for MATH 1081. All math requirements must be completed for junior standing.
2. A minimum of 3 semester hours of both microeconomics and macroeconomics is required.

#### Nonbusiness Electives (18 semester hours)

Not all classes are accepted as elective credits. Generally, to be acceptable, electives must have a form of assessment such as a term paper and/or examinations, and must be regular classroom-type courses. Course coverage must be college level, must not be repetitious of other work applied toward the degree, must be academic as opposed to vocational or technical, and must be part of the regular university offerings.

Specifically, the college will accept:

- A maximum of 12 hours of nontraditional credit. However, only 6 hours maximum from each of the following categories will apply as a part of the 12 hours: 6 hours of independent study, 6 hours of performance classes (choir, band, guitar, etc.), 6 hours of fine arts (painting, drawing, etc.), 6 hours of teaching (BADM 3820 and 3830), and 6 hours of physical education theory and dance. The college will not accept workshops, orientations, practica, certain teacher education classes, or certain classes offered by the College of Arts and Sciences.
- The only approved exceptions to the 6-hour limit in each category are 12 hours of ROTC credit, providing the student is enrolled and completes the program, and 12 hours of PRLC credit.

The previous examples are not exclusive but are intended to be guidelines.

The Leeds School of Business reserves the right to disallow any credit that it determines is not appropriate academic credit. For more information, contact the Office of Undergraduate Student Services.

#### Senior Audit

Prospective graduates must sign up for a senior audit with the Office of Undergraduate Studies and the Office of Career Development the semester before they plan to graduate. Students planning to graduate in May must request a senior audit by the previous October 1; August graduates must request a senior audit by the previous October 1; and December graduates must request a senior audit by the previous March 1. Failure to do so will delay graduation.

Students desiring to change their area of emphasis after completing the senior audit must request the change through their advisor no later than the first week of class of their final semester. Changes after that time will delay graduation.

### Double-Degree Programs

Numerous career opportunities exist for graduates trained in both a specialized field and business. For this reason students may be interested in a double-degree program leading to completion of degree requirements concurrently in two fields. Such double-degree programs have been arranged for engineering, environmental design, journalism, and music, and may be arranged for other professional combinations as well.

A combined bachelor's and master's degree program in telecommunications is available. Students take systems as their area of emphasis in business administration with advanced courses in telecommunications. See the program description under the information systems area of emphasis.

The two programs of study proceed concurrently, terminating together with the awarding of two degrees. Normally, at least five years will be needed to complete a double-degree program. No substitutions are allowed, and a minimum of 150 semester hours is required for all double-degree programs.

Students desiring to transfer from double-degree programs to the Leeds School of Business must submit an application to the Office of Undergraduate Studies.

For further information contact the Office of Undergraduate Studies.

## Minor in Business for Nonbusiness Students

A minor in business consists of 22 semester hours in addition to any prerequisite courses. Due to limited space in the required business courses during the fall and spring semesters, the school strongly suggests that students complete minor requirements during summer terms.

<i>Required Courses</i>	<i>Semester Hours</i>
BCOR 1000 Business Computing Skills .....	3
BCOR 2010 Business Statistics .....	3
BCOR 2000 Accounting and Financial Analysis 1 .....	4
BCOR 2050 Fundamentals of Marketing .....	3
BCOR 2100 Introductory Finance .....	3
BCOR 2150 Adding Value with Management .....	3
BCOR 3000 Business Law, Ethics, and Public Policy .....	3

In addition to the required 22 semester hours of course work, the following requirements apply to the minor program in business:

- No *pass/fail* work may be applied toward the minor.
- The cumulative grade point average for all minor degree course work must equal 2.00 or higher.
- Students will be allowed to apply no more than 9 credit hours of transfer work.
- Students must complete prerequisite courses as stated in the course descriptions.

## Areas of Emphasis: Leeds School of Business Programs

All business students pursuing a bachelor's degree in business administration must complete the prescribed courses in at least one area of emphasis. The school offers programs in five areas of emphasis: accounting, finance, systems, management, and marketing. An area of emphasis consists of a minimum of 15 semester hours taken at the University of Colorado at Boulder. A 2.00 cumulative grade point average is mandatory for the required area of emphasis courses.

In addition to the area of emphasis, students also may complete an area of application. The school offers the following areas of application: entrepreneurship and small business management, international business, tourism management, and real estate. An area of application consists of a minimum of 9 semester hours taken at the University of Colorado at Boulder. A 2.00 cumulative grade point average is required for the required area of application courses. Successful completion of additional requirements in some of these areas of application entitles students to a certificate issued by the dean of the college.

The school also offers a minor program in business for non-business students.

## Accounting

The accounting area of emphasis prepares students for careers in which they will develop, analyze, and interpret complex financial data. Accounting majors become experts in "the language of business." This expertise prepares them for careers in CPA firms, business consulting, industry (from Fortune 500 companies to small entrepreneurial enterprises), not-for-profit enterprises, or government. Accountants who develop careers in public accounting become partners in the Big-4 or other consulting firms. Those who make their careers in industry may have positions as a chief executive officer (CEO), chief financial officer (CFO), chief accounting officer (CAO) or controller, tax

specialist, internal auditor, accounting systems analyst, financial analyst, or managerial accountant. Many students begin their careers in CPA firms and move to industry or government after several years of experience. Employers seek students with skills in communication, interpersonal interactions, analytical thinking, problem solving, and integrity.

There are four major areas of study in the accounting area of emphasis: Financial Accounting and Analysis, Tax Planning and Compliance, Managerial Accounting, and Auditing and Assurance Services. Basic course work in accounting focuses on developing a comprehensive understanding of the theory and concepts underlying the presentation of financial and operating information about an enterprise to external and internal users. Additional coursework exposes the student to income taxation of business enterprises and individuals, the practice and principles of auditing and assurance services, and cost management. Specialization is available through graduate work.

Most accounting students from the University of Colorado earn professional credentials within a few years of completing their degrees. The two major types of professional certification are certified public accountant [CPA] and certified management accountant [CMA]. The CPA's expertise focuses on presentation and analysis of financial information for an external user. The CMA's primary focus is on the internal user. Professional accountants' expertise in financial matters and their understanding of company operations through financial information prepare them to become key players and critical decision makers for all aspects of business creation, operation, and transformation.

Requirements for the CPA license vary significantly by state. Every state requires that the candidate pass the two-day Uniform CPA Examination (a standard national exam), but the requirements regarding educational background and work experience are state-specific. Colorado is one of the few states that requires only a bachelor's degree (at least 120 hours) to sit for the CPA exam. Most states have passed rules requiring 150 hours of university education. All states write their own rules about the number of hours, specific courses, and experience required for becoming a CPA in that state. **It is very important that the accounting student obtain the guidelines for the relevant state to ensure proper development of his or her degree plan. The minimum requirement for earning a bachelor's degree with an emphasis in accounting in the Leeds School of Business does not satisfy the requirements to take the CPA exam in any state. The Leeds school provides the flexibility to meet most states' CPA education requirements with a concurrent bachelor's/master's degree program option. Students who wish to prepare for a career as a CPA MUST determine the requirements of the state in which they intend to seek certification and set up their degree plans accordingly.**

This program allows the student to earn both a bachelor's and a master's degree. Both concurrent degrees may be in accounting, but many students who choose the concurrent degree option plan their programs so that they are awarded a bachelor's degree in finance or systems and a master's degree in accounting. This program includes an optional (but highly recommended) for-pay/for-credit internship.

The degree options are:

**1. The bachelor of science in business administration with an emphasis in accounting.** This degree may be earned by a student who takes 15 hours of accounting beyond the core. The 15-hour requirement for the degree **does not qualify the student to sit for the CPA exam in any state.** This option may be chosen by a student who does not want to become professionally certified but who seeks a career involving accounting and financial analysis in industry, government, or not-for-profit enterprises.

**2. The bachelor of science in business administration with an emphasis in accounting, enhanced by additional coursework required to sit for the CPA exam in various states.** The student who aspires to earn the CPA credential must go beyond the basic college requirements for earning an area of emphasis. These requirements vary by state, but always include significantly more hours in accounting. Each student is responsible for determining the relevant requirements for the desired state of residence following graduation.

**3. The concurrent bachelor of science/master of science degree in business administration with a concentration in accounting or taxation.** This degree plan best prepares the student for becoming a CPA. Details on this program are provided under the Graduate Degree Programs section.

An additional year of study leading to an MS is available to graduates of four-year programs in accounting or other business disciplines. For those students who do not have an undergraduate degree in accounting or business but wish to pursue a graduate degree in the field, it is possible to take accounting courses in the MBA program. Consult the graduate section of this chapter for more information about advanced degree programs.

The undergraduate area of emphasis in accounting consists of at least 15 semester hours of course work beyond the undergraduate core requirements.

<i>Required Courses</i>	<i>Semester Hours</i>
ACCT 3220 Financial Reporting and Analysis 1	3
ACCT 3230 Financial Reporting and Analysis 2	3
ACCT 3320 Cost Management	3
Plus at least 6 credit hours from the following courses:	
ACCT 4430 Personal Financial Planning	3
ACCT 5240 Advanced Financial Accounting	3
ACCT 4250/5250 Financial Statement Analysis	3
ACCT 5330 Advanced Cost Management	3
ACCT 4540/5540 Accounting Information Systems	3
ACCT 4620/5620 Auditing and Assurance Services	3
ACCT 4800/5800 Government and Non-Profit	3

## Finance

The finance area of emphasis is designed to provide students with in-depth exposure to the theoretical concepts and applied tools and techniques necessary for entry-level positions in various areas of financial management. The principal areas of study include financial management, money and capital markets, investments and derivative securities, and financial institutions.

Finance is an applied discipline with an analytical orientation. Effort is made to develop students' ability to think logically about financial problems and to formulate sound financial decisions and policies. Although the emphasis is on financial management of profit-oriented organizations, the principles and concepts developed are also applicable to not-for-profit and governmental organizations.

It is strongly recommended that finance students take additional accounting (such as ACCT 3220 and ACCT 3230) beyond the business core requirements.

<i>Required Courses</i>	<i>Semester Hours</i>
FNCE 3010 Corporate Finance	3
FNCE 3020 Financial Markets and Institutions	3
Plus any three of the following six courses:	
FNCE 4000 Financial Institutions Management	3
FNCE 4020 Applied Business Finance	3
FNCE 4030 Investment and Portfolio Management	3
FNCE 4040 Derivative Securities	3
FNCE 4050 Capital Investment Analysis	3
FNCE 4060 Special Topics in Finance	variable credit

## Management

The management area of emphasis addresses the effective management of people, organizations, and technology to improve the performance of diverse public and private organizations. The area provides the managerial skills necessary for success in entry-level positions, and builds the foundations required for success in management positions of greater responsibility, authority, and leadership. Students completing the management area of emphasis are viewed by potential employers as having the broad-gauged education required in the team-oriented, horizontally organized, and globally competitive environments of the 21st century. The management area of emphasis prepares students for careers in general management or can serve as a strong secondary major to complement another functional area.

The management area of emphasis begins with three required courses covering modern theories of quality management and the development of critical managerial skills.

<i>Required Courses</i>	<i>Semester Hours</i>
MGMT 3020 Total Quality Management	3
MGMT 3030 Critical Leadership Skills	3
MGMT 4000 Strategic Management	3

Students must choose one of two tracks, one emphasizing the management of human resources, and the other emphasizing the management of operations. Cross-over courses are also possible with students in one track taking elective courses in the other track.

### Human Resource Management Track

The human resource management track provides students with the knowledge and skills necessary to earn certification in human resources from the Society of Human Resources, the principal professional society in the field. Graduates are qualified to act as human resource generalists in small- to medium-sized companies; specialists in organizations with more diverse human resource units; or well-rounded general managers in any organization. Under the human resource track, students must select three of the following courses.

MGMT 4010 Employee-Employer Relationship	3
MGMT 4020 Hiring and Retaining Human Resources	3
MGMT 4030 Managing Employee Reward Systems	3
MGMT 4040 Individual, Team, and Organizational Development	3

### Operations Management Track

The principal function of any organization is the efficient creation and delivery of products and services to its customers. The operations management track focuses on this creative process and identifies how organizations use productivity, quality, flexibility, timeliness, and technology to compete and prevail in their markets. Students graduating from the operations management track will have a broad understanding of the importance of operations in the success of any organization, and will be qualified to serve in entry-level line management positions and as general managers later in their careers. Under the operations management track, students must select three of the following courses.

MGMT 4050 Competing with Operations	3
MGMT 4060 Business Process Design	3
MGMT 4070 International Operations Management	3
MGMT 4080 Environmental Operations	3

## Marketing

The marketing area of emphasis hones skills in analysis and decision-making for a wide spectrum of marketing careers in fields such as advertising, market research, brand management, e-business, selling and sales management, distribution, industrial and

business-to-business marketing, international marketing, the marketing of services, and marketing for not-for-profit organizations.

Marketing strategies are essential to the communication and sale of both products and services. They are applied across consumer and business markets, across domestic and global boundaries, and across traditional and electronic business environments. Key concepts focus on identifying customer needs and wants, developing products and/or services to satisfy these needs and wants, establishing channels and communications to move products and services through intermediaries to end users, and monitoring transactions and customer responses to guide future activities.

Students should choose from one of the following two plans for taking required marketing courses. Students with a marketing emphasis must take 15 hours of marketing courses beyond BCOR 2050. These students should select Plan A. Plan B is intended for those students wishing to take marketing courses as part of their business electives.

*Students pursuing a marketing emphasis (Plan A) will need three semesters to complete the required course work (beyond BCOR 2050).*

#### Plan A

(For students with marketing as their area of emphasis)

Required Courses	Semester Hours
MKTG 3250 Buyer Behavior	3
MKTG 3350 Marketing Research	3
(Students planning on graduating in four years must take both MKTG 3250 and MKTG 3350 in their junior year.)	

Two of the following courses must be taken after the completion of MKTG 3250 and MKTG 3350 and before enrolling in MKTG 4800:

MKTG 4150 Sales Management	3
MKTG 4250 Product Strategy	3
MKTG 4350 Services Marketing Strategy	3
MKTG 4400 International Marketing	3
MKTG 4550 Advertising and Promotion Management	3
MKTG 4650 Institutional Relationships and Strategy	3

MKTG 4800 Marketing Strategy and Policy (capstone course for marketing majors only, to be taken after completion of two 4000-level marketing electives. Offered in fall and spring semesters only.) 3

#### Plan B

(For students taking marketing courses as business electives)

Required Courses	Semester Hours
MKTG 3250 Buyer Behavior	3
MKTG 3350 Marketing Research	3
Other 4000-level marketing course	3

## Systems

The systems area of emphasis addresses the complexity that results from the interactions of a collection of people, processes, organizations, and technologies. Dealing with complexity requires systems thinking in addition to knowledge of methodologies and techniques. The systems area of emphasis approaches problem solving, analysis, design and implementation of systems, and application of technology in a way that is useful to all types of organizations, large and small, public or private. In the systems area of emphasis students must choose one of two tracks, one emphasizing information systems or one emphasizing the operation of systems.

## Information Systems Track

The information systems track prepares students for professional careers in information systems involving people, organizations, computers, and networks. Students develop the technical skills and organizational insights required to analyze, design, implement, and manage information systems in a networked world. The track focuses on the analysis, design, and implementation of integrated, networked, and distributed information systems. The areas of study include systems development, database design, network design, and the integration of these skills for solving problems and creating opportunities.

Under the information systems track, students are required to complete at least six hours of programming courses in addition to the area of emphasis courses. Examples that meet this requirement include but are not limited to:

Required Course	Semester Hours
SYST 2010 Visual-Language Programming	3
SYST 2030 Introduction to Object-Oriented Programming	3

The following courses are taken as nonbusiness electives:

CSCI 1200 Introduction to Programming	4
CSCI 1300 Computer Science 1: Programming	4
CSCI 2270 Computer Science 2: Data Structures	4

## Area Courses

Students in the information systems track are required to take the following three courses:

SYST 3000 Systems Thinking	3
SYST 3010 Systems Analysis and Design	3
SYST 3020 Database Design and Inquiry	3

Plus any *two* of the following five courses:

SYST 3510 World Wide Web Technologies	3
SYST 4020 Advanced Systems Development	3
SYST 4030 Network Design and Management	3
SYST 4060 Business Process Design	3
SYST 4510 Systems Design for Usefulness and Usability	3

Students may take the following course as a business elective. However, this course does not count toward the area of emphasis in the Information Systems Track.

SYST 3050 Digital Business Strategies	3
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## BS/MS Program

In addition to the information systems track, the Leeds School of Business offers a unique program that allows undergraduates the opportunity to earn a bachelor's and master's degree simultaneously. The joint program graduates students with a bachelor's degree from the Leeds School of Business in information systems and a master's degree from the College of Engineering in telecommunications.

## Career Possibilities

Students completing this track may take jobs as systems analysts, systems designers, software engineers, network administrators, and the like. When combined with the operations track or a second area of emphasis in accounting, finance, management, or marketing, additional opportunities exist for technology analyst positions within these other business areas. For students interested in improving their information technology background for application to other fields but not wishing to take the entire track, the 3000-level courses in information systems provide a strong foundation to support the effective application of information technology to other business areas.

## Systems Operations Track

Efficiently running a complex organization or operation requires the precise coordination of materials, equipment, people, and information. The systems operations track is concerned with the design, analysis, and operation of systems ranging from a single piece of equipment to large business, social, and environmental systems. In each instance, the operations specialist's interest lies in modeling system functions and determining how best to achieve the objectives of the system. Students in this track learn methodology that is primarily quantitative in nature and that stresses the use of analytical models or of computer simulations with the goal of improving the output of managerial decision-making processes.

### Area Courses

Students in the systems operations track are required to take the following three courses:

<i>Required Courses</i>	<i>Semester Hours</i>
SYST 3000 Systems Thinking .....	3
SYST 3030 Total Quality Systems .....	3
SYST 4050 Supply Chain Systems .....	3

Plus any *two* of the following four courses:

SYST 3050 Digital Business Strategies .....	3
SYST 4060 Business Process Design .....	3
SYST 4070 Decision Modeling and Support Systems .....	3
SYST 4080 Project Management Systems .....	3

### Career Possibilities

Systems operations specialists are not confined to manufacturing organizations for their employment opportunities. Although manufacturing continues to be an important area of application, other areas such as health care, finance, management consulting, and government are increasingly turning to operations professionals to assist in providing answers to problems of productivity and profitability. For students interested in improving their background in the operation of systems for application to other fields but not wishing to take the entire track, our courses provide a strong foundation that is directly applicable to other business areas.

## Areas of Application

### Entrepreneurship and Small Business Management

The entrepreneurship and small business management area of application reflects the fact that practically all new job creation in the United States is produced by new ventures and small- to medium-sized emerging growth businesses. In addition, Boulder and the Leeds School of Business are highly recognized for a unique entrepreneurship climate. Students enhance their functional area of knowledge by applying such learning to entrepreneurship and small- to medium-sized environments. This application area provides the knowledge, understanding, and skills for creating, organizing, and managing new ventures or small- to medium-sized and emerging growth businesses as independent entities, or within corporate structures.

Students examine theory and research, but the fundamental thrust of this application area is to experience entrepreneurial cultures through professional experiences such as field projects, meeting entrepreneurs in the classroom, internships, writing feasibility and business plans, and developing other practical skills.

After completing the required lower-division core courses, students begin the study of entrepreneurial environments in their junior year. Entrepreneurial finance, business plan preparation, and an internship may be taken in the junior and/or senior year.

Students who complete the three required entrepreneurship courses with a 3.30 grade point average or better, and who complete an approved 60-hour internship, will qualify to sit for the entrepreneurship honors oral exam. Those who pass the exam will be awarded the Certificate of Excellence in Entrepreneurial Studies.

<i>Required Courses</i>	<i>Semester Hours</i>
ESBM 3700 Entrepreneurial Environments .....	3
ESBM 4570 Entrepreneurial Finance .....	3
ESBM 4830 Business Plan Preparation .....	3

**Note:** Students seeking internships should have completed ESBM 3700 by the end of their junior year.

### International Business

The globalization of the marketplace has created a need for managers who can function effectively in the international business environment. Despite this movement toward globalization, there remains significant environmental differences (cultural, economic, and political) between countries and/or regions. Managers in an international business must be sensitive to these differences and also must adopt the appropriate policies and strategies for dealing with them.

To address these issues, the Leeds School of Business offers an area of application in international business. In addition to this area of application, students can complete additional requirements that result in an international business certificate. The area of application and certificate program build on the student's understanding of the functional areas of business and provide her or him with an appreciation of the international environment and a framework for developing policies and strategies appropriate for this environment.

<i>Required Courses</i>	<i>Semester Hours</i>
INBU 4100 International Business and Marketing .....	3
INBU 4200 International Financial Management .....	3
INBU 4300 International Business Management .....	3

In addition, the certificate program requires completion of the following:

1. Six hours of economics, geography, or political science beyond arts and sciences course requirements. Courses must be selected from an approved list (students should see the advising office for details).
2. Three hours of foreign language beyond MAPS requirements.
3. Six hours of an international experience. This requirement can be satisfied through either study abroad programs or academic internships of an international business nature.

Finally, it is recommended that students in the international business area of application or the certificate program consider additional electives from the following courses: MGMT 4070 International Operations Management and ACCT 4700 International Accounting.

### Real Estate

The real estate area of application is designed to provide students with exposure to the concepts, tools, and techniques necessary for entry-level positions. A career in real estate provides an opportunity for individuals to operate as entrepreneurs whether they are brokers, appraisers, developers, property managers, consultants, or investors. An integrated process is followed in the three application area courses to prepare students for real estate careers.

<i>Required Courses</i>	<i>Semester Hours</i>
REAL 3000 Principles of Real Estate Practice .....	3
REAL 4000 Real Estate Law and Financing Instruments .....	3
REAL 4100 Real Estate Finance and Investment Analysis .....	3

The real estate certificate program allows students to broaden their knowledge and understanding of real estate through multi-disciplinary focus, whereby courses are taken outside of the Leeds School of Business. For this program, students must complete the courses listed above (REAL 3000, REAL 4000, REAL 4100) and an academic internship.

<i>Required Courses</i>	<i>Semester Hours</i>
College of Architecture and Planning courses .....	6
Construction management course in the Department of Civil, Environmental, and Architectural Engineering or another course from the College of Architecture and Planning .....	3
Academic internship in real estate practice or related area .....	3

## Tourism Management

The tourism area of application is designed to prepare students to take advantage of the opportunities provided by this industry, including the management and operation of tourism attractions, the various businesses that serve travelers, and the private and government organizations devoted to tourism industry development.

When combined with the skills and knowledge attained in an area of emphasis and an internship, the tourism area of application enhances students' opportunities to pursue their chosen area in the tourism industry. As the tourism management area of application combines academic and practical experience, students are encouraged to complete an internship with a tourism business, typically during the summer preceding their senior year.

<i>Required Courses</i>	<i>Semester Hours</i>
TOMG 3060 Resort Tourism .....	3
TOMG 3400 Tourism Management .....	3
TOMG 3500 Tourism Destination Development .....	3

## Graduate Degree Programs

The Leeds School of Business offers programs leading to the master of business administration (MBA), master of science in business administration (MS), juris doctor/master of business administration (JD/MBA), master of business administration/master of science in telecommunications (MBA/MS TLEN), master of business administration/master of arts (MBA/MA), master of business administration/master of anthropology, master of business administration/master of Germanic and Slavic languages, and doctor of philosophy in business administration (PhD) degrees. The Leeds School of Business also offers a part-time MBA program, called the Evening MBA, that leads to the same degree as the full-time MBA program. The Evening MBA program features the same outstanding faculty and curriculum as the full-time MBA program.

These programs are open to qualified individuals who hold a bachelor's degree from a regionally accredited college or university, or a recognized international university, without regard to their undergraduate major. The Leeds School of Business also offers a concurrent BS/MS program in accounting that awards the bachelor's and master's degrees simultaneously.

### Master of Business Administration

The breadth of training that master of business administration graduates receive prepares them to become high-level managers or become involved in new business ventures in a challenging and evolving business environment.

The MBA program is rigorous and comprehensive, and demands student commitment. The core curriculum provides a set of broad-based, integrative skills, rather than narrowly focused, highly specialized skills. Core courses provide a solid foundation in both business management and analytical disciplines, a foundation that fosters continued career growth. In addition to core courses stressing key functional areas of business, students can choose electives specific to their chosen area of concentration.

The case study method and student field projects are used broadly throughout all courses, and common areas of study such as ethics, technology, communications, and international issues are integrated throughout much of the curriculum. Students learn about management theory and its practical applications in "real-world" situations. Lectures, seminars, team teaching, team study groups, guest lectures, and videotaped critique sessions are all approaches taken by the faculty to generate new ideas and allow student input.

### Requirements for Admission to MBA Programs

For all MBA programs, the admissions committee reviews the applicant's complete application, with consideration given to the following:

- An applicant's academic record.
- An applicant's score on the Graduate Management Admission Test (GMAT). The GMAT must be retaken if the test date was more than five years ago.
- International students must provide a TOEFL exam score.
- An applicant's work experience.
- Written essays.
- Personal interviews.
- Letters of recommendation.

In addition, a nonrefundable application fee is required of all applicants. Please see the specific MBA application for more information.

The address for MBA applications is:

Leeds School of Business  
University of Colorado at Boulder  
419 UCB  
Boulder, CO 80309-0419  
303-492-1831 (general information)  
303-492-7662 (application request line)  
Information is available at [leeds.colorado.edu](http://leeds.colorado.edu).

### Diversity

The Leeds School of Business encourages qualified individuals to apply regardless of sex, race, religion, national origin, age, or physical limitation.

### MBA Policies and Requirements

For current, detailed information regarding the MBA program, contact the Leeds School of Business.

**Advising.** All graduate students are required to check in with an advisor during the first semester of study to ascertain degree requirements.

**Minimum Hours Required.** Students entering the MBA program take a prescribed sequence of classes before beginning elective courses. A minimum of 55 credit hours is needed to graduate. Students entering the MBA program must complete their degree in two years. Transferred course work is not accepted into the MBA program.

**Core Course Waiver.** Students are eligible to waive any core courses providing they successfully pass the appropriate waiver examinations. There is no limit on the number of core courses a

student may waive. However, the student must still complete 55 credit hours to satisfy graduation requirements.

**Courses Taken Outside the Leeds School of Business (limits).** MBA students may enroll in up to 12 hours of elective course work outside the Leeds School of Business provided the remaining 15 hours of electives are taken within the MBA program. Course work taken outside the Leeds School of Business must be at the graduate program level. Students may not take courses outside the University of Colorado at Boulder and count them toward the degree. Students should contact individual departments for course listings and registration requirements for nonbusiness courses.

**Grades and Quality of Work.** All courses applied toward the 55 credit hours must be taken for a grade. Courses in which a C- or below is received are not accepted for credit toward the 55 credit hours and may have to be retaken. In this case, both grades are factored into the GPA. To withdraw from an elective course and receive a grade of *W*, a student must be earning a passing grade in that course. Students normally are not permitted to withdraw from courses after the sixth week of the semester. Students in the MBA program may not withdraw from specified, lock-step course work. An *IF* is an incomplete grade. Use of the *IF* is at the discretion of the course instructor and/or the dean. Students must ask for an incomplete grade. An *IF* is given only when students, for reasons beyond their control, have been unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given.

**Calculating GPAs.** For the purpose of calculating GPAs for MBA student rankings and probation, only course work taken within the business school is counted.

**Withdrawal.** Students who choose to leave the program must formally withdraw. Failure to do so will result in assessment of full tuition and fees. Students who withdraw must reapply to the program if they wish to continue their studies. Applicants who reapply are evaluated with current applicants to the program. Students who are granted re-admission must complete the requirements of the current program. Course work taken more than five years earlier must be validated by examination in order to count toward the degree and may be considered elective credit.

**Probation.** A student whose cumulative GPA falls between a 2.50 and 3.00 is put on academic probation. The student is allowed to remain on probation for one semester as long as reasonable progress is made to improve the GPA. The assistant dean for MBA programs determines whether reasonable progress is being made and whether the student can graduate with a 3.00 in the stated time limit.

**Suspension.** A student whose cumulative GPA falls below 2.50 at any time is automatically suspended from the program. A suspended student is eligible to reapply after one year. Note that applicants who reapply are evaluated against other applicants applying for consideration that year.

## Juris Doctor/Master of Business Administration Degree

The purpose of this dual-degree program is to allow students admitted to both the School of Law and the Leeds School of Business to obtain the juris doctor (JD) and the master of business administration (MBA) degrees in four (or fewer) years of full-time study. The program is designed to train students for careers in which business administration and law overlap.

### Admission

To be eligible for the JD/MBA dual-degree program of the School of Law and the Leeds School of Business, a student must apply separately to and be admitted by each of the two schools under their respective admission procedures and standards.

Students may elect the dual-degree program at the time of initial application to both schools, or they may apply for the dual-degree program during their first year of study in the degree program of either school.

### Course of Study

A student enrolled in the JD/MBA program may commence studies under the program in either the School of Law or the Leeds School of Business. Dual-degree students are strongly encouraged to begin their course of study at the School of Law. However, a student must take the first year of the JD curriculum as a unit exclusively in the School of Law. Likewise, a student must take the first semester of the MBA curriculum as a unit exclusively in the Leeds School of Business. Students can then take additional courses necessary to meet the requirements of the degree programs of the two schools.

No student in the dual-degree program shall be allowed to take fewer than 9 semester hours or more than 16 semester hours during any term (excluding summer terms) without receiving the consent of the program advisor in each school in which courses are being taken.

### Credit for Law Courses in the JD/MBA Program

The Leeds School of Business grants credit toward the MBA degree for up to 12 semester hours of acceptable performance in law courses taken by a JD/MBA student at the School of Law. Core courses required in the law school program cannot be counted toward the 12 hours. A student must earn at least a 77 grade in a law school course to be accepted for Leeds School of Business credit. For credit to be granted, the law school courses must be approved before enrollment by an MBA advisor. Only courses taken after admission into the MBA program are credited toward the degree.

### Grading in the Dual-Degree Program

Leeds School of Business credit for courses completed in the School of Law as part of the joint degree program is recorded on a *pass/fail* basis and is not included in the required MBA 3.00 cumulative average.

## Master of Business Administration/ Master of Science—Telecommunications

The Leeds School of Business, in conjunction with the College of Engineering and Applied Science, offers a dual-degree program resulting in a master of business administration (MBA) and master of science in telecommunications (MS/TLEN). The dual-degree program combines broad-based business management study with an in-depth understanding of telecommunications technology. This program prepares students to be competent, effective managers in the telecommunications industry.

### Admission

An individual must apply separately and be admitted to both programs under each school's or college's admission procedures and standards. Applicants are encouraged to apply to the programs concurrently.

### Course of Study

Students considering the MBA/MS in telecommunications are strongly encouraged to begin their course of study in the MBA program.

### Credit for Telecommunications Courses in the MBA/MS Program

Twelve credit hours can "double count" towards both degrees. The Leeds School of Business will accept 12 hours of telecom-

munications course work toward the MBA degree. Grades received for these courses will be included in the 3.00 cumulative average. Course work completed in the MS/Telecommunications program prior to acceptance into the MBA program will not be credited toward the degree.

For additional information concerning the dual-degree program, see the program advisors in the College of Engineering and Applied Science and the Leeds School of Business.

### Master of Business Administration/ Master of Fine Arts

The Leeds School of Business, in conjunction with the Department of Art and Art History, offers students the ability to earn an MBA and an MA in fine arts through a three-year dual-degree program. Students in the MBA/MA dual-degree program pursue careers in digital marketing, web design, e-commerce, gallery/museum administration, and private art consulting.

#### *Admission*

An individual must apply separately and be admitted to both programs under each school's or college's admission procedures and standards. Applicants are encouraged to apply to the programs concurrently.

#### *Course of Study*

Students in the MBA/MA in fine arts spend the first year of their dual-degree program exclusively in either the business school or the fine arts program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and fine arts elective courses.

#### *Credit for Fine Arts Courses in the MBA/MA Fine Arts Program*

Dual-degree students in studio arts are required to complete 43 hours of MBA course work and 54 hours of fine arts course work. Dual-degree students in art history are required to complete 43 hours of MBA course work and 30 hours of fine arts course work.

### Master of Business Administration/Master of Anthropology

The MBA/MA in anthropology dual-degree program enables students to earn an MBA and an MA in anthropology simultaneously over three or four years depending on the student's sub-discipline in anthropology. Students in this MBA/MA program pursue careers in managing the business aspects of archaeological projects, working in the growing field of corporate cultural anthropology, and ethnography or museum management.

#### *Admission*

Applicants apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may also apply to one of the programs after having already started in the other master's program.

#### *Course of Study*

Students in the MBA/MA in anthropology spend the first year of their dual-degree program exclusively in either the business school or the department of anthropology. In the second year, courses are taken exclusively in the other department. The remaining year(s) offers students the opportunity to take both MBA and anthropology elective courses.

### Master of Business Administration/Master of Germanic and Slavic Languages

The MBA/MA in Germanic and Slavic languages dual-degree program enables students to earn an MBA and an MA in Germanic and Slavic languages simultaneously over three or four years. Students in this MBA/MA program pursue careers in international business.

#### *Admission*

Applicants apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may also apply to one of the programs after having already started in the other master's program.

#### *Course of Study*

Students in the MBA/MA in Germanic and Slavic languages spend the first year of their dual-degree program exclusively in either the business school or the department of Germanic and Slavic languages. In the second year, courses are taken exclusively in the other department. The remaining year(s) offers students the opportunity to take both MBA and Germanic and Slavic languages elective courses.

### Master of Science in Business Administration

There are two paths to the master of science in business administration (MS) degree. The first is the concurrent bachelor's and master's degree program. In this program, both the bachelor's and master's degrees are awarded following the completion of 150 specified hours of course credit. An academic internship is an option within this requirement. The program is designed for students pursuing the 150-hour educational background requirement for CPAs (required by most states) and is a highly integrated and challenging program of study. Undergraduate students in the Leeds School of Business may apply to the program in their junior year and begin taking graduate courses and an internship during their senior year. This program provides an excellent foundation for careers in professional accounting.

The second path is an independent master's degree program. This program is designed for students who have already obtained an undergraduate degree in accounting. Students with undergraduate degrees other than accounting may also be admitted to the program, but may have to fulfill deficiency requirements in addition to the regular program requirements. Students with business deficiencies may want to consider the MBA program instead.

All students in these programs choose an area of study that focuses on financial accounting or taxation.

Note that MS students are required to complete all degree requirements within four years. Graduate students are not given preferential enrollment in undergraduate courses needed for the deficiency requirements.

For detailed information concerning program requirements, course selection, and applications, contact the Leeds School of Business at **303-492-1831**.

For the 150-hour bachelor of science/master of science program in accounting, application should be made during the first semester of junior standing, after the student has completed 12 semester hours in accounting.

Recommendation letters may be waived for continuing Leeds School of Business students.



### Minimum Requirements

Accounting and taxation students must complete a minimum of 30 semester hours of graduate-level work. The newly accepted MS student should consult with the faculty advisor for the program to develop an individualized degree plan. No thesis is required.

Students in the Master of Science in Business Administration programs are governed by the rules of the Graduate School. See that section.

### Accounting

The expanding role and increased breadth of knowledge expected of accountants make graduate study in accounting highly desirable. Courses offered for the accounting area of emphasis prepare students for high-level, professional careers in the field. The graduate program in accounting is designed to provide a broad understanding of accounting issues as well as to enhance an undergraduate degree in accounting. It also provides the opportunity to develop knowledge in a related minor area, such as economics, finance, information systems, management, marketing, taxation, or telecommunications. Note that these supporting fields may require some undergraduate level course work beyond core requirements.

### Taxation

The master of science in business administration with an emphasis in taxation integrates accounting and law school courses. Some of the tax and law courses are strictly tax-related while others include related legal aspects of a particular subject area. The combination of courses is designed to give exposure to taxation from the accounting and law faculty perspectives.

The purpose of this program is to prepare students for professional careers as Certified Public Accountants (CPAs) specialized in taxation. Therefore, the focus of the program is to train students to:

- develop a refined ability to recognize tax problems and understand tax issues in a broad economic framework;
- research and present well-developed strategies or solutions to tax problems; and
- develop creative tax planning opportunities in a variety of contexts.

### Doctor of Philosophy in Business Administration

A PhD degree recognizes scholarly achievement and is the highest academic honor that CU-Boulder bestows. The PhD in business administration prepares scholars to be preeminent in their field of expertise. The program focuses on developing the necessary skills for the design and execution of original, innovative research and for the dissemination of knowledge through teaching and writing.

#### Requirements for Admission

To preserve the individualized character of the PhD program and its quality, the number of students is limited and the application process is very competitive. Students are admitted for study in a specific area for doctoral work. The Leeds School of Business currently offers the following areas of study: accounting, business strategy, entrepreneurship, finance, information systems, marketing, operations research and operations management, and organization management.

For more information on the application requirements and process, contact:

Leeds School of Business

PhD Program

University of Colorado at Boulder

419 UCB

Boulder, CO 80309-0419

303-492-4984

Web site: [leeds.colorado.edu/phdprog](http://leeds.colorado.edu/phdprog)

#### Background, Prerequisites, and Deficiencies

Each student must have a background in mathematics at or beyond calculus. Based on experience, background, and at the discretion of the academic advisor and/or division chair and/or the associate dean of academic programs, additional prerequisites may be required of the PhD student.

#### Requirements for the Degree

Most curriculum and program requirements are decided by the division. Consult the PhD program advisor or the appropriate division for information regarding course selection, graduate teaching program certification, research internships, and other division requirements. Students must complete all Graduate School, Leeds School of Business, and division requirements to be conferred the PhD in business administration.

The newly accepted PhD student should consult with the division chair and/or academic advisor to develop an individualized degree plan. Students are required to become proficient in their primary area of study. In addition, all students are required to complete course work in a field outside their division. These “second fields” are governed by the departments offering the course work but typically require 6 to 12 credit hours. The second field may also require an additional comprehensive exam.

#### Course Work

All doctoral students are required to complete at least 30 hours of course work and 30 hours of dissertation credit at CU-Boulder. Additional course work may be required as determined by the academic advisor. To comply with this 30-hour requirement, a course must have been taught by a member of the university’s graduate faculty, must be at the 5000 level or above, and the student must achieve a grade of B- or better.

Courses must be approved by the student’s academic advisor before registration. Most students are required to complete 7000- and 8000-level doctoral seminars.

For full-time status, the Leeds School of Business requires successful completion of 9 credit hours of course work each semester. During and after comprehensive exams, full-time status requires completion of a minimum of 5 dissertation hours each semester.

#### Transfer of Credit

A maximum of 9 semester hours of courses taken at other schools (this includes other University of Colorado campuses) or taken as a special student at the university may be transferred into the doctoral program. Course work must be recent and of doctoral-level quality. A doctoral student must establish a satisfactory record of residence in the doctoral program before the course work is eligible for transfer. The transfer of credit must be approved by the division, the associate dean of academic programs, and the Graduate School. There is no guarantee any course work will be accepted for transfer.

#### Residency

The Leeds School of Business adheres to the Graduate School rules regarding residency. All students in the doctoral program are expected to be full-time students on the Boulder campus (at least during residency and prior to completing the comprehensive examinations). Doctoral students are expected to be available to

participate in colloquia and other informal academic discussions. Full-time employment outside the university is prohibited during the residency period. Any off-campus status must be approved by the division and the associate dean of academic programs.

### *Time Limit*

Doctoral students have six years from the commencement of course work to complete all requirements of the degree, but students are encouraged to complete their program within four years.

### *Comprehensive Examination*

Before admission to candidacy, a doctoral student must pass a comprehensive examination in the field of concentration. The examination may be oral, written, or both, and will test the student's mastery of a broad field of knowledge, not merely the formal course work completed. Each division will determine the required content, length, and standards of evaluation for the exam. Check with the division as to the specific requirements for the comprehensive exam.

### *Admission to Candidacy*

Students are admitted to candidacy according to Graduate School procedures and requirements. Students shall complete all course work and any other requirements listed on their degree plans, earn at least four semesters of residence, and successfully pass the comprehensive exams before admission to candidacy is approved by the Graduate School. In addition, requirements related to academic quality of work, graduate-level course work, the minimum number of course hours, and graduate faculty membership must be met before admission to candidacy is approved.

### *Dissertation*

A dissertation based upon original investigation showing mature scholarship and critical judgment, as well as competence with research tools and methods, must be written on a subject approved by the candidate's dissertation committee. To be acceptable, the dissertation must be a significant contribution to knowledge in the candidate's primary field.

### *Final Examination (Defense)*

Upon recommendation of the candidate's doctoral dissertation committee, a final oral examination shall be given. This examination covers both the dissertation and the primary field of study. The oral examination is open to the public.

### *Filing the Dissertation*

The dissertation must comply in mechanical features with the University of Colorado Graduate School Thesis and Dissertation Specifications. The dissertation must be filed with the Graduate School by the posted deadline for the semester in which the degree is to be conferred.

## **Faculty— Leeds School of Business**

STEVEN MANASTER, dean of the Leeds School of Business. BA, Oberlin College; MBA, PhD, University of Chicago.

WILLIAM S. APPENZELLER, assistant professor of recreation emeritus.

JOSEPH W. BACHMAN, professor of accounting emeritus.

DAVID B. BALKIN, division chair of management; professor of strategy and organization management. BA, University of California, Los Angeles; MA, PhD, University of Minnesota.

JOHN BALLANTINE, senior instructor of business law. BS, Purdue University; MBA, Indiana University; JD, University of Colorado.

F. KENDRICK BANGS, professor of business and administration emeritus.

WILLIAM BAUGHN, professor of finance emeritus.

CHAUNCEY M. BEAGLE, associate professor of accounting emeritus.

WILMAR F. BERNTHAL, professor of management and organization emeritus.

SANJAI BHAGAT, professor of finance. BTech, Indian Institute of Technology; MBA, University of Rochester; PhD, University of Washington.

R. WAYNE BOSS, professor of strategy and organization management. BS, MPA, Brigham Young University; DPA, University of Georgia.

THOMAS A. BUCHMAN, associate professor of accounting. BS, MS, PhD, University of Illinois.

MEG CAMPBELL, assistant professor of marketing. AB, PhD, Stanford University.

PHILIP R. CATEORA, professor of marketing emeritus.

DIPANKAR CHAKRAVARTI, Orloff Professor of Business; professor of marketing. BS, University of Calcutta; MS, PhD, Carnegie Mellon University.

LAWRENCE D. COOLIDGE, professor of business administration emeritus.

MARK R. CORRELL, senior instructor of business economics. BA, University of Colorado; MS, PhD, University of Wisconsin.

JEROME C. DARNELL, professor of finance emeritus.

THOMAS J. DEAN, associate professor of strategy and organization management. BS, Pennsylvania State University; MBA, Oklahoma State University; PhD, University of Colorado.

JULIO DE CASTRO, associate professor of strategy and organization management. BS, Universidad Catolica Madre y Maestra; PhD, University of South Carolina.

JOHN D. DEMAREE, associate professor of management science and information systems emeritus.

CALVIN P. DUNCAN, division chair of marketing; associate professor of marketing. BS, MBA, University of Colorado; PhD, Indiana University.

STEVEN ENGEL, senior instructor of marketing. BA, University of Colorado; MBA, University of Oregon.

DAVID FRAME, assistant professor of real estate. BA, University of Minnesota; MA, PhD, Carnegie Mellon University.

JOSEPH L. FRASCONA, professor of business law emeritus.

DAVID M. FREDERICK, associate professor of accounting. BS, University of Colorado; PhD, University of Michigan; CPA.

H. LEE FUSILIER, professor of business law emeritus.

EDWARD J. GAC, associate professor of business law. AA, Wright College; BA, Western Illinois University; JD, University of Illinois.

JOHN J. GARNAND, senior instructor of business economics. BA, College of Santa Fe; MA, Northwestern University; PhD, University of Colorado.

WAYNE M. GAZUR, associate professor of accounting. BS, University of Wyoming; JD, University of Colorado; LLM, University of Denver; CPA.

FRED W. GLOVER, Media One chair in system science; professor of management science and operations research. BA, University of Missouri; PhD, Carnegie Institute of Technology.

CHARLES R. GOELDNER, professor of marketing emeritus.

KENNETH R. GORDON, senior instructor of operations management. BA, University of Iowa; MS, PhD, Northwestern University.

DAVID A. GUENTHER, Tisone chair of accounting; professor of accounting. BA, California State University, San Bernardino; PhD, University of Washington; CPA.

PAUL HERR, associate professor of marketing. AB, Oberlin College; PhD, Indiana University.

ERIC N. HUGHSON, associate professor. BS, Massachusetts Institute of Technology; MS, PhD, Carnegie Mellon University.

BETTY R. JACKSON, division chair of accounting; professor of accounting. BBA, Southern Methodist University; M.P.A., PhD, University of Texas at Austin; CPA.

JOHN JACOB, associate professor of accounting. BS, Indian Institute of Technology; MS, Xavier Labour Relations Institute; PhD, Northwestern University.

PAUL E. JEDAMUS, professor of management science and information systems emeritus.

HOWARD G. JENSEN, associate professor of accounting emeritus.

HENRY I. KESTER, professor of finance emeritus.

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BURTON A. KOLB, professor of finance emeritus.

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RALPH G. RINGGENBERG, associate professor of finance emeritus.

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# School of Education

*Lorrie A. Shepard, dean*

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school web site: [www.colorado.edu/education](http://www.colorado.edu/education)

**T**HE SCHOOL OF EDUCATION provides teacher licensure programs that ensure rigorous content preparation and extensive field-based practicum experiences. Its graduate programs emphasize research that focuses on educational policy and practice.

## Accreditation

The licensure programs, both undergraduate and graduate, are fully accredited by the North Central Association of Colleges and Schools, the National Council for Accreditation of Teacher Education, the Colorado Department of Education, and the Colorado Commission on Higher Education.

## Student Organizations

Tomorrow's Teachers Today represents undergraduate and postbaccalaureate students seeking teacher licensure. Members serve as liaisons between the students in licensure programs and the School of Education administration. The organization also sponsors special events for licensure students.

The Student Association of Graduate Education (SAGE) is a similar organization for graduate students. Its officers are selected in the fall. Other student organizations include Gay Straight Alliance (GSA) and Students of Color Coalition (SOCC).

Honorary societies in education include Phi Delta Kappa.

## Academic Excellence

### Scholarships and Awards

The School of Education administers a number of scholarships and awards for its students. Graduate students in education are eligible to compete for Graduate School fellowships, and both graduate and undergraduate students are eligible to apply for universitywide financial assistance. Students should contact the Office of Student Services (Education 151) to obtain scholarship and award information and applications. Application procedures and deadlines will be publicized, although we anticipate that university-funded awards will be made during the fall semester. A typical application deadline is April 1.

### Academic Standards

Upon enrollment in the Teacher Education Program, a student who fails to maintain a 2.75 GPA (3.00 for graduate students) will be placed on probation or may be suspended. Readmission is subject to program requirements in effect at the time of reapplication. The same conditions apply to students in other colleges and schools who have been admitted to the teacher education program.



## Teacher Licensure Programs

The School of Education offers course work leading to initial Colorado licensure to undergraduate students, postbaccalaureate students, and master's degree students. Colorado requires public school teachers to be licensed as qualified teachers by its state department of education. Students who successfully complete all School of Education requirements will be recommended for a Colorado provisional teaching license, the license issued to all new teachers in Colorado. Licensure requirements vary from state to state and from teaching area to area. Students who are interested in teaching in other states should familiarize themselves with the requirements of those states so they may plan an appropriate degree program.

### Undergraduate and Postbaccalaureate (Nonmaster's Degree) Licensure Programs

- Elementary (grades K–6) education
- Secondary education (grades 7–12) fields:
  - English
  - Foreign language (French, German, Italian, Japanese, Latin, Russian, or Spanish)
  - K–12 music
  - Mathematics
  - Science
  - Social studies

### Master's Degree Plus Licensure Programs (see Graduate Study section for additional program information)

- Elementary (grades K–6) education
- Secondary education (grades 7–12) fields:
  - English
  - Mathematics
  - Science
  - Social studies

The following principles guide the teacher education program. All teachers should:

1. Demonstrate knowledge of subject matter.
2. Have a strong background in liberal arts and subject area content.
3. Demonstrate knowledge of pedagogy and standards for K–12 students.
4. Be prepared to educate students in a diverse society.
5. Understand professional obligations and demonstrate professional dispositions of teachers in a democracy.

The objectives of the university relative to teacher education are the following:

1. Provide programs of undergraduate and graduate studies designed to develop outstanding teachers, supervisors, college teachers, administrators, and researchers.

2. Conduct and direct educational research and to engage in writing and related creative endeavors.

3. Identify and attract future outstanding teachers into the teacher education program.

4. Cooperate with other state, regional, and federal agencies to improve educational programs.

Teacher education at the University of Colorado, while administered by the School of Education, is a universitywide function. Many academic departments provide course work that supports the teacher in training. Undergraduate students follow a prescribed set of arts and sciences core courses that meet state content preparation standards, complete a major, and satisfy professional education requirements. The program involves a combination of courses at the university and K–12 school placements.

## Academic Majors

**Undergraduate Students.** Undergraduate students enrolled at the University of Colorado at Boulder seeking both a bachelor's degree and teacher licensure in elementary or secondary teaching must complete a major approved for prospective teachers by the Colorado Commission on Higher Education. With careful planning beginning freshman year, these programs may be completed in four years. A list of these approved majors may be obtained from College of Arts and Sciences advisors or the Office of Student Services, Education 151. No professional education course work taken more than 10 years ago may count for teacher education requirements.

The major selected is determined by the student's interest in teaching a certain subject or instructional level. Before selecting a particular major, students may see the School of Education advisor. **Students interested in teaching at the secondary level should be aware that in many subject areas the teaching program requires additional courses or more hours than the academic major.** Course requirements for all programs are explained in the advising manuals and program checklists available in Education 151.

## Arts and Sciences Core Requirements for Teacher Candidates

Arts and sciences students must complete college core curriculum requirements (see College of Arts and Sciences Undergraduate Degree Requirements section). Teacher licensure students must take specified courses within some categories of this core curriculum.

The arts and sciences core is listed below; courses specified in each area for students seeking teaching licensure are in *bold italic* type.

### Elementary Licensure

Foreign Language: Third semester proficiency in a single modern or classical foreign language.

Quantitative Reasoning and Mathematical Skills: 3–6 semester hours.

***MATH 1110 and 1120 Spirit and Uses of Mathematics 1 and 2 or MATH 1300 Calculus 1***

Written Communication: 3 lower-division and 3 upper-division semester hours.

Critical Thinking: 3 upper-division semester hours.

Historical Context: 3 semester hours.

***HIST 1010 Western Civilization 1 or HIST 1020 Western Civilization 2***

Cultural and Gender Diversity: 3 semester hours.

***EDUC 3013 School and Society***

United States Context: 3 semester hours.

***HIST 1015 History of the United States to 1865 or HIST 1025 History of the United States since 1865***

Literature and the Arts: 6 semester hours; 3 upper-division semester hours.

***American and British Literature or HUMN 1010 or HUMN 1020 Introduction to Humanities 1 or 2***

Natural Science: 13 semester hours, including a 2-course sequence and a laboratory or field experience.

Physical science required

Biological science required

Contemporary Societies: 3 semester hours.

***PSCI 1101 American Political Systems***

Ideals and Values: 3 semester hours.

***PSCI 2004 Survey of Western Political Thought***

**Additional liberal arts requirement:**

***GEOG 1982 World Regional Geography***

### Secondary Licensure

1. Foreign Language: Third semester proficiency in a single modern or classical foreign language.

2. Quantitative Reasoning and Mathematical Skills: 3–6 semester hours.

***MATH 1410 Mathematics for Secondary Teachers or MATH 1300 Calculus 1***

Written Communication: 3 lower-division and 3 upper-division semester hours.

Critical Thinking: 3 upper-division semester hours.

Historical Context: 3 semester hours.

Cultural and Gender Diversity: 3 semester hours.

***Course from major or EDUC 3013 School and Society***

United States Context: 3 semester hours.

Literature and the Arts: 6 semester hours, 3 upper-division semester hours.

***American and British Literature or HUMN 1010 or HUMN 1020 Introduction to Humanities 1 or 2***

Natural Science: 13 semester hours, including a 2-course sequence and a laboratory or field experience.

Contemporary Societies: 3 semester hours.

***Course from major or EDUC 3013 School and Society***

Ideals and Values: 3 semester hours.

**Postbaccalaureate Students.** Postbaccalaureate students do not have to graduate with a major in one of the majors approved by the Colorado Commission on Higher Education. *However, students who have graduated with a nonapproved major often must take additional arts and sciences and major course work to fulfill state teacher licensure requirements.*

## Admission

Admission to all School of Education programs is competitive. Satisfying minimal admission criteria does not guarantee admission. Please see Undergraduate Admission in the General Information section for specific requirements.

### *Students Entering or Currently Enrolled at the University of Colorado*

Undergraduate students seeking to complete the School of Education teacher education program must be enrolled in an approved degree program in one of the colleges or schools of the university. All undergraduates interested in teaching may seek teacher education advising at the time they enter the university. Freshman and sophomore students are encouraged to satisfy as many of the arts and sciences core requirements, liberal arts requirements for the appropriate licensure program, and major field requirements as possible before applying for admission to the teacher education program during the second semester of their sophomore year (56 semester hours). Several education courses may be taken prior to admission to the teacher education program. Students should pick up advising materials in Education 151 and attend all education information sessions, including freshman orientation.

### Transfer Students

Undergraduate students who seek to transfer to the University of Colorado from another accredited institution must apply for admission through the Office of Admissions. They must enroll in a degree program in one of the undergraduate degree-granting colleges or schools of the university and also apply for admission to the teacher education program in the School of Education. At least 30 hours of course work for licensure must be taken while the student is officially enrolled as a student in the university. Credit in student teaching will not transfer to the University of Colorado at Boulder. Please see Undergraduate Admission in the General Information section for specific requirements.

### Former Students

Former students who have not completed an undergraduate degree may reenter the university according to general university policies; however, subsequent to that readmission, they must apply separately for entry into the teacher education program. Undergraduate students who anticipate that they will graduate prior to completing the teacher education program must apply for readmission to the university through the School of Education by March 1 (for summer or fall readmission) or October 1 (for spring readmission). All admitted students who remain continuously enrolled will be expected to complete the program in effect at the time of their admission to the program unless state accrediting changes dictate otherwise.

### Postbaccalaureate and Master's Degree Students Seeking Teacher Training

Students who already hold a bachelor's degree and wish to pursue licensure in elementary or secondary teaching should apply directly to the School of Education. Students desiring institutional recommendation for licensure must complete at least 30 semester hours of work at the University of Colorado and also must fulfill the same requirements as undergraduate students. The actual number of required hours will depend on courses already completed.

## Application Requirements

Students may apply to one of the teacher education programs if the following requirements have been fulfilled:

1. **GPA.** Students must have and maintain a 2.75 (on a 4.00 scale) cumulative GPA overall, 2.75 at CU-Boulder, 2.75 in the subject area (secondary teaching fields and K–12 music only), and 2.75 in education. Students applying to Master's Plus (MA+) programs must have and maintain a 3.0 cumulative GPA.
2. **Prior Degrees.** Students applying to Postbaccalaureate and Master's Plus (MA+) programs must have a bachelor's degree from an accredited institution.
3. **Youth Experience.** Students must provide written verification of 25 clock hours of satisfactory experiences with elementary, middle/junior high, or senior high school-aged youth (appropriate to the desired program) in the past five years. Forms for this purpose are available in the Office of Student Services, Education 151.
4. **Basic Skills.** The state of Colorado requires all teacher education students to demonstrate basic skills competence in mathematics and literacy. This may be done through acceptable grades in appropriate college course work, or by acceptable standardized test scores. Contact the Office of Student Services in Education 151 for more information.
5. **PRAXIS II Exam.** Students applying to Postbaccalaureate and Master's Plus (MA+) programs must have passed the relevant PRAXIS II Content Test required for licensure prior to admission to the program. Those students who have not completed all relevant content course work may petition the School of Education to take the PRAXIS at the end of their first semester.
6. **Letters of Recommendation.** See the Application Materials section.
7. **Fee.** The appropriate application fee should be submitted with application materials. Fees vary by program.

8. **Deadlines.** Deadlines for undergraduate and postbaccalaureate admission are March 1 for fall or summer admission and October 1 for spring admission. The deadline for MA+ is January 1.

### Application Materials

Individuals interested in completing the teacher education program at the University of Colorado at Boulder should request application materials from the Office of Student Services, Education 151. Students currently enrolled in a degree program at Boulder will need to complete an application and submit official transcripts from all previous colleges to the Office of Student Services, Education 151. Transcripts must be mailed directly to the School of Education from the previous college to be considered official.

Individuals who have completed a baccalaureate degree at an accredited institution and are not currently enrolled at the university must complete a program application, apply for admission to the university, and submit official transcripts from all previous colleges directly to the School of Education. Applications cannot be processed until all materials are received in the Office of Student Services.

### Advising

Students are responsible for obtaining an advising manual and program checklist in Education 151 and becoming familiar with their contents. These materials include specific information for all teaching fields and advisor contact information.

Off-campus students may obtain advising materials online at [www.colorado.edu/education/students/advising.html](http://www.colorado.edu/education/students/advising.html), by writing to the School of Education, Office of Student Services, University of Colorado at Boulder, UCB 249, Boulder, CO 80309-0249, or by calling **303-492-6555**. Appropriate information can be sent only when a specific teaching field is indicated.

At CU-Boulder, degree requirements vary among the schools and colleges. Students seeking a degree at the University of Colorado should consult, as soon as possible, with an advisor in the college or school from which they expect to graduate and with the staff advisor in the School of Education.

Students are encouraged to become familiar with the teacher education requirements by comparing their own transcripts to the published advising materials. Students can then talk with an advisor before applying to the program or they may wait until after their applications are processed. Students seeking teacher training in French, German, Italian, Japanese, Latin, Russian, Spanish, or music should see the designated advisor for that teaching field in addition to the School of Education's staff advisor.

Advising also may be obtained by e-mail through **EdAdvise @colorado.edu**. When requesting e-mail advising, students should make questions as specific as possible.

## Graduate Study

Graduate study in education at the University of Colorado is administered through the Office of Student Services, School of Education, and all inquiries regarding programs should be directed to the following address:

Office of Student Services  
School of Education  
University of Colorado at Boulder  
249 UCB  
Boulder, CO 80309-0249

Detailed program materials and *The School of Education Graduate Student Handbook* are available from the School of Education Student Services office, Education 151. The degrees available in the various areas of graduate study are listed below:

**Instruction and Curriculum in the Content Areas** (education; English education; general curriculum in elementary and secondary education; mathematics education; reading education; science education; social studies education; and effective teaching)

Master of arts

Doctor of philosophy

#### **Master's Plus (MA+) Licensure Programs**

CU-Boulder offers special programs for prospective elementary and secondary teachers that combine a master of arts degree in instruction and curriculum in a content area and teacher licensure to qualified students already holding bachelor's degrees. Admission is highly competitive, and program completion requires a two-year commitment of course work and school placements. Students in the MA+ programs become eligible for a Colorado teaching license after three semesters; they complete remaining course work for the master's degree in the fourth semester. Applicants must meet all graduate requirements listed below and undergo an extensive screening process. Complete program information is available in the Office of Student Services, Education 151 or by calling **303-492-6555**.

**Educational-Psychological Studies** (educational psychology)

Master of arts

Doctor of philosophy

**Research and Evaluation Methodology** (methods of educational research and evaluation, including statistics, measurement, and qualitative methods)

Doctor of philosophy

**Social and Multicultural Bilingual Foundations** (bilingual and multicultural education; bilingual/special education; education and cultural diversity; English as a second language; cultural, historical, social, and philosophical foundations; educational policy)

Master of arts

Doctor of philosophy

CU-Boulder does not offer programs in early childhood education, physical education, art education, counseling, school administration, higher education, school psychology, or educational technology.

## Teaching Endorsements at the Graduate Level

Through the School of Education (and in conjunction with other departments), the University of Colorado at Boulder offers advanced course work leading to graduate level teaching and special services training in the following areas:

Linguistically diverse education: Bilingual education and English as a second language (grades K–6)

Linguistically diverse education: Bilingual education and English as a second language (grades 7–12)

Reading teacher (grades K–12)

Special education generalist

Special education specialist

Special services (offered through SLHS):

Audiologist

Speech/language pathologist

All of the above programs have degree, licensure, or experience requirements that must be fulfilled before admission. Please check with the department before applying.

## Admission

Prospective students seeking admission to a graduate degree program should request application forms from the University of Colorado at Boulder, Office of Student Services, 249 UCB, Boulder, CO, 80309-0249. The completed forms should be returned to that office. Prospective graduate students should also read the Graduate School section for additional admission information. If test scores are required for admission to the desired program, applicants should request that the Educational Testing Service send their scores on the verbal reasoning, quantitative reasoning, and analytical writing sections of the Graduate Record Examination (GRE) to the Office of Student

Services. A doctoral applicant who has not taken the GRE should arrange to do so.

Admission to all programs and degrees in the School of Education is selective. Meeting minimal admission requirements does not guarantee admission.

Application papers and all supporting documents, including GRE or Miller's Analogy Test (MAT) scores, if these scores are required for admission to the desired program, must be in the school's Office of Student Services by September 1 for spring semester and February 1 for summer session and fall semester. The Master's Plus (MA+) deadline is January 1. Note that some program areas (MA+ and PhD) admit students for fall semester only.

## Advising

Graduate students are assigned an individual faculty advisor after admission and are required to submit a formal plan of study, approved by their advisor, before the end of the first full year of study. Graduate students may obtain program information from the School of Education, Office of Student Services, Education 151, or from their faculty advisors.

## General Information

### *Maximum Load and Part-Time Study*

A maximum of 15 semester hours in any one semester may be applied toward degree requirements. During the summer, 9 semester hours is the maximum that will be counted toward education graduate degrees. Within this limit, students may take up to 6 semester hours in a five-week summer term, and/or 3 semester hours in a three-week term. During the academic year for financial aid purposes, students will be regarded as having a full load if they are registered for 5 or more semester hours in courses numbered 5000 or above, or are registered in a minimum of 5 thesis hours. At least four semesters of residence credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder. See the Graduate School section for clarification.

### *Quality of Work*

A grade average of *B* (3.00) or better is required for all work taken for any graduate degree. Transferred credits are not included when calculating grade averages.

A mark below *B-* will not be credited toward the PhD program; a mark below *C* is not acceptable for MA students. Any graduate course in which a mark of *D* or *F* is reported is failed and must be repeated and passed if it is required in a student's degree program. Students who do not maintain at least a *B* (3.00) average or better may be suspended by the dean of the Graduate School upon the recommendation of the director of graduate studies in the School of Education. Students may also be suspended from the Graduate School for continued failure to maintain satisfactory progress toward the degree sought.

## Master of Arts in Education

The master of arts degree is available, comprising one academic year or more of graduate work beyond the bachelor's degree.

The master's degree must be completed within four years of initial enrollment. The MA plan II (nonthesis) degree requires a minimum of 30 semester hours. *See the Graduate School section for discussion of plan I and plan II.* Students may transfer no more than 9 semester hours of work taken at another institution or as a nondegree student at CU-Boulder.

All program areas have outlined a recommended or required program of study, and students pursuing a degree are expected to follow that program unless they have appropriate substitu-

tions arranged in advance with their advisors and the director of graduate studies. Pamphlets outlining the programs of study in education are available in the Office of Student Services.

At the beginning of the final term of study, each student must submit a form titled, "An application for admission to candidacy for an advanced degree." These forms are available in the Office of Student Services. If a minor is included, the form must first be signed by a representative of the student's minor department or program area. The form must be signed by the student and the student's advisor, and then submitted to the school's Office of Student Services for School of Education approval and then to the Graduate School for final approval. All students are required to write a four-hour comprehensive-final examination or its equivalent, as determined by the program's faculty committee. (For time limits and other information, see the Graduate School section under Master's Degree.)

### *Education as a Minor Field*

In MA programs for majors outside the School of Education, students may include education as a minor if both their major department and the director of graduate studies in the School of Education approve. For master's degrees, a minor in education consists of at least 9 hours of study in related courses. Not more than 2 semester hours may be transferred from another institution. A minor in education alone will not meet Colorado licensure requirements.

Students who propose to minor in education must have had sufficient undergraduate work in education to prepare them for graduate study in the field. Appraisal of undergraduate preparation will be made by the director of graduate studies.

## Doctoral Study in Education

In addition to the information included here, prospective PhD students should see the Graduate School section, and obtain a current copy of the *School of Education Graduate Handbook*.

The School of Education offers the doctor of philosophy (PhD) in education. Most students take four to six years to complete the course work, examinations, and dissertation required for the doctoral degree.

The school requires at least two semesters of full-time study in residence (one semester must be during the first two years of doctoral study). The School of Education expects that students will not hold a full-time job during their two semesters of residence.

In addition to course work requirements, doctoral students should be immersed in ongoing research with the faculty as early in their program as possible. All doctoral students in the school will be required to complete, at a minimum, one scholarly product; other research endeavors prior to the dissertation are desirable. Each of the program committees has established a structure for implementing this requirement. For example, in some programs students work individually with their faculty advisors; in other programs students make the research product an extra course requirement attached to a professional seminar.

### *Admission Requirements*

Applicants for admission to doctoral study are expected to have a strong liberal arts background. A minimum undergraduate grade point average of 2.75 is required, but applicants are judged competitively so that most admitted applicants have GPAs of 3.00 or higher. A GPA of 3.00 or above is expected on all graduate work completed. PhD applicants are not required in all cases to have a master's degree; the decision rests with the program area faculty. At least two years of professional teaching experience relevant to the applicant's proposed area of study is required for programs in instruction and curriculum in the content areas.

The Graduate Record Examination (GRE) (verbal and quantitative reasoning) is required for admission; there is no established minimum score. Faculty consider the GRE score as one factor among many in making admission decisions. An interview with a faculty admissions committee may be required.

### *Degree Requirements*

Beginning fall 2004, incoming doctoral students are required to complete a one-year introductory sequence as a cohort. The sequence is comprised of courses in Perspectives on Classrooms, Learning, and Teaching; Introduction to Educational Research and Policy; Quantitative Methods; and Qualitative Methods. In the second year, students also enroll in the Doctoral Seminar in Multicultural Education (EDUC 8014). All other required course work is determined by the student's program area.

Approximately 43 semester hours of course work beyond the master's degree is the normal requirement for the PhD. All program areas committees have outlined a program appropriate for individuals pursuing study in their area, and students are expected to follow that program unless they have arranged appropriate substitutions in advance with their advisor and the director of graduate studies. Pamphlets outlining the recommended programs of study in education are available from faculty or the Office of Student Services.

No continuing education work is accepted for the PhD.

### *Foreign Language/Multiculturalism Requirements*

All PhD students also are expected to meet the conversational foreign language requirement and the multiculturalism course requirements.

**The Conversational Foreign Language** component focuses on oral proficiency in another language. This requirement can be satisfied by completing a one-semester college-level conversational language course at an accredited institution within the past three years. Courses can be introductory college-level courses, such as SPAN 1010, FREN 1010, GRMN 1010, and ITAL 1010, because instruction is conducted in the language and substantial language labs are part of the course expectations. Other language experience can fulfill this requirement with advisor approval. Courses taken at another institution must be equivalent to CU-Boulder courses to count toward this requirement. Students must earn a grade of C- or better.

**The Multiculturalism Course.** The Doctoral Seminar in Multicultural Education (EDUC 8014) should be completed after or during the conversational foreign language component. This specially designed doctoral-level course provides for both the theoretical analysis of issues and substantial field-based experiences.

### *Comprehensive Examination*

Before taking the comprehensive examination, each student must submit a form titled, "An application for admission to candidacy for an advanced degree." Application forms are available in the school's Office of Student Services.

Near the end of the term when students complete their course work and if their advisor approves, they take a comprehensive examination. The examination is given by the program area faculty and covers foundational knowledge in the program area. The exam is generally completed over a three day period, four hours per day. Students who fail the comprehensive examination may repeat it once, at a time to be determined by the examining committee.



### Dissertation

In addition to the course work, a doctoral dissertation for 30 semester hours of credit is required of each student. A student registers for EDUC 8994 (PhD Doctoral Dissertation) for three or more terms, but not more than 10 semester hours in any term. Not more than 10 dissertation credit hours taken in semesters prior to the semester in which the comprehensive examination is passed may be counted in the 30 dissertation hours required for the degree. After satisfactory completion of the comprehensive examination, the student must continuously register for a minimum of 5 dissertation hours during fall and spring semesters until the final defense. Off-campus students may register for 3 dissertation credit hours. On- and off-campus students must be registered for 5 hours during the semester the defense is completed.

When the student and the chair of the dissertation committee agree on a subject for the dissertation, they work with the director of graduate studies to identify a five-person committee. Then the student prepares a detailed prospectus and arranges for a meeting with the committee. When the committee approves the prospectus, the student may proceed with the research. Research involving human subjects must also have the approval of the university committee on human research. During the research for and the writing of a dissertation (thesis), a grade of *IP* (in progress) is reported for the credit hours taken; if the dissertation is completed and accepted as satisfactory, a grade is reported for the student's record.

### Time Limits

Time limits for the PhD in education are the same as time limits for all University of Colorado at Boulder PhD programs. Students in education should read the Graduate School section for PhD time limits.

When students have passed the comprehensive examination, they are required to register each semester until the degree is attained, and pay the standard fee as announced by the Graduate School.

### Progress toward a Degree

Doctoral study entails a long period of scholarly endeavor, which requires a time schedule. Students are responsible for meeting the deadlines involved.

### Opportunities for Assistantships

The School of Education has a limited number of assistantships administered by the dean of the School of Education on the recommendations of faculty and the director of teacher certification or director of graduate studies. Some assistantships involve the supervision of student teachers; others involve helping professors in their teaching or research. Taxable stipends in amounts set by the university are paid for all assistantships. Appointments are usually made in terms of one-fourth time (10 hours a week) or one-half time (20 hours a week). Inquiries should be directed to the dean, School of Education.

## Faculty— School of Education

LORRIE A. SHEPARD, dean; professor. BA, Pomona College; MA, PhD, University of Colorado.

HAROLD MILTON ANDERSON, professor emeritus.

RONALD DeLAINE ANDERSON, professor. BS, PhD, University of Wisconsin.

LEONARD M. BACA, professor. STB, Catholic University of America; MA, University of New Mexico; EdD, University of Northern Colorado.

HILDA BORKO, professor. BA, MA, PhD, University of California at Los Angeles.

DEREK BRIGGS, assistant professor. BA, Carleton College; PhD, University of California, Berkeley.

RUTH K. CLINE, professor emeritus.

JACK EUGENE COUSINS, professor emeritus.

PHILIP DiSTEFANO, provost and executive vice chancellor for academic affairs; professor. MA, West Virginia University; BS, PhD, Ohio State University.

RUBEN DONATO, associate professor. BA, University of California, Santa Cruz; MA, PhD, Stanford University.

MARGARET A. EISENHART, professor. BA, Emory University; MA, PhD, University of North Carolina.

KATHY C. ESCAMILLA, associate professor. BA, University of Colorado at Boulder; MS, University of Kansas; PhD, University of California at Los Angeles.

ROBERTA FLEXER, associate professor emeritus.

PAMELA FORD, director of field experiences; senior instructor. BS, University of Missouri; MA, University of Northern Colorado; PhD, University of Colorado at Boulder.

MARIA E. FRANQUIZ, associate professor. BA, MA, PhD, University of California, Santa Barbara.

JEFFREY A. FRYKHOLM, assistant Professor. BA, MS, Whitworth College; PhD, University of Wisconsin–Madison.

STEVEN R. GUBERMAN, associate professor. BA, University of Chicago; MA, PhD, University of California at Los Angeles.

JOHN HAAS, professor emeritus.

MYRLE EMERY HEMENWAY, associate professor emeritus.

STEPHEN E. HODGE, associate professor emeritus.

KENNETH D. HOPKINS, professor emeritus.

ERNEST R. HOUSE, professor emeritus.

KENNETH R. HOWE, professor. BA, MA, PhD, Michigan State University.

KENNETH LAWRENCE HUSBANDS, professor emeritus.

A. SUSAN JUROW, assistant professor. BA, New York University; MA, PhD, University of California, Berkeley.

MICHAEL KALK, professor emeritus.

VERNE CHARLES KEENAN, associate professor emeritus.

JANETTE KETTMANN KLINGNER, associate professor. BA, San Jose State University; MS, PhD, University of Miami.

RICHARD JOHN KRAFT, professor emeritus.

PHILIP LANGER, professor. AB, University of Michigan; MA, New York University; PhD, University of Connecticut.

MARGARET D. LeCOMPTE, professor. BA, Northwestern University; MA, PhD, University of Chicago.

ROBERT L. LINN, distinguished professor. AB, University of California, Los Angeles; MA, PhD, University of Illinois.

DANIEL P. LISTON, professor. BA, Earlham College; PhD, University of Wisconsin.

ROY P. LUDTKE, professor emeritus.

WILLIAM McGINLEY, associate professor. AB, Western Kentucky University; MEd, Idaho State University; PhD, University of Illinois.

ROBERT McKEAN, professor emeritus.

SHAILAJA MENON, assistant professor. BA, Delhi University, New Delhi, India; MSc, MS, University, Gujarat, India; PhD, University of Michigan–Ann Arbor.

OFELIA MIRAMONTES, associate vice chancellor and associate professor. MA, United States International University; BA, PhD, San Diego State University.

MITCHELL J. NATHAN, associate professor. BS, Carnegie Mellon University; MA, PhD, University of Colorado at Boulder.

MILES C. OLSON, professor emeritus.

KARL OPENSHAW, professor emeritus.

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ROBERT D. PRICE, professor emeritus.

MARIA de la LUZ REYES, associate professor emeritus.

ALBERT EDWARD ROARK, professor emeritus.

STEPHEN ROMINE, professor emeritus.

JAMES S. ROSE, professor emeritus.

DARYL L. SANDER, professor emeritus.

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MARC SWADENER, associate professor emeritus.

CLARISSA THOMPSON, assistant professor. BA, Wesleyan University; EdM, Harvard University; PhD, University of Washington.

LUIS URRIETTA JR., assistant professor. BA, University of California, Los Angeles; MA, California State University, Los Angeles; PhD, University of North Carolina, Chapel Hill.

JAMES R. WAILES, professor emeritus.

KEVIN G. WELNER, assistant professor. BA, University of California, Santa Barbara; JD, PhD, University of California, Los Angeles.

JENNIFER WHITCOMB, assistant dean of teacher education and administration, senior instructor. BA, PhD, Stanford University.

SHELBY ANNE WOLF, associate professor. BA, University of Richmond; BA, MS, University of Utah; PhD, Stanford University.

# College of Engineering and Applied Science

*Robert H. Davis, dean*

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college web site: [ecadw.colorado.edu/engineering](http://ecadw.colorado.edu/engineering)

**T**HE COLLEGE OF ENGINEERING AND APPLIED SCIENCE offers eleven undergraduate degrees: aerospace engineering sciences, architectural engineering, chemical engineering, civil engineering, electrical engineering, electrical and computer engineering, environmental engineering, mechanical engineering, computer science, applied mathematics, and engineering physics. The first eight degree programs are accredited by the Accreditation Board for Engineering and Technology. The remaining degree programs are applied sciences; accreditation by ABET is not usually sought in these areas. All degree programs are accredited under the North Central Association of Colleges and Schools. Degrees in applied mathematics and engineering physics are offered in cooperation with the Departments of Applied Mathematics and Physics in the College of Arts and Sciences.

Additional information about the academic programs, services, and faculty of the College of Engineering and Applied Science is found at [ecadw.colorado.edu/engineering](http://ecadw.colorado.edu/engineering).

The goals of this college are to:

- attract and graduate excellent students of diverse demographics, providing them with an education that prepares them for success and future leadership in engineering and related professions or for advanced post-graduate study;
- be one of the foremost institutions of research, advancing the frontiers of knowledge for the benefit of individuals and society;
- be a nationally recognized leader in the evolving paradigm of engineering education, integrating teaching, discovery learning, and service learning at the undergraduate and graduate levels;
- provide academic support to all engineering students;
- achieve a recognized level of excellence in all degree programs; and
- conduct outreach activities to support enrollment goals, diversity, demands for continuing education and lifelong learning, and the educational needs of the citizens of the state of Colorado.

This college strives to graduate technically proficient men and women who have a diverse global outlook on life, realize that learning is a lifelong endeavor, and appreciate their potential to benefit humanity and to protect our environment.

## Equal Opportunity

The College of Engineering and Applied Science is dedicated to an open, inclusive, and supportive human climate for all of its students, staff, and faculty. It is guided by the principles of empowerment and respect for all individuals.



The college does not discriminate on the basis of race, color, sex, age, religion, sexual orientation, national or ethnic origin, disability, or veteran status in any of its programs or activities, including admission, employment, and the administration of its education and research policies.

## Facilities

Students have an opportunity to study engineering with over 190 faculty members of national and international reputation. They have access to the superb facilities of the College of Engineering and Applied Science. Each engineering department has laboratories suitable for undergraduate and graduate instruction and experimental research through the doctoral or post-doctoral level. Specific information on these facilities may be obtained from the departments concerned.

## Computing

Classes in the departments of the college place strong emphasis on the use of computers. Entering freshmen receive instruction and undertake academic projects involving computers. While most students choose to obtain personal computers, several hundred computers are available in open laboratories in the college, and over one thousand are located throughout the campus for student use. Many computer laboratories are located in the Engineering Center.

More computing information may be found under Campus Facilities in the General Information section, in engineering department summaries, and under Laboratories and Special Equipment in the Graduate School.

## Degree Programs

In most departments of this college, several options are offered within each degree program. Many departments offer options of bioengineering and/or premedicine and environmental engineering. Some programs of study are oriented toward graduate work, and others toward engineering practice.

Engineers work in a wide variety of disciplines, with the college's 11 undergraduate and eight graduate degree programs reflecting this diversity. The following descriptions summarize these areas.

**Aerospace engineering sciences** prepares engineers for an industry that encompasses the design and construction of commercial and military aircraft and space vehicles. The systems education of aerospace engineers also prepares them for careers in other fields requiring highly technical systems. Because of their extensive background in mathematics and physics, they are often at the forefront of emerging technologies.

**Applied mathematicians** have the expertise and mathematical sophistication necessary to make contributions in a wide variety of fields, including scientific computation, actuarial science, financial modeling, and most areas of science and engineering that have a mathematical basis.

A professional applied mathematician may work with engineers, scientists, programmers, and other specialists. The curriculum at CU-Boulder is designed to have the breadth for such an interdisciplinary career.

Course offerings at the undergraduate level focus on providing students with mathematical tools, problem-solving strategies, and expertise useful in science and engineering. To fulfill requirements, a concentrated area of engineering courses (or approved natural science courses) must be completed. The college has formulated several recommended options within the discipline.

**Architectural engineering** prepares students for leadership careers in the building design, management, and construction industry and for research at the graduate level on building-related topics. This course of study fulfills the academic requirements for registration as a professional engineer.

The architectural engineering curriculum is recommended for those wishing to specialize within the building industry in engineering design (heating, cooling, illumination, electrical, solar, and structures) or construction and contracting (facilities management). The architectural engineering student may select any one of several areas of specialization offered: HVAC (heating, ventilating, and air conditioning), illumination, electrical, building energy, structures, or construction.

**Chemical engineers** convert natural resources into industrial and consumer products using a wide variety of processing techniques. Among their products are many that often are not identified with chemical engineering—oils, metals, glass, plastics, rubber, paints, soaps and detergents, foods, beverages, electronics, synthetic and natural fibers, nuclear and exotic fuels, and medicines.

This department has a strong general undergraduate program with curricular options in environmental, materials, microelectronics, computing, and bioengineering. There is also a premedicine curriculum track. There are active research and educational programs in the exciting field of biotechnology, which involves the use of individual cells and their components for producing pharmaceuticals and other important products, and biomedical engineering, which involves medical devices, tissues, and biomaterials. The department also is involved in pollution control, novel membrane separations, and advanced polymeric and ceramic materials. A formal cooperative education Co-Op program is offered by the department and its industry partners.

**Civil engineering** offers a wide range of challenging careers for students interested in the planning, design, and supervision of the construction of facilities essential to modern life in both the public and private sectors. Varying widely in nature, size, and scope, such facilities include space satellites and launching facilities, offshore structures, bridges, buildings, tunnels, highways, transit systems, dams, airports, irrigation projects, treatment and distribution facilities for water, and collection and treatment facilities for wastewater.

In the next two decades, almost two billion more people will populate Earth. This growth will create demands for producing energy, supplying food, stabilizing land, processing water, providing transportation, handling materials, disposing waste, moving earth, providing health care, cleansing the environment, creating structural facilities, living and working on an unprecedented scale. Civil engineers will play a critical role in fulfilling those demands and in preserving the quality of life.

**Computer science** offers study in the fields of programming languages, artificial intelligence, human-computer interaction, soft-

ware engineering, operating systems, parallel processing, numerical analysis, database systems, the theory of computation, networks, and computer security. Graduates typically take positions as systems programmers for computer manufacturers or software firms, advanced applications programmers in scientific research firms, or technically oriented systems designers in commercial or government settings.

**Electrical engineering** offers study of the basic science and technology of information and energy. Its areas of knowledge include information theory and communications systems, computers and digital systems, signal processing and instrumentation, feedback systems and automatic control, electrical and electronic devices and systems, energy conversion and power systems, and electromagnetics and microwave devices. Students learn how this basic knowledge is applied to such modern technologies as computers, telecommunications, biomedical systems, and remote sensing. The curriculum accommodates a variety of student interests including design, production, testing, consulting services, research, teaching, and management. Graduates pursue careers in a large variety of fields in the computer industry, telecommunications, instruments, the biomedical industry, aerospace, and academia. Some go on to careers in other professions such as law or medicine.

**Electrical and computer engineering** offers the same curriculum as electrical engineering except that required courses in computer hardware and software replace some upper-division electives. Like electrical engineering, it accommodates broad student interests from design to service and from research to management. Its graduates take positions in fields as diverse as those listed above for electrical engineering.

**Engineering management** equips individuals with technical management expertise, preparing them to be leaders in high technology organizations in the 21st century. The program provides a comprehensive graduate master's degree program and several professional graduate certificates for working engineers and technical professionals that can be taken on campus and through distance education. Areas of technical management emphasis are in quality and process, research and development, operations, and project management.

**Engineering physics** provides students with a broad exposure to the basic physical theories and mathematical techniques underlying engineering. The program may be specialized to meet the student's interests through engineering electives. Most students become involved in laboratory research, and graduates find opportunities in optics, electronics, magnetism, and other hardware-based job markets. The program also provides excellent preparation for graduate study in physics, applied physics, and other areas of the natural sciences and engineering.

**Environmental engineering** plays a vital role in maintaining the quality of both human environmental systems and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere and land, water, and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations.

The degree in environmental engineering includes course work in advanced mathematics, biology, chemistry, and physics. In common with other engineering fields, courses in solid mechanics, fluid dynamics, and thermal sciences are central to the environmental engineering degree. Course work specific to environmental engineering includes water and wastewater treatment, hazardous waste storage and treatment, and air pollution control.

**Mechanical engineering** prepares students for careers in a variety of industrial sectors including transportation, energy, electronics manufacturing, medical, and environmental. Basing their educa-

tion on the fundamentals of mathematics, physics, and chemistry, mechanical engineers deal with diverse components and systems such as internal combustion engines, automobiles, computers, power plants, aircraft, medical instruments, space platforms, and pollution control devices. Career opportunities include work in basic and applied research and development, design, manufacturing, project management, consulting, and teaching. They are employed by a wide variety of industrial, governmental, and educational organizations. A mechanical engineering background also provides a firm foundation for other professional careers such as engineering management, law, and medicine.

**Open Option Program.** The College of Engineering and Applied Science provides the opportunity for new freshmen (first-year students) to delay their selection of an engineering major by enrolling in the open option (OPEN) program. This program is available only to new first-year students; students in the program are required to select a specific engineering degree program no later than the end of the spring semester, regardless of when they entered the OPEN program. This provides students with one or two semesters to explore the variety of engineering degree programs before selecting a major.

The dean's office provides general advising for all open option students through staff advisors. This advising is supplemented with freshmen faculty advisors in each engineering degree program. Students selecting the open option program are subject to all College of Engineering and Applied Science academic rules and policies. They are also required to satisfy any remaining minimum academic preparation standards (MAPS) required for graduation. For information, see [www.colorado.edu/engineering/ar\\_ugradadvising.html](http://www.colorado.edu/engineering/ar_ugradadvising.html) (OPEN option).

## Professional Registration

The need for professional registration depends on the field of engineering and the nature of practice in that field. Engineers in private professional practice generally need to be registered. Currently, registration is required in all states for the legal right to practice professional engineering. Although there are variations in state laws, graduation from an accredited curriculum in engineering, subscription to a code of ethics, and four years of qualifying experience are minimum requirements for registration. Two days of examinations covering the engineering sciences and the applicant's practical experience are also required in most states and territories.

## Study Abroad

In today's international environment, engineers frequently work and travel in foreign nations or with foreign engineers. Therefore, it is desirable that engineering students familiarize themselves with foreign cultures by selecting appropriate courses or by studying abroad. The University of Colorado has several programs that enable students to undertake course work in engineering. These include programs at the Universities of New South Wales, Wollongong, and Murdoch in Australia; the Universidad de Costa Rica in the Americas; the Universities of East Anglia, Lancaster, and Sussex in England; Denmark's International Study Program; Uppsala University in Sweden; the University of Edinburgh in Scotland; the American University of Cairo in Egypt; the University of Ghana; and the Instituto Tecnológico y de Estudios Superiores de Monterrey in Mexico. All participants in the university study abroad programs remain enrolled at the university, and the *pass/fail* grade option is used for all course work taken during study abroad. Financial aid from the university can be applied to the program costs in most cases, and special study abroad scholarships may be available for program participants. More information about studying

abroad is available at the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, **303-492-7741**.

Engineering departments may also assist students wishing to study engineering at the Ecole National des Ponts et Chaussées in Paris, the Ecole Polytechnique Feminine in Paris, and the University of Oviedo in Spain.

With the proper preparation, students may complete one or two semesters of engineering education during study abroad. All students preparing for study abroad must petition their major department about specific courses planned away from CU, and to ensure that the college residency requirement is satisfied.

## Student Organizations

The following honorary engineering societies have active student chapters in the College of Engineering and Applied Science:

- Chi Epsilon, civil and architectural engineering society
- Eta Kappa Nu, electrical engineering society
- Omega Chi Epsilon, chemical engineering society
- Pi Tau Sigma, mechanical engineering society
- Sigma Gamma Tau, aerospace society
- Tau Beta Pi, engineering society

Student chapters of the following professional or social societies meet frequently to present papers, speakers, films, and other programs of technical interest:

- American Indian Science and Engineering Society
- American Institute of Aeronautics and Astronautics
- American Institute of Chemical Engineers
- American Society of Civil Engineers
- American Society of Heating, Refrigerating, and Air Conditioning Engineers
- American Society of Mechanical Engineers
- American Solar Energy Society
- Architectural Engineering Institute
- Asian Engineering Society
- Associated Energy Engineers
- Associated General Contractors
- Association for Computing Machinery
- Biomedical Engineering Society
- Illuminating Engineering Society of North America
- Institute of Electrical and Electronics Engineers
- National Society of Architectural Engineers
- National Society for Black Engineers
- Sigma Tau, engineering social fraternity
- Sigma Xi, scientific research society
- Society of Automotive Engineers
- Society of Environmental Engineers
- Society of Hispanic Professional Engineers and Scientists
- Society for Industrial and Applied Mathematics
- Society of Manufacturing Engineers
- Society of Mexican-American Engineers and Scientists
- Society of Physics Students
- Society of Women Engineers
- Structural Engineers Council

A student organization, the University of Colorado Engineering Council (UCEC), represents students in the College of Engineering and Applied Science. UCEC supervises matters of interest to all undergraduate students through the control board, its legislative body. Students in this college also publish the *Colorado Engineer Magazine*, first published in 1904.

## Multicultural Engineering Program

The Multicultural Engineering Program (MEP) is an academic excellence community dedicated to the success of students historically underrepresented in engineering. The mission of MEP is to recruit, retain, and graduate underrepresented multicultural and first generation students with the personal and profes-

sional skills needed to excel in professional engineering careers and/or graduate studies.

In addition to program participation grants, MEP conducts a five-week summer bridge program, a new student leadership course, academic excellence workshops, advising, tutoring, and internship and career placement assistance. The MEP Resource Center serves as a central meeting place for forming study groups and networking, while providing access to MEP staff, computer stations, study tables, a resource library, a photocopy machine, and a kitchenette.

MEP is supported by the college and the university, as well as by federal grants and donations from industry and private individuals. See [www.colorado.edu/engineering/MEP](http://www.colorado.edu/engineering/MEP).

## Women in Engineering Program

The Women in Engineering Program (WIEP) provides services to current and prospective women students to maximize the recruitment and retention of women in engineering. Precollegiate and undergraduate programs and activities include outreach to elementary, middle, and high school students, scholarships, job placement assistance, assistance for transfer students, counseling, supplemental academic advising, peer and professional mentoring, job shadowing, departmental lunches, and an electronic mail network to keep women informed on important issues and events.

The WIEP is committed to maintaining an encouraging academic and social environment for all students. The StorageTek Women in Engineering Resource Center and the Boeing Study Room provide a comfortable setting where students can work and study together.

The WIEP is funded by donations from alumni, StorageTek, Boeing, industry, companies, other friends, and the college. Visit [www.colorado.edu/engineering/WIEP](http://www.colorado.edu/engineering/WIEP).

## Herbst Program of Humanities

The Herbst Program of Humanities aspires to enrich and broaden the technical education offered in the College of Engineering and Applied Science and to enable Herbst students and faculty to participate in a discussion as old as humanity itself and as fresh as the newest voice.

The centerpiece of the Herbst Program is a two-semester, 6 credit-hour sequence open to juniors and seniors. These seminars, HUEN 3100 and 3200, are limited to 12 students and are devoted almost entirely to roundtable discussions of original texts, primarily in literature and philosophy, but with secondary attention given to art, music, and architecture. These seminars endeavor to help students improve their writing skills, gain confidence and skill in civil discourse on controversial issues, see more clearly the inadequacy of dogmatic responses to complex questions, and develop intellectual rigor on non-technical issues. Students must apply to participate in the Junior Seminars, which also satisfy the university's required writing course.

The Herbst Program offers two different courses for first-year engineering students. HUEN 1010, Introduction to the Humanities, explores such diverse forms of humanistic expression as short novels, poems, visual art, music, drama, and philosophy. HUEN 1100, History of Science and Technology, surveys from ancient times to the present a subject of special interest and importance for engineers. Original source material and textbook readings provide insight into science and technology in changing historical, social, and political contexts. This lecture course is offered only in the fall semester.

For sophomores, Herbst offers HUEN 2843, Tradition and Identity, which examines—through ancient epics, modern novels, children's literature, poetry, short stories, drama, film, and

philosophy—what it means for you to be you while belonging to a world of others.

The Herbst Program was initially funded by an endowment established by Mr. Clarence Herbst in 1989, and it is sustained by the generous support by a variety of donors, including Ms. Linda Vitti Herbst, and by the College of Engineering and Applied Science. Visit [www.colorado.edu/engineering/herbst/main.html](http://www.colorado.edu/engineering/herbst/main.html).

## Residence Hall Program

In cooperation with the Department of Housing, the College of Engineering and Applied Science offers a residential academic program for students majoring in engineering or the sciences. This program features a variety of student support services, an extensive tutoring program in courses related to the first-year engineering curriculum, a computer laboratory, and increased opportunity for faculty and student interaction. If requested by housing, the college also may be involved in student behavior or disciplinary actions. There is a minimal fee for this program to cover program costs and computer purchases. Students interested in this residential academic program should contact the Department of Housing for application information.

## Academic Excellence

### Dean's List

A student in the College of Engineering and Applied Science who completes at least 12 credit hours of course work for a letter grade during the fall or spring semester on the Boulder campus (excluding continuing education), and who earns a semester grade point average (GPA) of at least 3.60, will be included on the college dean's list for that semester. Notation of "Dean's List" is also placed on the student's internal transcript by the Office of the Registrar.

### Honors at Graduation

In recognition of high scholastic achievement, the designation "With High Distinction" or "With Distinction" is awarded at graduation and is recorded on the diploma and official transcript of the graduate and indicated in the commencement program.

To qualify for the "With High Distinction" designation, the student's cumulative University of Colorado GPA must be at least a 3.90. For the "With Distinction" designation, the student's cumulative GPA must be at least a 3.75 but less than a 3.90. In addition, for these designations, at least 50 semester hours must have been earned at the Boulder campus. Grades earned during the semester immediately prior to graduation are not considered.

Interested students also are encouraged to participate in honors programs offered through the College of Arts and Sciences. Honors awards within this program are cum laude, magna cum laude, and summa cum laude and are recorded on the student's diploma and in the commencement program. Criteria for these designations are determined by the Honors Council. Interested students should consult with the director of the Honors Program at **303-492-6617** for detailed information.

### Scholarships

Undergraduate scholarships are provided by public funds and private donations by alumni, corporations, and friends of the college through gifts to the University of Colorado Foundation, Inc. In some cases, endowments have been established; other scholarships are based on annual gifts. Many companies provide matching funds for gifts from their employees who are alumni. More than 650 scholarships have been made available to qualified students.

Awards are based on demonstrated academic ability and performance. Financial need is considered if designated by the donor (see the Financial Aid section).

For additional information about college-based scholarships, contact the dean's office at **303-735-2440** or see [ecadw.colorado.edu/engineering/prospective/scholarships.html](http://ecadw.colorado.edu/engineering/prospective/scholarships.html) (Undergraduate Scholarships). Students may also contact the Office of Financial Aid at **303-492-5091**.

Anyone interested in providing an undergraduate scholarship or contributing to the scholarship fund may contact the Engineering Development Office, University of Colorado at Boulder, 422 UCB, Boulder, CO 80309-0422, **303-492-7335**.

## Academic Standards

### Ethics

As members of the academic community, students have a responsibility to conduct themselves with the highest standards of honesty and integrity. These qualities are also vital to the profession of engineering.

Academic penalties, including suspension or expulsion, are imposed for the following acts, or intent to engage in such acts: plagiarism; illegal possession and distribution of examinations or answers to specific questions; the presentation of another student's work as one's own; performing work or taking an examination for another student; or the alteration, forging, or falsification of official records. Any student accused by a course instructor of academic dishonesty will be allowed to remain in the course until a time the student acknowledges an act of academic dishonesty or until a hearing has determined that an act of academic dishonesty has been committed. This listing is not complete and includes only some types of academic dishonesty brought before the Undergraduate Academic Affairs Committee. For additional information, see [ecadw.colorado.edu/engineering/academics/ugradadvising.htm](http://ecadw.colorado.edu/engineering/academics/ugradadvising.htm) (Student Academic Honesty). See also Academic Integrity and Student Conduct under Campus Policies in the General Information section.

### Policy on Academic Progress

To remain in good standing in the College of Engineering and Applied Science, a student must maintain satisfactory academic performance, as measured by grades reported to and calculated by the Office of the Registrar, and satisfactory academic progress toward completion of a bachelor of science degree in the college. Failure to meet these requirements results in the student being placed on academic probation and, if not corrected, on academic suspension. A student will be directly placed on academic suspension if retroactive grade changes lower their cumulative or prior semester GPA, or if their cumulative CU grade point average falls below 1.00. For additional information, see [ecadw.colorado.edu/engineering/academics/ugradadvising.htm](http://ecadw.colorado.edu/engineering/academics/ugradadvising.htm) (Academic Probation and Suspension).

#### Academic Probation

*Academic probation is normally the first step taken by the college to express concern that a student is not maintaining satisfactory academic performance. It represents an official warning that the student's academic performance must improve or the student will be subject to suspension from the college.* Once placed on academic probation, a student remains in that status the following two semesters of enrollment as an undergraduate student in the College of Engineering and Applied Science.

If a student's cumulative University of Colorado GPA drops below 2.00, or the student's semester GPA is less than 2.00 for two consecutive semesters at the University of Colorado, the student is placed on academic probation. Once placed on academic

probation, the student must meet the academic requirements imposed by the probation sanction or will be academically suspended from the College of Engineering and Applied Science.

Students placed on academic probation by cumulative grade point average must raise their cumulative University of Colorado GPA to at least 2.00 during the next semester of enrollment and keep it above a 2.00 the two following semesters. Students are also subject to probation by the consecutive semester GPA rule; this rule prescribes that a student placed on academic probation by the consecutive University of Colorado semester grade point average rule must maintain a semester GPA of at least 2.00 the two following semesters.

If probation is due to both cumulative and semester GPAs, students are required to maintain both cumulative and semester GPAs above 2.00 for the two following semesters.

While on academic probation, a student must enroll for and complete at least 12 credit hours per semester of courses that meet engineering degree requirements. Course work taken above minimum degree requirements in humanities, social science, and ROTC subjects does not count toward this minimum course load requirement, and students may not elect to take any courses with the *pass/fail* grade option.

#### Academic Suspension

Academic suspension is the involuntary withdrawal of a student from the college. *It reflects the college's position that the student is unable to meet minimum academic requirements for a bachelor of science degree.*

*If a student does not maintain satisfactory academic performance, that student is placed on academic suspension from the College of Engineering and Applied Science. A student is placed directly on academic suspension if retroactive grade changes lower the cumulative or prior semester grade point averages, or if the cumulative University of Colorado grade point average is below a 1.00 (without a period of academic probation).*

The conditions of academic suspension are as follows:

1. The period of the suspension is indefinite, but must be for at least one academic semester (summer not included) for the first academic suspension and two semesters (summer not included) for the second academic suspension.
2. This academic suspension applies to the College of Engineering and Applied Science on all campuses of the University of Colorado.
3. Suspended students may not enroll in courses, except those offered during summer session and those offered by Extended Studies through the Division of Continuing Education, University of Colorado at Boulder. Under no circumstances are suspended students to enroll for courses through the Division of Extended Studies, University of Colorado at Denver, or Maymester courses offered by the Division of Continuing Education, University of Colorado at Boulder.
4. If a student, while on academic probation or suspension, transfers to another college or school of the University of Colorado, the College of Engineering and Applied Science considers that student to have permanently changed their choice of academic major to one offered by that college or school. Therefore, the suspended student is not permitted to enroll in any courses taught by the college of engineering that may apply toward engineering degree requirements. If the suspended student attempts to transfer back into the college through intrauniversity transfer (IUT), the college policy governing IUT admissions applies, and the student must petition the Undergraduate Academic Affairs Committee for removal of the dean's scholastic stop.

# University of Colorado System Course Equivalencies

The following course-by-course equivalency table can assist a student anticipating an intercampus transfer between the individual colleges of engineering and applied science within the University of Colorado

system. Course equivalencies do not always accurately indicate the number of credit hours applicable toward degree requirements.

<i>CU-Boulder Course</i>	<i>Equivalent Colorado Springs Course</i>	<i>Equivalent Denver Campus Course</i>
<b>College of Arts and Sciences</b>		
<b>Applied Mathematics</b>		
APPM 1350-4 Calculus 1 for Engineers	MATH 135	MATH 1401
APPM 1360-4 Calculus 2 for Engineers	MATH 136	MATH 2411
APPM 2350-4 Calculus 3 for Engineers	MATH 235	MATH 2422/2423
APPM 2360-4 Linear Algebra/Differential Equations	MATH 313/340	MATH 3191/3200
<b>Chemistry</b>		
CHEN 1211-3 Engineering General Chemistry	CHEM 103	CHEM 1130 or 2031
CHEM 1211-2 General Chemistry Lab	CHEM 103	CHEM 2038
CHEM 3311-3 Organic Chemistry 1	CHEM 331	CHEM 3411
CHEM 3321-1 Organic Chemistry 1 Laboratory	CHEM 333	CHEM 3418
CHEM 3331-3 Organic Chemistry 2	CHEM 332	CHEM 3421
CHEM 3341-1 Organic Chemistry 2 Laboratory	CHEM 334	CHEM 3428
<b>Physics</b>		
PHYS 1110-4 General Physics 1	PES 111	PHYS 2311
PHYS 1120-4 General Physics 2	PES 112	PHYS 2331
PHYS 1140-1 Experimental Physics 1	PES 115 or 215	PHYS 2321/2341
PHYS 2130-3 General Physics 3	PES 313	PHYS 2811
PHYS 3330-2 Experimental Physics	PES 315	PHYS 3711
<b>College of Engineering and Applied Science</b>		
<b>Architectural Engineering</b>		
AREN 1316-1 Introduction to Architectural Engineering	ENGR 1502	none
AREN 1017-2 Engineering Drawing	ENGR 1501	ENGR 1025
AREN 1027-2 Descriptive Geometry	none	none
AREN 2010-3 Introduction to Solar Utilization	CHE 405	none
AREN 2020-3 Energy Fundamentals	ENGR 211	ENGR 3012
<b>Aerospace Engineering</b>		
ASEN 2010-3 Mechanics 1	MAE 2101	ME 2023
ASEN 2020-3 Mechanics 2	MAE 2102	ME 2033
ASEN 2022-3 Material Science/Engineering	MAE 3201	ME 3024
ASEN 2023-3 Thermodynamics	MAE 2301	ENGR 3012
<b>Civil and Environmental Engineering</b>		
CVEN 1317-1 Introduction to Civil/Environmental Engineering	ENGR 1502	none
CVEN 2012-3 Plane Surveying	none	CE 2212
CVEN 2121-3 Analytical Mechanics 1	MAE 2101	CE 2121
CVEN 3161-3 Mechanics of Materials 1	MAE 3201	CE 3121
CVEN 3313-3 Theory of Fluid Mechanics	MAE 3130	CE 3313
<b>Computer Science</b>		
CSCI 1300-4 CS I/Programming	CS 115	CSC 1410 (missing credit hours)
CSCI 2270-4 CS II/Data Structures	CS 145	CSC 2421 (missing credit hours)
CSCI 3104-4 Algorithms	CS 472	CSC 3412
CSCI 3155-4 Principles of Programming	CS 316	none
CSCI 3202-3 Artificial Intelligence	none	CSC 4202
CSCI 3287-3 Database Systems	none	CSC 4287
CSCI 3434-3 Theory of Computation	none	CSC 4034
CSCI 3656-3 Numerical Computation	none	CSC 4656
CSCI 4555-3 Introduction to Compiler Construction	none	CSC 4555
<b>General Engineering</b>		
GEEN 1300-3 Introduction to Engineering Computing	CS 115	CSC 1200
<b>Electrical and Computer Engineering</b>		
ECEN 1400-3 Methods and Problems ECE	ECE 1010 or ENGR 1502	EE 2651
ECEN 2250-5 Circuits/Electronics 1	ECE 2210/2230	EE 2132/2532
ECEN 2260-5 Circuits/ Electronics 2	none	EE 2142/2552
ECEN 3000-3 Electricity and Electrical Circuits for Non-Majors	none	EE 3030
ECEN 3100-5 Digital Logic	ECE 2410/2420 or ENGR 1411 and ECE2411	EE 1510/2531
ECEN 3400-5 Electronic Fields and Waves	none	EE 3133 (lecture only)
ECEN 3170-3 Energy Conversion 1	none	EE 3164
ECEN 3250-5 Circuits/Electronics 3	none	EE 3215 (lecture only)
<b>Mechanical Engineering</b>		
MCEN 1000-1 Introduction to Mechanical Engineering	MAE 1000	none
MCEN 1025-3 Computer Aided Drawing/Fabrication	MAE 2501	none
MCEN 2022-3 Engineering Thermodynamics	MAE 2301	ENGR 3012
MCEN 2023-3 Mechanics of Particles	MAE 2101	ME 2023
MCEN 2043-3 Mechanics of Rigid Bodies	MAE 2102	ME 2033



5. If an academically suspended engineering student is also a double-degree student with another school or college at CU-Boulder and desires to work on the second degree program while on academic suspension from engineering, this student must drop engineering as a degree program. The student may attempt to return to engineering in the future through the intra-university transfer process.

6. The suspended student may elect to attend another accredited institution. However, a student seeking readmission to the college must have raised his or her cumulative CU grade point average to at least 2.00; grades earned at other institutions do not transfer to the University of Colorado.

Under select circumstances, the dean reserves the option of extending the period of academic probation for one semester, rather than placing the student directly on academic suspension. This option is exercised only in cases involving the student's cumulative grade point average (GPA) and the following conditions:

- The student must have a CU cumulative GPA of at least 1.95.
- The most recent semester of academic performance must demonstrate a highly significant improvement over prior semester(s).
- The student must have been enrolled in a curriculum of study related to one of the degree programs offered by this college and demonstrate an intent to complete that degree program.
- The student cannot have elected the option of enrolling in any course during the past two semesters with the *pass/fail* or no-credit options, or have taken any incomplete (*IF* or *IW*) grades.
- The student must have successfully completed at least 15 semester credit hours each of the last two semesters, or a total of 30 hours during the past two semesters on the Boulder campus.
- The student must have abided by all conditions imposed by their academic probation.

This special review of academic suspension is exercised at the option of the dean of the College of Engineering and Applied Science. A student can receive this special review only once during his or her period of undergraduate enrollment.

A student may be academically suspended multiple times from this college. However, a third academic suspension is permanent; with a third academic suspension, the student no longer has the option of returning to this college.

Readmission of suspended students must be approved by the college and the CU-Boulder Office of Admissions; such readmission is not assured. Students must present convincing evidence of their ability to successfully complete an engineering degree program.

## Petition Policy

A student desiring a waiver of college or departmental policies must request and secure approval for this waiver through a petition procedure. Petition forms and information on the petition procedure are available in the dean's office or in the academic department office.

## Admission and Enrollment Policies

### Freshman Applicants

Prospective engineering students must have a mathematical aptitude and keen interest in science and its methods. Curiosity about the natural principles governing the behavior of forces and materials and the ability to visualize structures and concepts are prerequisites. Strong skills are also essential in written and oral communications.

The college seeks applicants who demonstrate a high probability of completing their designated engineering degree program. Admission is based on the evaluation of many criteria; among the most important are the general level of academic performance prior to admission, performance on standardized tests, and other evidence of motivation, potential, academic ability, and accomplishment. These factors are indicated by academic records, test scores, letters of recommendation, and personal accomplishments.

Engineering students are expected to begin their study of mathematics with calculus. The college also requires that students have prior credit in chemistry and physics.

Specific admission requirements are detailed in Undergraduate Admission in the General Information chapter of this catalog. All new freshmen are expected to be enrolled as full-time students and must petition to be enrolled part time.

### Transfer Students

Students desiring to transfer from other accredited collegiate institutions are considered for admission on an individual basis if they meet the transfer student admissions requirements outlined in Undergraduate Admission in the General Information chapter of this catalog. All transfer students are expected to be enrolled as full-time students and must be admitted to the college prior to the last 45 semester credit hours of their degree program.

### Intercampus Transfer Students

The acceptance of a student transferring from one campus to another within the University of Colorado system is determined by the Office of Admissions on the basis of guidelines established by the respective College of Engineering and Applied Science.

Intercampus transfer applications are considered on the basis of the student's University of Colorado system grade point average, grades earned in engineering-related courses, grades earned at other institutions, satisfactory academic progress toward degree requirements, course load completed, and the residency requirement of the gaining engineering college.

The student is advised that the engineering degree requirements differ from one campus to another in the number of credit hours required for the degree, specific course content and titles, and residency required in the college. Where there is a difference in credit hours between courses listed as equivalent, the College of Engineering and Applied Science at CU-Boulder applies the smaller number of credit hours. To ensure the maximum acceptance of credit toward degree requirements and minimize the length of time required to complete the degree, the student planning an intercampus transfer must contact the gaining major department as soon as possible once deciding to complete an engineering degree on another University of Colorado campus.

Generally, an intercampus transfer should be accomplished at the end of the first year, with some course selection coordination required between the student and the degree-granting major department during that year. With increased course selection coordination, some students may be able to delay their transfer until the middle or end of the sophomore year. Beyond that point, the student is most likely to lose substantial course credit and time in completing degree requirements.

All intercampus transfer students are expected to be enrolled as full-time students and must petition to be enrolled part time.

Any minimum academic preparation standards (MAPS) deficiencies are to be completed prior to the intercampus transfer. A sample freshman year for the intercampus transfer student includes the following courses:

**First Semester**

Calculus 1 .....	4 hrs.
Chemistry 1 .....	.5 hrs.
Computer Science* .....	3-4 hrs.
Humanities/Social Science .....	.3 hrs.

**Second Semester**

Calculus 2 .....	4 hrs.
Physics 1 .....	4 hrs.
Engineering Draw/Graphics* .....	2-3 hrs.
Humanities/Social Science .....	.3 hrs.
Humanities/Social Science* .....	.3 hrs.

\* Coordination is required on these course selections to ensure the application of this credit toward degree requirements. If transferring to CU-Boulder, the student should not enroll in any English composition or speech courses. Engineering drawing and/or graphics courses are applicable only in select majors. The student is expected to use this opportunity to complete any MAPS deficiencies.

For additional information, visit [ecadw.colorado.edu/engineering/academics/ugradadvising.htm](http://ecadw.colorado.edu/engineering/academics/ugradadvising.htm) (Inter-campus Transfer).

To assist the prospective inter-campus transfer student in contacting a faculty or staff advisor in the gaining major department, the following list is provided.

**University of Colorado at Boulder Campus**

Dean's Office, Engineering Administration Wing ECAD 100, 303-492-5071  
Aerospace Engineering Sciences, Engineering Office Tower ECOT 634,  
303-492-6417

Applied Mathematics, Engineering Office Tower ECOT 225, 303-492-4668  
Chemical and Biological Engineering, Engineering Chemical Wing ECCH  
111, 303-492-7471

Civil, Environmental, and Architectural Engineering, Engineering Office  
Tower ECOT 447, 303-492-4193

Computer Science, Engineering Office Tower ECOT 717, 303-492-7514

Electrical Engineering and Electrical and Computer Engineering,  
Engineering Electrical Wing ECEE 1B55, 303-492-7327

Engineering Management, ECOT 417, 303-492-2570

Engineering Physics, Duane Physics Building E-1B32, 303-492-6952

Environmental Engineering, Civil Engineering Wing ECOT 511,  
303-735-0253

Mechanical Engineering, Engineering Mechanical Wing ECME 132,  
303-492-7151

Interdisciplinary Telecommunications Program, Office Tower ECOT 313,  
303-492-8916

**University of Colorado at Colorado Springs Campus**

Dean's Office, Engineering 201, 719-593-3246

Applied Mathematics, Engineering 274, 719-593-3311

Computer Science, Engineering 199, 719-593-3325

Electrical Engineering, Engineering 299, 719-593-3351

**University of Colorado at Denver Campus**

Dean's Office, North Classroom 3024, 303-556-2870

Civil Engineering, North Classroom 3027, 303-556-2871

Computer Science, North Classroom 2605, 303-556-4314

Electrical Engineering, North Classroom 2615, 303-556-2872

Mechanical Engineering, North Classroom 3502, 303-556-8516

**Intrauniversity Transfer Students**

Undergraduate intrauniversity transfers (IUTs) on the Boulder campus of the University of Colorado to the College of Engineering and Applied Science are considered on an individual basis. The applicant is expected to apply during the second semester of calculus and the appropriate laboratory science course. The applicant's academic record must fulfill the IUT admissions requirements of the College of Engineering and Applied Science. The applicant must apply prior to the college IUT deadline of April 1 for fall, November 1 for spring, July 1 or August 1 for summer. Specific admission criteria and application details are available in the Office of the Dean (ECAD 100).

All intrauniversity transfer students must be enrolled for at least 12 semester credit hours (6 in summer) during their semester of IUT application. For additional information, visit [ecadw.colorado.edu/engineering/prospective/transfer\\_students.htm](http://ecadw.colorado.edu/engineering/prospective/transfer_students.htm) (intrauniversity transfer).

**Former Students**

A former student are expected to meet the requirements outlined in Undergraduate Admissions in the General Information chapter and must reapply to the university. Courses taken at other collegiate institutions are not necessarily a determining factor in the student's readmission to the University of Colorado, but transcripts on all such work must be submitted.

Interruption of studies may require completion of current degree work in addition to repetition of course work for new degree requirements.

**Attendance**

Successful work in the College of Engineering and Applied Science is dependent upon uninterrupted attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. *If students stop attending a course in which they are enrolled, they receive a failing grade (F).* If a student has received a final grade of *F* for nonattendance due to failure to properly drop a course, the student can request the college to insert a letter of explanation in her or his college file for future reference.

If a student misses a final examination because of illness or other valid personal emergency, the student must notify the instructor and the Office of the Dean no later than the end of the day on which the final examination is given. Failure to properly notify these officials may result in an *F* in the course.

**Changing Majors**

The form necessary for transferring from one undergraduate engineering major to another and to apply for double-degree programs is available in the dean's office (Engineering Administration ECAD 100).

**Class Standing**

To be classified as a sophomore in the college, a student must have completed 30 semester credit hours; to be classified as a junior, 60 hours; and to be classified as a senior, 90 hours. A student with more than 120 hours is classified as a fifth-year senior. All transfer students are classified on this basis according to their hours of credit accepted at the University of Colorado. This class standing does not necessarily reflect the academic standing of a student in a degree program.

**Credit Policies****Advanced Placement**

Advanced placement (AP) and college credit may be granted on the basis of the College Entrance Examination Board's (CEEB) Advanced Placement tests. For students who have taken an advanced placement course in high school and who make the required score in the CEEB's Advanced Placement examination, advanced placement and college credit are granted. All advanced placement credit must be validated by satisfactory achievement in subsequent courses, in accordance with the transfer credit policies of the college. For additional information, see [ecadw.colorado.edu/engineering/prospective/ad\\_reg\\_fresh.htm](http://ecadw.colorado.edu/engineering/prospective/ad_reg_fresh.htm) (Advanced Placement, IB, and MAPS).

**College-Level Examination Program Credit**

Prospective students may earn college credit on select College-Level Examination Program (CLEP) examinations, provided that they score at the 67th percentile or above. A list of subjects in which CLEP examinations are accepted may be obtained in the Office of the Dean of the College of Engineering and Applied Science. All CLEP credit must be validated by satisfactory

achievement in subsequent courses, in accordance with the transfer credit policies of the college.

### **Credit for Reserve Officers Training Corps**

Any student may, with departmental approval, receive up to 6 semester hours of credit toward an engineering degree from among Reserve Officers Training Corps (ROTC) courses appearing on an approved list available in the Office of the Dean (ECAD 100). Humanities and social science courses that are cross-listed with ROTC courses may be used to fulfill the college humanities and social science requirements, subject to departmental approval.

### **Incompletes**

By university policy, use of the *IF* grade is at the option of the academic dean's office. The grade of *IF* (incomplete, failing) may be given by an engineering faculty member when requested and only with documented circumstances beyond a student's control. If an incomplete grade is given, the instructor is required to document both the conditions precedent to the removal of the incomplete and the time limit for the fulfillment of these conditions. The specified time shall not exceed a one-year period. A copy of this documentation is filed with the Office of the Dean, the instructor's department office, and the student involved.

Course work to complete a grade of *IF* must be taken on the same campus on which the grade of *IF* was awarded. Credit for a course similar to the course in which the grade of *IF* was awarded may not be used to substitute for the incomplete course or be used to remove the grade of *IF*.

*The grade of IW (incomplete, withdrawn) may not be awarded to undergraduate students in courses taught in this college.*

### **No Credit Restrictions**

In the College of Engineering and Applied Science, courses required for fulfillment of graduation requirements *cannot be taken for no credit (NC)*. Once a course has been taken for no credit, the course cannot be repeated for credit. Engineering students must petition for approval before enrolling for any course *NC*.

### **Pass/Fail Option**

The primary purpose for offering courses on a *pass/fail* grading option is to encourage students to broaden their educational experience by selecting elective courses with this grade option without serious risk to their academic record. Individual departments may have rules that should be checked before registering for the *pass/fail* option. The college *pass/fail* policy is:

1. The maximum number of credit hours a student may elect with the *pass/fail* option shall be designated by the student's major department. No more than 16 semester hours of *pass/fail* credit can be applied toward degree requirements.

2. It is recommended that a student obtain advance approval from the major department prior to selecting the *pass/fail* option. Course work taken *pass/fail* without appropriate approval may be reverted to the letter grade earned.

3. All students who wish to register for the *pass/fail* option must do so during the university registration or schedule adjustment period.

4. A transfer student may count toward graduation 1 hour of *pass/fail* credit for each 9 credit hours completed in this college.

5. Students on academic probation may not elect the *pass/fail* grade option.

### **Transfer Credit**

After a prospective transfer student has applied and submitted transcripts to the University of Colorado, the Office of Admissions issues a transfer credit evaluation form listing those courses acceptable for transfer by University of Colorado at Boulder

standards. A copy of this evaluation is made a part of the student's college record. The appropriate faculty transfer credit evaluator uses this form to indicate which of those courses are acceptable in meeting engineering degree requirements. It is the responsibility of the transfer student to request final validation of the transfer credit hours by the major department and confirm that this validation is noted in the student's college file.

If at any time a student wishes to have a course not previously accepted reconsidered for transfer, the student should consult with the departmental faculty transfer credit evaluator and petition the dean through the department for approval of the course.

**Nontransferable Credit Hours.** Students desiring to transfer credit hours from engineering technology programs should note that such credit hours are accepted only upon submission of evidence that the work involved was fully equivalent to that offered in this college.

Some technology courses are taught with titles and textbooks identical to those in similar engineering courses. These courses may still not be equivalent to engineering courses because the areas of academic emphasis are divergent.

In order to assist engineering technology students with transfer problems, the following guidelines have been established:

1. Courses on basic subjects such as mathematics, physics, foreign languages, literature, or history may be acceptable for transfer credit if they were taught as part of an accredited program for all students and were not specifically designated for technology students.

2. Students who have taken courses with technology designations that may be valid equivalents for engineering courses have these options:

- They may petition for permission to waive the course requirement. The course requirement can be waived if students demonstrate that, by previous course work, individual study, or work experience, they have acquired the background and training normally provided by the course. No credit is given for a waived course, but students may benefit from the waiver by being able to include more advanced work in their curriculum. Other students may profit by repeating the course at this college and thus establishing a fully sound basis for what follows.
- The appropriate University of Colorado academic department may recommend to the dean's office that credit be transferred to count toward the requirements for a related course in its curriculum. Credit cannot be given for vocational/technical or remedial courses under rules of the university.
- The student may seek credit for the course by examination.

For more information on transfer of credit policies, see Transfer of College-Level Credit in the Undergraduate Admission section.

### **Work Experience**

It is the academic policy of the College of Engineering and Applied Science that credits accrued in the official records of a student that were awarded for work or co-op experience do not apply toward degree requirements.

### **Other University Campuses**

A student who needs to work at a part-time or full-time job while obtaining a college education, or who lives in the metropolitan areas of Denver or Colorado Springs, is encouraged to attend the University of Colorado at Colorado Springs or the University of Colorado at Denver.

A listing of undergraduate lower-division course equivalencies between the colleges of engineering and applied science at CU-Boulder, CU-Colorado Springs, and CU-Denver is included in this catalog.

### *University of Colorado at Colorado Springs*

Bachelor's degree programs are offered in electrical engineering, computer science, computer engineering, mechanical engineering, and applied mathematics. The master of science degree is awarded in computer science, applied mathematics, electrical engineering, mechanical engineering, and aerospace engineering with space operations. Students may also complete work for master of engineering and PhD degrees through the systemwide Graduate School.

### *University of Colorado at Denver*

The College of Engineering and Applied Science at the Denver campus of the University of Colorado offers bachelor's, master's, and doctoral degree programs. The bachelor of science degree is offered in civil engineering, computer science and engineering, electrical engineering, and mechanical engineering. Master of science degrees are offered in civil engineering, computer science, electrical engineering, and mechanical engineering. The master of engineering degree also is available. At the Denver campus, the PhD degree is offered in civil engineering, and the PhD degrees in electrical engineering and mechanical engineering are available through the systemwide Graduate School.

## Registration

To ensure the prompt completion of degree requirements and satisfaction of the four-year guarantee, the undergraduate student is expected to register for, and complete each semester, a full-time course load as outlined in this catalog or the approved departmental curriculum guide.

A student in the College of Engineering and Applied Science is encouraged to enroll for a minimum of 12 semester credit hours each fall and spring semester. Part-time enrollment will negatively impact the student's financial aid and scholarships, and is likely to negatively impact student health insurance, on-campus housing, and the four-year graduation guarantee.

### *Sequence of Courses*

Students are expected to follow the curriculum recommended by their major department.

A student who receives a grade of *D+* or lower in a course that is prerequisite to another may not enroll in the succeeding course without an approved petition from student's major academic department, the instructor of the succeeding course, and the dean's office.

All courses are not necessarily offered each semester. According to college policy, undergraduate courses having an enrollment of fewer than 20 students may be cancelled. Students can minimize scheduling problems by closely following the curricular sequence recommended by their major department. If a course is unavailable, a student may petition to enroll for equivalent study.

### *Grading System, Pass/Fail, and Drop/Add Procedures*

See Registration in the General Information chapter of this catalog for the University of Colorado uniform grading system and for additional *pass/fail* option information and drop/add procedures. Also see the current *Registration Handbook and Schedule of Courses* and current *Student Guide to Success*.

Only under circumstances beyond the student's control are petitions for dropping courses approved after the drop deadline.

## Repetition of Courses

Students are not to register for credit in courses in which they already have received a final grade of *C* or higher. When students take a course for credit more than once, *all grades are used in determining their University of Colorado grade point average* (unless the course forgiveness policy is utilized). A final grade of *F* in a required course necessitates that the course be repeated and a satisfactory final grade attained. Students may not register for credit in any course they have previously completed for no credit (*NC*).

*A student is not permitted to enroll in a course offered by the college when that course has not been successfully completed on three prior attempts.*

## Summer Courses

A limited selection of summer session courses is offered for new and continuing students and for those who must remove academic deficiencies. For information about courses, students should contact the Office of the Registrar or the academic department that teaches the course.

## Withdrawal

Students may withdraw only during the first six weeks of the semester. After this time, withdrawals are permitted by this college only upon presentation of evidence to verify that the withdrawal is necessary because of documented conditions clearly beyond the student's control (medical, psychiatric, or extended family emergency).

If a student withdraws, college permission may be required for reenrollment. Students who interrupt their course of study may be required to complete all current degree requirements and to repeat courses previously completed. A student wishing to return after a withdrawal must reapply for admission and is therefore subject to enrollment limits and academic performance evaluation.

## Undergraduate Degree Requirements

Fundamentals taught in the freshman year are of prime importance in the more advanced classes, and every effort is made to place all freshman students in appropriate courses.

It is strongly recommended that students avoid the likelihood of later scheduling problems by carefully following the curriculum in their major or in the recommended open option program.

Each freshman is exposed to a broad university background, completing course work outside the College of Engineering and Applied Science in science, mathematics, social science, and the humanities.

## Advising

All students are advised by faculty and staff from their respective major academic department or program. The college also provides a professional advising staff.

Advising information is available at the administrative offices of the College of Engineering and Applied Science, ECAD 100, telephone **303-492-5071**, or directly through the major departments.

Aerospace Engineering Sciences, ECOT 634,

303-492-6417

Applied Mathematics Program, ECOT 225,

303-492-4668

Chemical and Biological Engineering, ECCH 111,

303-492-7471

Civil, Environmental, and Architectural Engineering, ECOT 447,

303-492-4193 (for civil and architectural engineering students)

Computer Science, ECOT 717,  
303-492-7514  
Electrical and Computer Engineering, ECEE 1B55,  
303-492-7327  
Engineering Physics, Duane Physics Bldg. E-1B32,  
303-492-6952  
Environmental Engineering, ECOT 511,  
303-735-0253  
Mechanical Engineering, ECME 132,  
303-492-8483  
Open Option, ECAD 100,  
303-492-5071

These sources of help are readily available to assist students with academic, vocational, or personal concerns. Students are assigned departmental advisors for academic planning and should consult with the departmental chair or designated faculty or staff representative if there is uncertainty over who is the student's advisor or if the student wants a change in advisor. Additional advising information is contained in a series of advising guides available within the College of Engineering and Applied Science. Contact the appropriate academic department or the dean's office, ECAD 100, **303-492-5071**, about these advising guides.

## Four-Year Graduation Guarantee

The College of Engineering and Applied Science at the University of Colorado at Boulder is committed to providing an undergraduate educational experience among the best offered by any comprehensive research university in the country.

The College of Engineering and Applied Science offers 11 bachelor of science degree programs, each of which may be completed within eight full-time semesters. Many students elect to extend their studies at the University of Colorado beyond eight semesters to take advantage of research and employment opportunities, add minor programs, complete double-degree programs, and/or to pursue specialized plans of study.

For new freshmen who do not wish to extend their studies beyond eight semesters, the University of Colorado extends a guarantee that required or essential courses, or acceptable alternative courses, will be available so each student can complete all course work required for a bachelor of science degree from the College of Engineering and Applied Science no later than the end of the eighth consecutive semester of enrollment, when the student follows the degree plan recommended by the major department. In the event the University of Colorado is not successful in meeting the terms of this guarantee, the university will reimburse the student all tuition and course fees for those courses remaining to successfully complete the previously designated bachelor of science degree. This guarantee is subject to the conditions noted later in this document.

This guarantee is offered only to new freshmen who matriculate in fall 1996 or thereafter directly into the College of Engineering and Applied Science at the University of Colorado at Boulder.

To qualify for the guarantee, students must satisfy the following requirements:

- Enroll in CU-Boulder course work for eight consecutive fall and spring semesters. Due to the sequential nature of some courses, this enrollment must begin with the fall semester.
- Satisfactorily complete all prescribed course work directly applicable toward major degree requirements in accordance with the following schedule: at least 30 credit hours by the end of the first year (12 months), at least 62 credit hours by the end of the second year (24 months), at least 94 credit hours by the end of the third year (36 months), and at least 128 credit hours by the end of the fourth year (48 months).
- Follow the prescribed curriculum guide of their major department. Any deviations from this curriculum must be approved, in advance and in writing, by a faculty or staff advisor from the major department.

Complete all minimum academic preparation standards (MAPS) deficiencies in mathematics, physics, chemistry, and foreign language no later than the beginning of the second semester of enrollment.

Earn a grade point average of at least 2.00 each semester and 2.00 in all required and elective courses taken from the major department. The student must maintain a cumulative CU grade point average of at least 2.00. Also, each prerequisite course must be completed with a final grade of at least of C-.

Begin a recommended plan of study, toward the major in which the student will be graduating, no later than the beginning of the sophomore year or at the time when 30 semester hours have been earned.

Schedule and meet with a departmental staff and/or faculty advisor at periods recommended by the major department. There must be at least one documented conference between the student and approved departmental advisor each academic year, during which specific degree requirements are discussed. The student must also meet with a faculty or staff advisor whenever required to resolve academic problems, and to answer questions relating to course work and/or satisfactory academic progress.

Register each semester within one week of the day and time assigned by the Office of the Registrar.

Enroll only in courses approved by the designated major department faculty and/or staff advisor.

Strictly adhere to the Admission and Enrollment Policies and the Undergraduate Degree Requirements sections of this chapter.

Not enroll in any courses or participate in any activities or employment having a time conflict with major degree course requirements.

Notify the College of Engineering and Applied Science of the intent to graduate no later than the beginning of the seventh semester of enrollment.

Also see [ecadv.colorado.edu/engineering/academics/ugradadvising.htm](http://ecadv.colorado.edu/engineering/academics/ugradadvising.htm) (Four-Year Guarantee).

Students are urged to maintain a personal academic file, documenting meetings with faculty and staff advisors, copies of change of record forms, change of major forms, and any other documents that relate to the requirements of this guarantee.

## Degree Requirements

1. The BS degree requires that no fewer than 128 semester hours in an acceptable curriculum be completed to the satisfaction of the major department.

The last 45 hours must be earned after admission and matriculation as an undergraduate engineering degree student at the University of Colorado at Boulder campus. Some students will need to present more than the minimum number of credit hours because they may have enrolled in courses that do not apply toward degree requirements.

A student is awarded a degree by a vote of the faculty of the College of Engineering and Applied Science after the student's major academic department determines that all degree requirements have been successfully completed.

The diploma indicates the University of Colorado campus from which the department recommending the student for the degree is located. Consideration will generally be given to designating the campus where the majority of the course work was completed. However, the final decision on the campus designation is made by the designated faculty representative from the student's major academic department.

2. The cumulative grade point average of an engineering student includes all academic courses attempted at the University of Colorado (unless the course forgiveness program has been utilized). A cumulative GPA of 2.00 is required in courses used to fulfill degree requirements. In addition, a separately computed GPA of 2.00 must be attained in those courses taken from the student's major department. For students in the engineering physics program, the major department is the physics department.

3. Each degree program requires a minimum of 18 credit hours of approved course work in the humanities and social sciences. Humanities and social science electives must not be

limited to a selection of unrelated introductory courses. At least 6 credit hours must be at an advanced level (3000 or above) and must include WRTG 3030 or HUEN 3100 and HUEN 3200. All electives should be selected with the approval of a faculty advisor.

Qualified students may take appropriate honors courses for humanities and social sciences credit.

A list of acceptable humanities or social science courses for student reference is available in the dean's office (Engineering Administration, ECAD 100), departmental offices, with faculty and staff advisors, and on the College of Engineering and Applied Science home page at [ecad100.colorado.edu/hss\\_advising](http://ecad100.colorado.edu/hss_advising).

4. Students who graduated from high school in the spring of 1988 and thereafter must complete any minimum academic preparation standards (MAPS) deficiencies prior to graduation. Students should consult with a faculty advisor or the dean's office (ECAD 100) to determine any MAPS deficiencies and how to satisfy these deficiencies.

5. Some majors require successful completion of an educational outcome measurement prior to graduation. Students should contact their major department to determine whether an outcome measurement is required and when it must be taken.

## Graduation

It is the student's responsibility to be certain that all degree requirements are fulfilled, to notify the major department upon completion of 100 semester hours applicable to BS degree requirements, to fill out the Application for Diploma form at the beginning of the next-to-last semester before graduation, and to keep the departmental advisor and the dean's office informed of any change in graduation plans.

All incompletes must be completed and all correspondence course grades must be officially received no later than three weeks prior to the graduation ceremony. It is the student's responsibility to contact the appropriate instructor concerning the removal of incomplete grades. Graduation periods are in December, May, and August.

## Double Degrees

A student in the College of Engineering and Applied Science may be able to obtain bachelor's degrees in two engineering disciplines or one degree in engineering and one in another field, such as business, music, or one of the arts and sciences disciplines. Interested students should come to the dean's office (ECAD 100) for additional information and application materials for these double-degree programs.

### *Double Degrees from Engineering and Another College*

Arrangements to obtain bachelor's degrees in engineering and in the academic program of another college may be made through consultation with and written approval of the appropriate deans and completion of a minimum of 30 additional semester hours beyond the largest minimum required by either college or school.

### *Double Degrees within the College of Engineering and Applied Science*

Two bachelor of science degrees in engineering may be earned by obtaining the written approval of both departments concerned and completing a minimum of 30 additional semester hours beyond the largest minimum required by either department. Transfer students desiring two bachelor's degrees must present a minimum of 75 semester credit hours taken as a student in this college, and must satisfy all other stipulations

regarding total hours required and approval of all course work by both departments concerned. Of the 30 additional hours for the second degree, a minimum of 24 shall be in courses offered by the secondary academic department or in courses approved in advance by the department as substitutes.

Students desiring to pursue a double-degree program must formally designate themselves double-degree candidates by filing a petition signed by the chairs of both departments concerned and the dean before enrolling for the last 30 hours of work to be completed for the double degree.

The decision to earn a double degree should be carefully weighed, since qualified students may be able to obtain a master's degree for a similar number of credit hours (see Graduate Study in Engineering).

## Minors

The college offers minors in applied mathematics, computer science, mechanical engineering, and engineering management. A student interested in these minor programs should contact the Applied Mathematics Program, ECOT 226, **303-492-4668**, the Department of Computer Science, ECOT 725, **303-492-7514**, the Department of Mechanical Engineering, ECME 134, **303-492-7151**, or the Engineering Management Program, ECOT 417, **303-492-2570**.

Information is also available at [ecadw.colorado.edu/engineering/students/minor\\_programs.htm](http://ecadw.colorado.edu/engineering/students/minor_programs.htm) (Minor Programs).

## Premedical Option

Several engineering departments have an option by which a student may meet all requirements for entry into medical school while earning a degree in engineering. Engineering departments with this option will approve inclusion of appropriate biological and bioengineering courses in the student's program of technical electives. The courses listed below are usually prescribed by medical schools and must be completed with superior grades.

<i>Required Courses</i>	<i>Semester Hours</i>
Expository or creative writing .....	3
General chemistry .....	8-10
Organic chemistry .....	8-10
General biology or zoology .....	8
Literature .....	6
English composition .....	3
Physics .....	9
Calculus (recommended) .....	4

Students can meet these requirements by carefully substituting electives in their engineering curriculum. In some cases where additional credit hours may be required, interested students should consult with the department chair and the preprofessional advisor on the Boulder campus.

The admissions committee of the School of Medicine at the University of Colorado Health Sciences Center welcomes inquiries and visits from prospective students, particularly at the time of their first interest in medicine as their chosen profession.

## Graduate Work in Business

Undergraduates in engineering who intend to pursue graduate study in business may be able to complete some of the business background requirements as electives in their undergraduate programs. Seniors in engineering who have such intentions and appear likely to qualify for admission to graduate study in business may be permitted to register for graduate fundamentals courses designed to provide qualified students with needed background preparation in business. (See Graduate School information in the Leeds School of Business section.)

In order to take advantage of CU-Boulder's location in one of the country's leading entrepreneurial areas, the College of Engineering and Applied Science and the Leeds School of Business jointly administer the Center for Entrepreneurship. Both undergraduate and graduate courses are offered, along with an internship program. For additional information on this joint program, call **303-492-5576**.

## Concurrent BS and MS Degree Program in Engineering

Students with strong academic records who plan to continue in the Graduate School usually find it advantageous to apply for admission to the concurrent BS/MS degree program. Excellent students plan a graduate program beginning in their junior year. The plan provides a small tuition discount for the MS degree and, in many departments, may allow up to 6 credit hours of graduate course work to be applied to the BS degree. This program also provides opportunities to work with faculty on independent study or research projects.

Application is made to the Graduate School through the appropriate academic department. Application and admission may occur during the junior year; consult individual departments for their exact timing. The college requires a minimum GPA of 3.25 for admission to this program; some departments may have higher requirements. Requirements for the two degrees are the same as those for two degrees taken separately: 128 credit hours for the BS degree and 24–30 hours including thesis (Plan I) or 30 credit hours (Plan II) for the MS degree.

All students choose or are assigned a faculty advisor to help them develop a program of study best suited to their interests. Students in each program are encouraged to pursue independent study on research programs or in areas of specialization beyond those offered in formal courses. Students are allowed to structure their senior and graduate years in an order that is optimal for their program, as long as all requirements for both the BS and MS degrees are completed by the end of the concurrent BS/MS program. The BS and MS degrees must be awarded concurrently at the completion of both degree programs.

A minimum GPA of 3.00 must be maintained for continuation in the program; if the GPA falls below 3.00, all hours completed with a passing grade while in the program count only towards fulfillment of the BS degree.

Tuition rates for resident students in this program are usually at the undergraduate rate until requirements for the BS and MS degrees are completed. For additional details on this program, contact the appropriate engineering academic department or the Graduate School.

## Graduate Study in Engineering

The College of Engineering and Applied Science offers degree programs for the master of engineering (ME), master of science (MS), and doctor of philosophy (PhD) degrees. There are degree programs in each of the following departments or fields:

- aerospace engineering sciences
- chemical engineering
- civil engineering
- computer science
- electrical engineering
- engineering management
- mechanical engineering
- telecommunications

The master of science in applied mathematics is offered through the Department of Applied Mathematics in the College of Arts and Sciences.

Graduate programs within each engineering department offer a variety of options, providing a number of alternative careers.

The **aerospace program** has a strong emphasis on astrodynamics, orbit determination, remote sensing, control systems, structures, aerodynamics, and gas dynamics, as well as spacecraft, aircraft, space experiment design, unmanned vehicle systems, and biological systems in space.

Key activities in **chemical engineering** include membrane and thin-film science, biomedical engineering and biotechnology, surface science, process control, polymeric and ceramic materials engineering, microelectronics, and environmental engineering.

Fields emphasized in **civil engineering** include geotechnical engineering, structural mechanics and engineering, building systems engineering, construction management and engineering, environmental and water resource engineering.

Strengths in **computer science** include algorithm design, artificial intelligence, database design, numerical optimization, operating systems, parallel processing, speech and language processing, human-computer interaction, networks, mobile computing, programming languages, software engineering, systems, theoretical computer science, and computer security.

Areas of focus in **electrical engineering** include atmospheric remote sensing; biomedical engineering; devices, materials, and quantum electronics; digital signal processing and communications; information systems; energy conversion and power systems; systems, robotics, and control theory; circuits and electronics; fields and radio propagation; computer languages and logic circuits; optics and optoelectronics; microwave optics; and computer-aided design and VLSI.

**Engineering management** combines technical courses with unique, integrated management courses in the areas of quality and process, research and development, operations, and project management. These courses are designed for the professional engineer or technical professional preparing for early management assignments.

**Mechanical engineering** areas of concentration include combustion science, air pollution, heat transfer, energy conversion, materials science/engineering, design and manufacturing, electronic packaging, micro-electro-mechanical systems (MEMS), biomedical devices, pollution prevention, nondestructive structural evaluation, wave propagation and scattering, solid mechanics, and fluid mechanics.

**Telecommunications** offers an interdisciplinary master's degree program that integrates courses in electrical engineering, computer science, business, economics, policy, and law. Through such an approach, and access to its world-class telecommunications laboratory, students are equipped to design, plan, analyze, and manage telecommunications systems, networks, and the many advanced and innovative uses of interactive communications today. Students enter the program from a wide variety of technical or liberal arts undergraduate degrees and expand their knowledge through an individually tailored combination of courses from the various disciplines that meet the criteria for the degree. This ensures balanced, specialized capabilities necessary for a comprehensive understanding of the technological and socio-cultural aspects of telecommunications. For more information see the Program in Interdisciplinary Telecommunication listing in the Graduate School section. Students enrolled in the interdisciplinary telecommunications program pay the tuition rate of the College of Engineering and Applied Science.

## Graduate Study for Practicing Engineers

The Center for Advanced Engineering and Technology Education (CAETE) provides graduate education and professional development at a distance for practicing engineers, computer

scientists, and managers of technology. Courses from the College of Engineering and Applied Science are delivered from the Boulder campus via live instructional television with two-way audio, various media, and the Internet to business and students across the country, and abroad.

Course sequences may lead to a master's degree in aerospace engineering, computer science, electrical and computer engineering, engineering management, and telecommunications. Individual courses are also offered in civil and mechanical engineering. Graduate certificates and short courses are also available in some fields.

Students may enroll in distance learning courses before being accepted to the Graduate School, but they must apply for the degree before finishing the third distance learning course. Courses taken before admission are considered transfer credit, and only 9 transfer credit hours (three courses) will be accepted toward a graduate degree program. All applicable courses taken after admission count toward the degree.

CAETE also provides ongoing access to over 100 courses taught in previous semesters through the Course Library. Library courses may be taken for credit and are available for rental or purchase.

For more information, prospective students should contact the office responsible for professional development at their work place or CAETE, University of Colorado at Boulder, 435 UCB, Boulder, CO, 80309-0435, call **303-492-6331**, or visit [caete.colorado.edu](http://caete.colorado.edu).

### Graduate Degree for Science Majors

Science graduates who have good academic records and strong backgrounds in mathematics and science may be eligible for admission as graduate students in engineering or may be able to qualify with some extra course work. Information may be obtained from the appropriate academic department office.

### Master of Engineering, Master of Science, and Doctor of Philosophy

Students wishing to pursue graduate work in engineering leading to candidacy for advanced degrees should read carefully the requirements for advanced degrees in the Graduate School chapter of this catalog. Some departments also have available explanatory material on their advanced degree programs.

**Prerequisites.** To enroll for an advanced degree in any department of the College of Engineering and Applied Science and the interdisciplinary telecommunications program, candidates either must have previously earned a bachelor's degree in a curriculum that includes the necessary prerequisites for that branch of engineering or must qualify for the concurrent BS and MS program. If the candidate's preliminary education was taken at some other institution, the degree of qualification for advanced work is determined by the department concerned and by the dean of the Graduate School.

Graduates of engineering technology programs should note that the equivalent of a BS degree in an appropriate engineering field is required for entry into the Graduate School. Because the goals and orientation of engineering programs differ from those of technology programs, technology graduates should expect to make up deficiencies before being admitted to graduate study in engineering. Students may not be admitted to the Graduate School while making up deficiencies, but can enroll as nondegree students.

For admission as a regular degree student, an undergraduate grade point average of at least 3.00 is normally required.

**Language Requirement.** PhD candidates should note that some engineering departments have foreign language requirements.

**Course Work.** Graduate work in each department of the College of Engineering and Applied Science falls into two classes:

1. Courses that are offered for candidates who have chosen to major in the particular department or as a base for the ME combined degree
2. Courses that are offered as minors for candidates who have chosen their major in some other department

Graduate students majoring in any department receive no credit in the Graduate School for courses listed as required undergraduate work in the same department. They may, however, receive graduate credit for advanced undergraduate courses in an engineering department other than that in which they received their bachelor's degree, with the approval of the department granting the degree and the dean of the Graduate School.

**Availability of Courses.** All courses are not necessarily offered every year. They are available only if there is sufficient demand.

**Qualifying Examinations.** Graduate students who plan to become candidates for the MS or PhD degree may be required to take a qualifying examination in the appropriate field of specialization during the first semester in which they are registered as candidates for a graduate degree. Individual departments should be consulted concerning the timing or requirement of this examination. The purpose of this examination is to enable the advisor and student to plan a suitable program of study.

## Aerospace Engineering Sciences

The aerospace curriculum 2000—developed by students, faculty, staff, alumni, and employers—outlines the desired attributes of an engineer, the program's educational objectives, and the assessment process.

### *Desired Attributes of an Engineer*

Well-educated graduates of the aerospace curriculum 2000 should have:

- a good understanding of engineering science fundamentals: mathematics, statistics, physical and life sciences, and information technology;
- a good understanding of design and manufacturing;
- a multi-disciplinary, systems perspective;
- a basic understanding of the context in which engineering is practiced: economics, history, the environment, and customer and societal needs;
- communication skills: written, oral, graphic, and listening skills;
- high ethical standards;
- an ability to think both critically and creatively— independently and cooperatively;
- flexibility—an ability and the self-confidence to adapt to rapid or major change;
- curiosity and a desire to learn for life; and
- a profound understanding of and commitment to teamwork.

### *Educational Objectives*

The program in aerospace engineering sciences aims to provide:

- a high-quality undergraduate education that imparts to students the technical proficiency to have distinguished professional careers in the aerospace field, including a balanced exposure to theory, experiment, design, and sufficient exposure to the arts and humanities for the enjoyment of life;



- sufficient exposure to engineering practice in the form of design, building, and testing to initiate productive careers in the aerospace industry; and

- a strong base in science, mathematics, and aerospace disciplines, enabling students to continue on successfully in graduate studies.

### Desired Outcomes

The undergraduate degree in aerospace engineering sciences emphasizes knowledge and awareness of:

- the basic subfields of aerospace engineering (fluid mechanics; astrodynamics; dynamics and control; guidance and navigation; aerospace structures; materials; and systems engineering);

- mathematics sufficient to facilitate the understanding and application of physical principles to the solution of aerospace engineering problems; and

- the major principles and theories of the natural sciences.

In addition, students completing the degree in aerospace engineering acquire the ability and skills to:

- apply the knowledge and design skills of aerospace engineering to solve the problems of society and help attain society's goals;

- address socially related technical problems that confront the engineering profession;

- attain design standards of reliability, environmental quality, and protection of both occupational and public health and safety in the execution of projects;

- maintain professional competency through lifelong learning in aerospace engineering, humanities, and social science fields;

- design aerospace vehicles to meet technical and societal goals; experiments to meet scientific and societal goals; and air and space transportation systems to serve society's needs;

- manage aerospace projects;

- conduct laboratory experimental investigations necessary to validate aerospace system analysis and designs; and

- communicate effectively, both orally and in writing, including presenting and writing technical aerospace project proposals and results.

## Bachelor's Degree Requirements

The major part of the first two years is devoted to the study of mathematics, physics, mechanics, chemistry, computer science, and the humanities and social sciences. The last two years are devoted to engineering courses in fluid dynamics, flight dynamics, systems and control, materials and structures, energy conversion and propulsion, space science, and aircraft and spacecraft design. Advanced professional area elective courses are available for further specialization in those subfields. Students are also encouraged to pursue special research topics for credit during their junior and senior years under the direction of a faculty member of their choice.

For students having sufficient ability and interest, planning for graduate study should begin by the start of the junior year. Such a plan should consider the foreign language requirements of appropriate graduate schools and an advanced mathematics program. Students who wish to combine the business and aerospace engineering sciences curricula are advised to consider obtaining the BS degree in aerospace and a master's degree in business rather than a combined BS degree.

## Bioengineering Option/Premedical Curriculum

These courses have been specifically designed for students who wish either to attend medical school or to enter graduate work in bioengineering after receiving the BS degree. Students should consult their advisor regularly to assure the adequacy of their curricula.

### Curriculum for BS, Aerospace Engineering Sciences

The BS curriculum in aerospace engineering sciences is revised annually to keep up with new advances in technology, to make use of new educational methodologies, and to satisfy updated program accreditation criteria. The following curriculum requirements are those in effect at the time this catalog was printed.

#### Required Courses Semester Hours

##### Freshman Year

###### Fall Semester

APPM 1350 Calculus 1 for Engineers .....	4
ASEN 1000 Introduction to Aerospace Engineering Sciences .....	1
CHEM 1221 General Chemistry Lab for Engineers .....	2
CHEN 1211 Engineering General Chemistry .....	3
GEEN 1400 Engineering Projects .....	3
Humanities or social science elective .....	3

###### Spring Semester

APPM 1360 Calculus 2 for Engineers .....	4
PHYS 1110 General Physics 1 .....	4
Computing elective .....	3
Humanities or social science elective .....	3

##### Sophomore Year

###### Fall Semester

APPM 2350 Calculus 3 for Engineers .....	4
ASEN 2001 Aerospace 1 .....	5
ASEN 2002 Aerospace 2 .....	5
Humanities or social science elective .....	3

###### Spring Semester

APPM 2380 Introduction to Ordinary Differential Equations I .....	4
ASEN 2003 Aerospace 3 .....	5
ASEN 2004 Aerospace 4 .....	5
Humanities or social science elective .....	3

##### Junior Year

###### Fall Semester

ASEN 3111 Aerodynamics .....	4
ASEN 3112 Structures .....	4
ASEN 3113 Thermodynamics and Heat Transfer .....	4
PHYS 1120 General Physics 2 .....	4

###### Spring Semester

ASEN 3128 Aircraft Dynamics .....	4
ASEN 3200 Orbital Mechanics/Attitude Dynamics and Control .....	4
ASEN 3300 Electronics and Communications .....	4
WRTG 3030 Writing on Science and Society .....	3
Humanities or social science elective .....	3

##### Senior Year

###### Fall Semester

ASEN 4013 Foundations of Propulsion .....	3
ASEN 4018 Senior Projects 1 .....	4
Free elective .....	3
Professional area electives .....	6

###### Spring Semester

ASEN 4012 Aerospace Materials .....	3
ASEN 4028 Senior Projects 2 .....	4
Free elective .....	3
Professional area elective .....	6

## Humanities and Social Science Electives

1. A minimum of 18 semester credit hours in the humanities and social sciences is required.
2. The 18 hours of humanities and social science elective credit should not be composed of a selection of unrelated introductory courses. At least 6 semester credit hours must be successfully completed at an advanced level, which is the upper division (3000-4000) or graduate (5000 and above) level.

3. ROTC course sequences (AIRR 4010-4020 and MILR 4072-4082) are acceptable for 3 semester credit hours of humanities and social science elective credit. They are considered equivalent to PSCI 4191 and COMM 4240, respectively. NAVR 2020 is acceptable for 3 semester hours of humanities and social science elective credit.
4. Students are permitted to take appropriate honors courses for humanities and social science credit.
5. Most courses in business are not acceptable as humanities and social science electives.
6. Most foreign language courses (including first-year courses) are acceptable for meeting humanities and social science requirements.
7. Participation in the Presidents Leadership Class is accepted for up to 12 credit hours.
8. The Herbst Program in Humanities for engineering students, a two-year program, is available to juniors. It provides up to 12 hours of honors humanities credit (3 hours per semester) and includes a waiver of the junior writing program requirement. See the dean's office for application deadlines and materials.

### Professional Area Electives

1. Any ASEN course at the 3000 level or above that is not a required course can be used as a professional area elective.
2. A professional area elective is generally a course in engineering or science (such as mathematics, applied mathematics, physics, chemistry, biology, ASTR, ATOC, or computer science) at the 3000 level or higher. Elective ASEN courses most likely to help an aerospace engineer's career development are ASEN, math, CSCI, and physics courses. It is suggested that students secure advance approval for professional area elective courses from their advisor.
3. Independent study or undergraduate research is acceptable for up to 6 credit hours of professional area elective credit. Upper-division ROTC course work is acceptable for 3 semester hours of professional area elective credit. Any ROTC course numbered 3000 and above may be used for this credit. This does not affect the use of ROTC hours as humanities and social science elective credit discussed earlier.

## Graduate Degree Programs

The Department of Aerospace Engineering Sciences offers graduate programs in the following areas: fluids (theoretical fluid dynamics, computational fluid dynamics, aerodynamics, atmospheric dynamics and modeling, low-gravity fluid mechanics and heat transfer, experimental fluid dynamics, and transonic flow); unmanned vehicle systems; astrodynamics and remote sensing (orbit determination, space debris, space mission analysis, satellite geodesy, satellite oceanography, ocean modeling, and application of the global positioning system); controls and systems engineering, structures, and spacecraft design (classical control theory and optimization, software engineering and control of large space structures, attitude control and fine-pointing, design and control of space vehicles and experiments); and bioastronautics (spacecraft life support systems and space life sciences research).

Aerospace-related research centers in the college include the Colorado Center for Astrodynamics Research, the Center for Aerospace Structures, and Bioserve Space Technologies (a NASA Center for the Commercial Development of Space). Other research centers within the university that are involved in space-related research activities are the Center for the Study of Earth from Space, the Center for Astrophysics and Space Astronomy, the Laboratory for Atmospheric and Space Physics, JILA, and the Cooperative Institute for Research in Environmental Sciences.

### Requirements for Advanced Degrees

Graduate students applying for admission to aerospace engineering sciences are required to submit the results of the analytical, quantitative, and verbal sections of the general examination, Graduate Record Examination (GRE).

The department offers graduate programs leading to the master of engineering, and the MS and PhD degrees in aerospace

engineering sciences. Degree plans often are formulated on the basis of the student's interest and needs. Portions of the program are designed to promote the student's engineering and professional development.

Advanced degrees are available with specialization in the four broad areas of astrodynamics and remote sensing; fluid dynamics; space structures, systems and controls; and bioastronautics. Courses below the 5000 level in aerospace engineering cannot count toward graduate degree requirements; relevant courses below the 5000 level outside the department may be accepted for master's degree credit if they fit with the student's degree plan. Such courses must have academic content consistent with graduate study in aerospace engineering sciences.

**Advising.** Once students have selected a research area for the thesis, academic advising is done by their thesis advisor.

## Master of Science Degree

### Plan I (Thesis Option)

1. A total of 30 semester hours, at least 21 semester hours of which must be completed at the 5000 level or above, and 18 credits from ASEN. Note: The ASEN requirement exceeds the university requirement for total semester hours for the thesis option.
2. A minimum of 4 and a maximum of 6 thesis hours.
3. Completion of a MS thesis and oral examination based upon this thesis.
4. Completion of all degree requirements within four years of the date of commencing course work, normally completed in one to two years.
5. Master's degree residence requirements can be met only by residence on the CU-Boulder campus for two semesters or three summer sessions, or a combination of at least one semester and two summer sessions.

### Plan II (Nonthesis Option)

1. A total of 30 semester hours, at least 24 semester hours of which must be completed at the 5000 level or above, and 18 credits from ASEN.
2. A final master's exam, or equivalent, to be determined by department.
3. Completion of all degree requirements within four years of the date of commencing course work, normally completed in two years.
4. Master's degree residence requirements can be met only by residence on the CU-Boulder campus for two semesters or three summer sessions, or a combination of at least one semester and two summer sessions.

## PhD Degree

**Course Requirements.** A minimum of 36 semester credit hours of courses numbered 5000 or above (at least 18 of these must be in ASEN) and 30 credit hours of thesis credit are required for the degree. A maximum of 21 credit hours may be transferred from another accredited institution and applied toward a PhD degree if approved by the graduate committee of the department and the Graduate School. All courses taken for the master's degree at the 5000 level or above at the University of Colorado may be applied toward the doctoral degree at the university. The formal course work must include a minimum of 18 hours of courses or their equivalent in aerospace engineering sciences.

**Preliminary Examination.** Students must pass a preliminary examination, administered by the graduate committee, which consists of a written, open book examination in aerospace engineering disciplinary core fields.

**Comprehensive Examination.** The degree program culminates in an oral examination before the student's committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School. This should be preceded by individual examinations or interviews, either written or oral or both, by every committee member. The oral examination before the committee is based primarily on a detailed, written proposal for the thesis research provided by the student to committee members in advance.

**PhD Thesis.** Students must write a thesis based on original research conducted under the supervision of a graduate faculty

member. The thesis must fulfill all Graduate School requirements. After the thesis is completed, an oral final examination on the thesis and related topics is conducted by a committee of at least five graduate faculty members. Further details are available from the department graduate coordinator.

## Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers a BS degree in applied mathematics through the College of Engineering and Applied Science. The BS degree is designed to prepare graduates for exciting and diverse professional careers, and for graduate study in a wide variety of disciplines. The department also offers both an MS degree and a PhD degree through the Graduate School.

The objectives of the Department of Applied Mathematics at CU-Boulder are summarized below:

- provide undergraduate and graduate students with high-quality education and training in applied mathematics, and prepare them for careers in industry, laboratories, and the academic professions;
- offer and monitor degree programs leading to BS, MS, and PhD degrees in applied mathematics;
- nourish and maintain a professional environment in which excellence in teaching, learning, scholarship, and creativity are of central importance;
- assure teaching and research expertise in a number of key areas of applied mathematics including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, applied probability, and statistics.

Courses at the undergraduate level provide training in a broad range of mathematical techniques and problem-solving strategies. These courses teach the concepts and methods central to applications of linear algebra, ordinary and partial differential equations, numerical analysis, probability and statistics, complex variables, and nonlinear dynamics. Since applied mathematicians are often involved in interdisciplinary work, the BS degree requires an in-depth knowledge of some area of science or engineering where mathematics is used. This knowledge prepares graduates to successfully communicate and cooperate with engineers and scientists. The BS degree also requires knowledge of a programming language and skill in using the computer.

### Desired Outcomes

The undergraduate degree in applied mathematics emphasizes knowledge and awareness of:

- differential and integral calculus in one and several variables;
- vector spaces and matrix algebra;
- ordinary and partial differential equations;
- at least one programming language;
- at least one application software package in either mathematics or statistics;
- methods of complex variables as used in applications; and
- numerical solutions of linear and nonlinear problems.

In addition, students completing a degree in applied mathematics acquire:

- an in-depth knowledge of an area of application (an engineering discipline or a natural science field or one of the quantitative areas of business and economics);
- knowledge of problem-formulation, problem-solving, and modeling techniques and strategies central to applications; and

- the ability to clearly and concisely, and in oral and written forms, communicate analytic arguments.

### Minor Program

The department also offers a minor in applied mathematics that is available to engineering as well as to arts and sciences students. A minor in applied mathematics indicates that a student has received in-depth training in mathematical techniques and computational methods well beyond the training usually received by science and engineering majors.

### Concurrent BS/MS Degree Program

The concurrent BS/MS program in applied mathematics enables well-qualified and motivated students to experience graduate-level course work earlier in their education and to obtain an MS degree in a reduced time period. Applied math majors may apply for this program during their junior year. Minimum requirements for admission include completion of at least two APPM courses numbered 3000 or higher, an overall GPA of 3.40 or higher, and two letters of recommendation from APPM faculty. Students interested in this program are encouraged to consult with an applied mathematics faculty advisor early in their undergraduate career.

### Bachelor's Degree Requirements

The BS degree in applied mathematics requires the completion of a minimum of 128 credit hours of acceptable course work with cumulative and major grade point averages of C or better. Students must complete the following minimum requirements:

1. Three semesters of calculus (APPM 1350, 1360, and 2350) with a minimum grade of C- in each course.
2. Computing experience (CSCI 1300 or GEEN 1300 or APPM 2775).
3. Science requirement: completion of PHYS 1110, 1120, and 1140. Completion of at least 5 additional credits of chemistry or biology (including 2 credits of laboratory science), chosen from one of the following: CHEM 1221 and CHEN 1211; CHEM 1151; EBIO 1210, 1220, 1230, and 1240; or MCDB 1150, 1151, 2150, and 2151.
4. Completion of the following required applied mathematics courses: APPM 2360 Differential Equations with Linear Algebra; APPM 3310 or MATH 3130 Linear Algebra; APPM 4350 and 4360 Methods in Applied Mathematics 1 and 2; APPM 4650 Intermediate Numerical Analysis 1; and MATH 3000 Introduction to Abstract Mathematics or MATH 4310 Introduction to Analysis.
5. A two-semester course sequence of applied mathematics or mathematics courses numbered 4000 or above in addition to APPM 4350-4360 (for example, APPM 4570 and 4580, APPM 4560 and 4520, APPM 4650 and 4660, or MATH 4310 and 4320 or MATH 4310 and 4330).
6. A minimum of 24 credit hours in applied mathematics or mathematics courses numbered 3000 or above (including the required courses). No more than 3 credits of APPM 4840 may count toward these 24.
7. A minimum of 24 credit hours in engineering courses (or approved courses with a significant mathematical content in arts and sciences or business) with at least 15 credit hours in courses numbered 2000 or above and at least 6 credit hours in courses numbered 3000 or above. These 24 credit hours are in addition to those required credit hours listed in numbers 2 and 3 (mentioned above). HUEN 3100, 3200, 4100, and 4200 may not be used to fulfill this requirement, although they may be used as social and humanistic electives. Several possible options are listed separately.

8. The general bachelor's degree requirements of the College of Engineering and Applied Science (18 credit hours of social and humanities electives that include WRTG 3030, a writing course offered through the University Writing Program). Students may take HUEN 3100 and 3200 in place of WRTG 3030. Humanities and social science electives must not be limited to a selection of unrelated introductory courses. At least 6 credit hours must be at an advanced level (3000 or above). The WRTG 3 credits or the HUEN 6 credits can be used toward the requirement of at least 6 credits at the 3000 level.

### Some Recommended Options for Applied Math Majors

#### Aerospace Engineering Sciences Option

##### a. Astronautical Option

ASEN 2001 Aero 1: Introduction to Statics, Structures, and Materials	5
ASEN 2003 Aero 3: Introduction to Dynamics and Systems	5
ASEN 3112 Structures	4
ASEN 3113 Thermodynamics and Heat Transfer	3
ASEN 3200 Orbital Mechanics/Attitude Dynamics and Control	4
One additional course chosen from:	
ASEN 4112 Advanced Structures	3
ASEN 4114 Automatic Control Systems	3
ASEN 4148 Spacecraft Design	3

##### B. Aeronautical Option

ASEN 2002 Aero 2: Introduction to Thermodynamics and Aerodynamics	5
ASEN 2004 Aero 4: Introduction to Vehicle Design and Performance	5
ASEN 3111 Aerodynamics	4
ASEN 3113 Thermodynamics and Heat Transfer	3
ASEN 3128 Aircraft Dynamics	4
One additional course from:	
ASEN 4013 Propulsion	3
ASEN 4111 Advanced Aerodynamics	3
ASEN 4138 Aircraft Design	3
ASEN 3112 Structures	4

*Advising Note: Students seeking to enroll in ASEN courses must register through an aerospace advisor.*

#### Chemical Engineering Option

CHEM 1221 and CHEM 1211	5
Recommended courses (total of 23 credit hours):	
CHEM 2120 Material and Energy Balance	3
CHEM 3200 Fluids	3
CHEM 3210 Heat Transfer	4
CHEM 3220 Mass Transfer	4
CHEM 3320 Thermodynamics	3
CHEM 4511 Physical Chemistry	3
CHEM 4330 Reaction Kinetics	3

Also recommended:

APPM 4570 Statistical Methods	3
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*Note: One additional course is required to bring the total number of credits to at least 24.*

#### Computer Science Option

Recommended courses (total of 9 credit hours):

CSCI 2270 Data Structures	4
ECEN 2120 Computers as Components	5
Additional courses to bring the total number of credits to at least 24; at least two of these must be at the 3000 level. possible choices include:	
CSCI 3104 Algorithms	3
CSCI 3155 Principles of Programming Languages	4
CSCI 3287 Database Systems	3
CSCI 3753 Systems	4
ECEN 3100 Digital Logic	5

*Advising Note: Students completing the computer science option should have a minor in computer science. Check with the computer science department.*

#### Electrical and Computer Engineering Option

Recommended courses (total of 25 credit hours):

ECEN 2120 Computers as Components	5
ECEN 3100 Digital Logic	5
ECEN 2250 Circuits/Electronics 1	5
ECEN 2260 Circuits/Electronics 2	5
ECEN 3250 Circuits/Electronics 3	5

#### Engineering Physics Option

Recommended courses after first-year physics (18 or 19 credit hours):

PHYS 2140 Methods of Theoretical Physics	3
PHYS 2150 Experimental Physics	1
PHYS 2170 Foundations of Modern Physics	3
PHYS 3210 Analytical Mechanics	3
PHYS 3220 Quantum Mechanics and Atomic Physics	3
PHYS 3310 Principles of Electricity and Magnetism 1	3
PHYS 3320 Principles of Electricity and Magnetism 2	3

Plus either of the following:

PHYS 3330 Junior Laboratory	2
PHYS 4230 Thermodynamics and Statistical Mechanics	3

*Note: Additional courses are required to bring the total number of physics credits to 24.*

Also recommended:

APPM 3570 Applied Probability	3
MATH 3140 Abstract Algebra 1	3

#### Mechanical Engineering Option

Recommended courses (total of 25 credit hours):

MCEN 2023 Statics and Structures	3
MCEN 2063 Mechanics of Solids	3
MCEN 3021 Fluid Mechanics	3
MCEN 3022 Heat Transfer	3
MCEN 3025 Component Design	3
MCEN 3043 Dynamics	3
MCEN 4043 System Dynamics	3

*Note: Additional MCEN courses are required to bring the total number of credits to 24.*

Also recommended:

APPM 4570 Statistical Methods	3
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#### Civil, Environmental, and Architectural Engineering Option

Recommended basic courses (total of 15 credit hours):

AREN 2020 Energy Fundamentals	3
CVEN 2121 Analytical Mechanics 1	3
CVEN 3161 Mechanics of Materials 1	3
CVEN 3227 Probability, Statistics, and Decisions	3
CVEN 3313 Theoretical Fluid Mechanics	3

Students also take two courses from any one of the following groups:

a) AREN 2010 Introduction to Solar Utilization	3
AREN 3010 Mechanical Systems for Building	3
AREN 3540 Illumination 1	3
b) CVEN 3414 Introduction to Environmental Engineering	3
CVEN 4333 Engineering Hydrology	3
c) CVEN 3525 Structural Engineering 1	3
CVEN 3708 Geotechnical Engineering 1	3

#### Actuarial Option

Recommended basic courses (19 credit hours):

BCOR 1000 Business Computing Skills	3
BCOR 2000 Accounting and Financial Analysis 1	4
BCOR 2010 Business Statistics	3
BCOR 2100 Accounting and Financial Analysis 2	3
FNCE 3010 Corporate Finance	3
ECON 1000 Introduction to Economics	4
ECON 3070 Intermediate Microeconomics Theory	3
ECON 3080 Intermediate Macroeconomics Theory	3
ECON 4818 Introduction to Econometrics	3

Some of the following courses should also be taken:

ACCT 3220 Intermediate Financial Accounting 1	3
ACCT 3230 Intermediate Financial Accounting 2	3

BCOR 3000 Business Law, Ethics, and Public Policy .....	3
FNCE 3020 Financial Markets and Institutions .....	3
FNCE 4040 Derivative Securities .....	3

### Finance Option

Recommended basic courses (19 credit hours):

BCOR 1000 Business Computing Skills .....	3
BCOR 2000 Accounting and Financial Analysis 1 .....	4
BCOR 2010 Business Statistics .....	3
BCOR 2100 Accounting and Financial Analysis 2 .....	3
FNCE 3010 Corporate Finance .....	3
FNCE 3020 Financial Markets and Institutions .....	3

Plus at least two of the following courses to meet the 24 credit-hour requirement of the option:

FNCE 4000 Financial Institutions Management .....	3
FNCE 4020 Applied Business Finance .....	3
FNCE 4030 Investment and Portfolio Management .....	3
FNCE 4040 Derivative Securities .....	3
FNCE 4050 Capital Investment Analysis .....	3
FNCE 4060 Special Topics in Finance .....	variable credit

### Environmental, Population and Organismic Biology Option

Required courses (17 credits):

EPOB 1210 General Biology 1 .....	3
EPOB 1220 General Biology 2 .....	3
EPOB 1230 General Biology Lab 1 .....	1
EPOB 1240 General Biology Lab 2 .....	1
EPOB 3200 Genetics .....	3
EPOB 3250 Principles of Evolution .....	3
EPOB 3020 Principles of Ecology .....	3

Plus a selection of the following courses to meet the 24-credit-hour requirement of the option:

EPOB 3630 Parasitology .....	3
EPOB 4030 Limnology .....	3
EPOB 4050 Vegetation Description and Analysis .....	3
EPOB 4165 Landscape Ecology .....	3
EPOB 4171 Ecosystem Ecology .....	3
EPOB 4270 Population Genetics and Evolution .....	3
EPOB 4410 Biometry .....	4
GEOG 4732 Population Geography .....	3

Other areas of academic focus are also possible. Check with the applied mathematics office for more information.

## Architectural Engineering

Architectural engineering has many elements in common with civil, mechanical, and electrical engineering, but is specifically directed toward the building industry. It focuses on building systems, which include design of systems such as heating, ventilating, and air conditioning (HVAC) systems; illumination and electrical systems; structural building systems; and construction methods applied to buildings. The program is administered by the Department of Civil, Environmental, and Architectural Engineering. Students also take courses in architectural history and architectural design from the College of Architecture and Planning.

### Objective of the Architectural Engineering Program

The educational objective of the architectural engineering bachelor's degree program is to have students acquire the broad knowledge and skills necessary to successfully begin and sustain a career in the building design and construction industry and, in the process, emphasize one of four core disciplines:

- building electrical and lighting systems;
- building heating, ventilating, and air conditioning systems;
- building structural systems; or
- construction and construction management.

### Areas of Knowledge

The areas of knowledge that define these objectives include both technical and non-technical areas.

Technical areas are:

- elementary—the fundamentals for architectural engineering, including basic science and mathematics, building design and construction processes; overview of building systems; elementary principles and processes of architecture; and laboratory measurement and data analysis.
- intermediate—introduction to building systems and their components, with corresponding analysis, of electrical, HVAC, and lighting systems as well as structural elements and components;
- proficiency—design, integration, and advanced analysis of at least two types of building systems, including design of electrical, HVAC, lighting, solar, and structural systems; as well as the codes and recommended practices that govern these building systems;
- specialization—advanced design, coupled with industry experience via internships, for building lighting system design and specification, lighting engineering and equipment design, building HVAC systems design, building structural system design, solar system design, and construction and construction management.

Non-technical areas include:

- professional life, including methods of time and resource management, and professional ethics;
- processes and requirements of written and oral communication; and
- broad areas in the humanities and social sciences, including architectural history and language.

### Desired Outcomes

The undergraduate degree in architectural engineering emphasizes knowledge and awareness of:

- basic principles of mathematics, physics, and chemistry;
- computer-aided engineering and design;
- manual and computer-aided drawing;
- surveying;
- building construction practices and materials;
- engineering mechanics;
- structural analysis and design;
- building electrical and mechanical systems;
- HVAC analysis and design;
- solar energy utilization;
- illumination and electrical;
- architectural appreciation, design, and history;
- architectural engineering systems integrated design; and
- professional practice and ethics.

### Bachelor's Degree Requirements

There is a broad core of requirements for all students. Students are also expected to choose, in consultation with faculty advisors, elective courses to add depth in one or more specialty areas. Such specialty areas include structural analysis and design, construction engineering, building energy analysis, mechanical systems, and illumination. A list of recommended electives is available to help students select a coherent academic program that enhances one of these areas.

*Curriculum for BS (Arch E)*

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
AREN 1017 Engineering Drawing .....	2
AREN 1316 Introduction to Architectural Engineering .....	1
APPM 1350 Calculus 1 for Engineers .....	4
CHEM 1221 Engineering Chemistry Lab .....	2
CHEN 1211 General Chemistry for Engineers .....	3
Humanities or social science elective .....	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers .....	4
AREN 1027 Descriptive Geometry .....	2
CVEN 2012 Plane Surveying .....	3
PHYS 1110 General Physics 1 .....	4
Humanities or social science elective .....	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
AREN 2050 Engineering Systems for Buildings .....	3
AREN 2110 Thermodynamics .....	3
APPM 2350 Calculus 3 for Engineers .....	4
CVEN 2121 Analytical Mechanics 1 .....	3
PHYS 1120 General Physics 2 .....	4
<b>Spring Semester</b>	
AREN 2120 Fluid Mechanics and Heat Transfer .....	3
AREN 2300 Engineering Computing .....	3
APPM 2360 Introduction to Differential Equations with Linear Algebra .....	4
AREN 3406 Introduction to Building Construction .....	3
CVEN 3161 Mechanics of Materials 1 .....	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
AREN 3010 Mechanical Systems for Buildings .....	3
AREN 3540 Illumination 1 .....	3
CVEN 3246 Introduction to Construction .....	3
CVEN 3525 Structural Analysis .....	3
ECEN 3030 Electrical Circuits .....	3
<b>Spring Semester</b>	
AREN 4570 Electrical Systems .....	3
CVEN 4545/4555 Structural Design .....	3
WRTG 3030 Writing for Science and Society .....	3
Technical elective .....	3
Technical elective .....	6
<b>Senior Year</b>	
<b>Fall Semester</b>	
ARCH 3114 History and Theories of Architecture 1 .....	3
ARCH 4010 Architectural Appreciation and Design .....	6
Technical elective .....	9
<b>Spring Semester</b>	
ARCH 3214 History and Theories of Architecture 2 .....	3
AREN 4317 Architectural Engineering Design .....	3
CVEN 4039 Senior Seminar .....	1
Technical elective .....	6
Humanities or social science elective .....	3
Minimum hours for degree .....	128

**Courses Available for Specialization**

Upon consultation with their advisors, students are expected to select technical elective courses applicable to their areas of interest and specialization. The areas of specialization are construction engineering and management, mechanical systems, illumination, and structural engineering.

In addition to the courses listed below, other courses not listed may be proposed by a student and approved by the advisor if they are found to be applicable.

- AREN 3130 Building Energy Laboratory
- AREN 3140 Illumination Laboratory
- AREN 4010 Solar Design

- AREN 4315 Design of Masonry Structures
- AREN 4317 Architectural Engineering Design
- AREN 4466 Construction Planning and Scheduling
- AREN 4540 Exterior Lighting Systems
- AREN 4550 Illumination 2
- AREN 4560 Luminous Radiative Transfer
- AREN 4580 Daylighting
- AREN 4590 Computer Graphics in Lighting Engineering
- CVEN 3313 Theoretical Fluid Mechanics
- CVEN 3323 Applied Fluid Mechanics
- CVEN 3708 Geotechnical Engineering 1
- CVEN 3718 Geotechnical Engineering 2
- CVEN 4161 Mechanics of Materials 2
- CVEN 4525 Matrix Structural Analysis
- CVEN 4545 Steel Design
- CVEN 4555 Reinforced Concrete Design
- CVEN 4565 Timber Design
- CVEN 4087 Engineering Contracts
- CVEN 4161 Mechanics of Materials 2
- CVEN 5010 HVAC System Controls 1
- CVEN 5020 Building Energy Measurements
- CVEN 5030 Architectural Lighting Equipment Design
- CVEN 5040 Lighting Systems Engineering
- CVEN 5050 Advanced Solar Design
- CVEN 5060 Advanced Passive Solar Design
- CVEN 5070 Thermal Analysis of Buildings
- CVEN 5090 Building Systems Seminar
- CVEN 5110 HVAC Design 1
- CVEN 5111 Introduction to Structural Dynamics\*
- CVEN 5161 Advanced Mechanics of Materials\*
- CVEN 4511 or 5111 Introduction to Finite Element Analysis\*
- ACCT 2000 Introduction to Financial Accounting
- ACCT 2310 Managerial Cost Accounting 1
- ECEN 5767 Power Distribution Systems
- MCEN 3022 Heat Transfer

\* For well-qualified undergraduates.

**Double Degree with Business**

Students interested in pursuing a BS degree in business in addition to the BS degree in architectural engineering should be prepared to spend at least three additional semesters in school. A faculty advisor should be consulted in the student's freshman year so that social sciences and humanities courses required of business students can be taken.

Academically qualified students may want to consider working toward the master of business administration degree upon completion of the baccalaureate in engineering as an alternative to a BS in business.

**Graduate Study**

Graduate credit is offered in the following courses:

- CVEN 5010 Energy Controls Systems
- CVEN 5020 Building Energy Measurements and Audits
- CVEN 5030 Architectural Lighting Equipment Design
- CVEN 5040 Lighting Systems Engineering
- CVEN 5050 Advanced Solar Design
- CVEN 5060 Advanced Passive Solar Design
- CVEN 5070 Thermal Analysis of Buildings
- CVEN 5080 Computer Simulation of Building Energy Systems
- CVEN 5090 Building Systems Seminar
- CVEN 5110 HVAC Systems Design 1
- CVEN 5111 Introduction to Structural Dynamics
- CVEN 5161 Advanced Mechanics of Materials
- CVEN 5206 Design Development
- CVEN 5217 Building Reuse and Retrofit
- CVEN 5218 Construction Accounting and Financial Management
- CVEN 5226 Quality and Safety
- CVEN 5236 Construction Planning and Scheduling
- CVEN 5246 Engineering Contracts
- CVEN 5256 Construction Management

CVEN 5266 Project Administration  
 CVEN 5276 Engineering Risk and Decision Analysis  
 CVEN 5286 Construction Engineering 1  
 CVEN 5296 Construction Engineering 2  
 CVEN 5326 Construction Project Controls  
 CVEN 5511 Introduction to Finite Element Analysis  
 CVEN 5525 Matrix Structural Analysis  
 CVEN 5575 Advanced Topics in Steel Design  
 CVEN 5585 Advanced Topics in Reinforced Concrete Design  
 CVEN 5830 Special Topics in Energy  
 CVEN 6161 Advanced Mechanics of Materials 2  
 CVEN 6525 Finite Element Analysis of Structures  
 CVEN 6595 Earthquake Engineering  
 CVEN 7111 Dynamics of Structures  
 CVEN 7131 Theory of Elasticity  
 CVEN 7141 Plates and Shells  
 CVEN 7161 Buckling in Structures  
 CVEN 7511 Computational Mechanics of Solids and Structures  
 CVEN 7545 Structural Optimization  
 CVEN 7555 Structural Reliability

## Chemical and Biological Engineering

The Department of Chemical and Biological Engineering offers degrees at the bachelor's, master's, and doctoral levels.

The department seeks to instill in its students an education in the principles and practices of chemical engineering that will serve a broad and dynamic range of career paths and provide a foundation for lifelong professional growth.

### Educational Objectives

The educational objectives in the undergraduate program in the Department of Chemical and Biological Engineering are to:

- educate students in chemical engineering fundamentals and practice;
- train students in chemical process and product design;
- train students in critical thinking and in the identification, formulation, and solution of open-ended engineering problems;
- help students be aware of their responsibility to conduct ethical, safe, and environmentally conscious engineering;
- train students to be good communicators and function effectively as individuals and in teams;
- provide students with knowledge of contemporary issues and understanding of the impact of engineering practices in global and societal contexts; and
- teach students the necessity and tools for continued, life-long learning.

Students completing the undergraduate program in chemical engineering demonstrate the following educational outcomes, the ability and skills to:

- apply knowledge of mathematics, science, and engineering;
- design and conduct experiments and analyze and interpret data;
- use modern engineering tools, skills, and methods for engineering practice;
- design processes and systems to meet desired performance specifications;
- identify, formulate, and solve engineering problems;
- understand professional and ethical responsibilities;
- communicate effectively in oral and written forms;
- function effectively on multidisciplinary teams;

- understand the impact of engineering solutions in global and societal contexts;
- know contemporary issues; and
- recognize the need for and have an ability to engage in life-long learning.

## Bachelor's Degree Requirements

Chemical engineers are responsible for producing products based on chemical and biochemical processing. They carry out basic research; they design, build, operate, and manage chemical processes and plants; and they supply petroleum products, plastics, detergents, agricultural chemicals, pharmaceuticals, biological compounds, photographic materials, microelectronic devices, and various food and other products. Today's processes must be energy efficient, nonpolluting, and profitable. Thus, students must master inorganic, organic, and physical chemistry, mathematics, statistics, computers, physics, and often biology and biochemistry. Students must learn to apply these fundamentals in the process industries. Paralleling the technical courses are studies in the humanities and the social sciences.

There is a natural affinity between chemical engineering, biotechnology, and medicine, and the department offers a bio-engineering option and a premedicine curriculum track. Chemical engineering also offers environmental, computer, microelectronics, and materials options.

At the BS, MS, and PhD levels, there are opportunities to specialize via electives, independent study, and research. If a student has an interest that is not included in the following information, special arrangements can usually be made.

Students may carry out part of their studies in another country (see the Office of International Education section in this catalog), and are encouraged to consider this opportunity, given the international nature of most large chemical and engineering corporations and international cooperation in scientific and engineering research. Many faculty members have significant international experience.

**Cooperative Education and Internships.** The Department of Chemical and Biological Engineering offers a formal Co-Op Program, where students obtain a BS in chemical engineering and significant industrial experience in five years. A Biotechnology Internships program is also offered for summer internships with local companies.

### Options in the Chemical Engineering Curriculum

Curricular options have been established in fields of major importance and particular interest. To follow one of these options requires careful planning and course selection by student and advisor.

**Bioengineering Option.** Since all biological and medical systems involve complex chemical and physical processes, chemical engineering is a natural professional basis for biotechnology research. The department has a strong undergraduate program tailored to meeting the needs of students who are preparing for careers in biomedical engineering, biochemical engineering, or biotechnology. Modern biotechnology has been defined as "applied genetic engineering" and is of considerable importance due to recent advances in molecular biology and genetic engineering. The successful industrial application of these advances will, in large part, depend on new chemical engineering initiatives in the development of high-rate bioreactors, efficient separation and purification techniques for bioproducts, and computer-interfaced instrumentation for optimal bioprocess control.

The courses available for this option are Pharmaceutical Biotechnology, Bioprocess Engineering, and Biochemical Separations. In addition, bioengineering option students are required to

complete two semesters of general biology and one semester of biochemistry.

The department also offers graduate bioengineering technology research programs at both the MS and PhD levels. These programs are oriented toward specialization in various aspects of biochemical engineering, biomedical engineering, biotechnology, and sensory physiology.

**Environmental Option.** Chemical engineers can make major contributions in the fields of pollution prevention and control, resource utilization, and environmental improvement. The environmental engineering option is designed to emphasize biological and environmental sciences, the effects of chemicals on the environment, and chemical engineering applications in environmental problems.

The courses taken by students following this option include electives in environmental science and engineering. A capstone course in environmental engineering processes or environmental separations is taken in the senior year.

**Computer Option.** Applications of computers in chemical engineering are widespread, and the chemical engineer who has solid preparation in computer science and engineering is in demand. Areas include computer architecture and interfacing; machine, assembly, and high-level language programming; and online real-time computing. Students in this option complete the core of the computer engineering degree program in the Department of Electrical and Computer Engineering.

**Materials Option.** The need to develop new materials for a rapidly broadening spectrum of applications is one of the major technological challenges confronting applied science. Chemical engineers have the required background in chemistry and transport theory to contribute significantly in this area. This option focuses on polymeric and ceramic materials by complementing the chemical engineering curriculum with elective courses stressing the interrelationship between materials fabrication, structure, properties, and performance.

**Microelectronics Option.** The manufacture of semiconductor microelectronic circuits or “chips” involves many chemical steps. In recent years, more and more chemical engineers are finding employment in the expanding microelectronics industry. Completion of this option, which includes courses in solid state and semiconductor physics and microstructure fabrication, provides specialization to help launch a successful career in microelectronics.

**Premedicine Curriculum Track.** This track is offered for students preparing for medical school. Since chemical engineering already requires most of the premed courses, it is a logical choice for students who desire an engineering degree and the opportunity to pursue a medical profession.

**Senior Thesis.** The department offers this program for undergraduates with a strong interest in research. The student carries out a year-long project under the direction of a faculty member in lieu of taking CHEN 4130 Chemical Engineering Laboratory 2. Students must apply at the end of their junior year.

### Curriculum for BS (ChE)

Required Courses	Semester Hours
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers	4
CHEM 1221 General Chemistry Laboratory for Engineers	2
CHEN 1211 General Chemistry for Engineers	3
GEEN 1300 Introduction to Engineering Computing (Note 1)	3
Humanities or social science elective (Note 2)	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers	4
CHEN 1300 Introduction to Chemical Engineering (Note 3)	1
PHYS 1110 General Physics 1	4

Humanities or social science elective (Note 2)	3
Elective (Note 4)	3

### Sophomore Year

#### Fall Semester

APPM 2350 Calculus 3 for Engineers	4
CHEM 3311 Organic Chemistry 1	4
CHEN 3321 Laboratory in Organic Chemistry	1
CHEN 2120 Chemical Engineering Material and Energy Balances (Note 1)	3
PHYS 1120 General Physics 2	4
PHYS 1140 Experimental Physics	1

#### Spring Semester

APPM 2360 Introduction to Differential Equations with Linear Algebra	4
CHEM 3331 Organic Chemistry 2	4
CHEN 3341 Laboratory in Organic Chemistry 2	1
CHEN 4521 Physical Chemistry for Engineers (Notes 1 and 6)	3
CHEN 3200 Chemical Engineering Fluid Mechanics (Note 1)	3
Humanities or social science elective (Note 2)	3

### Junior Year

#### Fall Semester

CHEN 3010 Applied Data Analysis (Note 1)	3
CHEN 3210 Chemical Engineering Heat Transfer (Note 1)	3
CHEN 3320 Chemical Engineering Thermodynamics (Note 1)	3
CHEM 4541 Physical Chemistry Lab	2
WRTG 3030 Writing on Science and Society	3
Elective (Note 4)	3

#### Spring Semester

CHEN 3130 Chemical Engineering Laboratory 1 (Note 1)	2
CHEN 3220 Chemical Engineering Separations and Mass Transfer (Note 1)	3
CHEN 4330 Chemical Engineering Reaction Kinetics (Note 1)	3
Chemistry elective (Note 3)	3
Humanities or social science elective (Note 2)	3
Elective (Note 4)	3

### Senior Year

#### Fall Semester

CHEN 4090 Undergraduate Seminar	1
CHEN 4130 Undergraduate Engineering Laboratory 2 (Note 1)	2
CHEN 4520 Chemical Process Synthesis (Note 1)	3
CHEN 4580 Numerical Methods for Process Simulation (Note 1)	3
Electives (Note 4)	6

#### Spring Semester

CHEN 4530 Chemical Engineering Design Project (Note 1)	2
CHEN 4570 Instrumentation and Process Control (Note 1)	4
CHEN 4440 Chemical Engineering Materials (Notes 1 and 5)	3
Humanities or social science elective (Note 2)	3
Elective (Note 4)	3
Minimum total hours for degree	129

### Curriculum Notes

1. Course offered only in semester indicated.
2. Courses selected must meet humanities and social science requirements. Students should consult with their advisor and the current ChE Help Guide.
3. Students should consult the current ChE Help Guide about chemistry electives.
4. Electives must meet specific requirements. At least 6 credit hours must be in CHEN courses at 3000 level or higher. See the current ChE Help Guide.
5. Alternate is CHEN 4460 Polymer Engineering.
6. Students may take CHEM 4511 if during fall semester.

## Graduate Degree Programs

Major areas of current research interest in the chemical engineering department are applied mathematics and computers, biomedical engineering, biotechnology, ceramics processing, colloid science, environmental engineering, heterogeneous catalysis and kinetics, fluid dynamics, low gravity science, mass transfer, materials engineering, membrane and polymer science, particle technology, process control and optimization, separations, supercritical fluids, surface science and interfacial phenomena, transport in porous media, and thermodynamics.



### Master of Science Degree Requirements

**Admission.** General criteria for regular admission to the master's program include a bachelor's degree with a 3.00 or better overall grade point average from a college or university of recognized standing, equivalent to the degree given at this university (or college work equivalent to that required for such a degree, at least 96 semester hours of which must be acceptable toward a degree at this university); promise of ability to pursue advanced study and research, as judged by previous scholastic record or otherwise; and adequate preparation to begin graduate study in the chosen field.

A candidate for the master of science degree in chemical engineering must fulfill the following departmental requirements:

1. Thirty semester hours of graduate work, including a satisfactory thesis. Maximum credit of 6 semester hours is allowed for the completion of the master's thesis. Fifteen of the remaining semester hours must be chemical engineering courses at the 5000 level or above. A nonthesis master's degree is available and requires completion of 30 semester hours of course work.

2. A final examination as required by the Graduate School on the thesis.

It is expected that a qualified student can complete the master's degree in less than two calendar years. A graduate student with a bachelor's degree in a field related to chemical engineering can obtain the master's degree in chemical engineering but may be required to make up deficiencies in background. Programs are arranged on an individual basis.

The following courses comprise the core for the MS degree:

CHEN 5210 Transport Phenomena (required)

And two of

CHEN 5370 Intermediate Chemical Engineering Thermodynamics

CHEN 5390 Chemical Reactor Engineering

CHEN 5740 Analytical Methods in Chemical Engineering

The course CHEN 5128 Applied Statistics in Research and Development may be taken as an alternate to CHEN 5740.

A degree plan must be prepared at the beginning of the academic program in consultation with an advisory committee. The student is urged to maintain close contact with this advisory committee during the entire course of study.

The MS thesis committee must consist of three members, including at least two graduate faculty members from the Department of Chemical and Biological Engineering.

### Master of Engineering Degree Requirements

**Admission.** (The standards of admission to the MS program also apply to ME degree applicants.) A 3.00 overall undergraduate GPA is required for regular admission.

**ME Degree Advisor.** All ME candidates should see the chemical engineering master of science degree advisor for counseling.

**Requirements for Graduation.** Nine hours of chemical engineering at the 5000 level or above are required for those ME degree students enrolled in the Department of Chemical and Biological Engineering. Students orally defend their written reports as specified in the ME degree description, and a comprehensive examination is administered by the student's advisory committee on the report and course work.

### Doctor of Philosophy Admission Requirements

1. The applicant must have achieved academic competence equivalent to a master of science degree from an accredited college or university, with a GPA substantially above the minimum normally required for the degree.

2. The applicant must show the ability to perform independent research.

3. The applicant must indicate a field of specialization and obtain an advisor in the chemical engineering graduate faculty.

4. The applicant must pass the PhD preliminary examination administered by the Department of Chemical and Biological Engineering.

A candidate for the doctor of philosophy degree must meet the requirements as described under requirements for advanced degrees in the Graduate School chapter. A minimum of 33 semester hours of courses numbered 5000 or above is required for the degree, including those applied toward an MS degree. These must include at least 24 semester hours of chemical engineering courses, including all five core courses listed previously.

All PhD students in chemical engineering must satisfy a communication skills requirement. This includes performing an advanced teaching assistantship and demonstrating satisfactory communication skills on the PhD comprehensive examination. Students whose primary language is English may choose to demonstrate foreign language proficiency instead of being judged on their communications skills on the comprehensive exam.

The PhD dissertation committee must consist of five members, including at least three from the Department of Chemical and Biological Engineering and at least one from within CU-Boulder, but outside the department. A graduate faculty member of the department must serve as chair of the committee.

### Research Facilities

Chemical and biological engineering research facilities are extensive and modern. Nearly all research equipment is interfaced to microcomputer systems for automated data collection, monitoring, and control. A full description of chemical engineering research facilities can be found in the Graduate School chapter.

### Civil, Environmental, and Architectural Engineering

The curricula within the Department of Civil, Environmental, and Architectural Engineering have been designed to qualify students for entry-level positions in professional practice in the areas of civil and environmental engineering. These broad area designations may be separated into the subdisciplines of building systems and energy management; construction engineering and management; environmental engineering; geotechnical engineering; mechanical systems; structural engineering and structural mechanics; and water resource engineering and management. Alternatively, undergraduates are prepared to begin graduate study in any of the subdisciplines listed above, improving their qualifications and permitting them to enter professional practice at a higher level or to progress to higher levels more rapidly after entry at the beginning level. The overall objectives of the bachelor of science program are to:

- enable students to apply basic knowledge in mathematics, basic science, and engineering fundamentals to solving problems and making effective designs in areas encompassing a breadth of civil engineering professional practice in contemporary society;
- allow students sufficient specialization to prepare them for professional careers and/or graduate study in subdisciplines of civil engineering: construction, environmental, geotechnical, structural, and water resources engineering;
- enable students to enhance technical contributions to the public infrastructure with understanding of nontechnical concepts, especially those that bear on civil engineering projects such as cost, public safety, and health;

- expose students to the unique responsibility of civil engineers to uphold ethical relationships with both their clients and with the public at large;
- teach students how to extend their knowledge and skills in order to meet new technical challenges and continuously innovate in their chosen professional careers; and
- give students a broad education in humanities and social sciences and encourage them to participate fully in a democratic society.

Students in civil and environmental engineering gain experience with or exposure to a capstone experience in environmental engineering, structural or foundation design; civil engineering systems; construction; engineering geology; engineering materials, geotechnical, or water quality laboratory; environmental engineering; fluid mechanics; geotechnical engineering; manual and computer-aided engineering drawing; mechanics; personal computers and engineering workstation usage; a seminar in professional practice and ethics; structural analysis and design; surveying; transportation systems; and technical electives in the area of emphasis.

## Bachelor's Degree Requirements

This curriculum requires students to obtain a background in the humanities, a broad knowledge of the basic engineering sciences of chemistry, mathematics (including differential equations), physics, mechanics (including fluid mechanics and soil mechanics), electrical engineering, and thermodynamics. Social-humanistic hours may be devoted to the social sciences, the humanities, or to approved communication courses, with not more than 12 hours from any one of the three areas.

Advanced technical courses are selected in the senior year. Random selection is not allowed, the objective being to permit a graduate to enter the engineering profession with a firm groundwork in fundamental engineering science and adequate knowledge in specialized fields. Students should consult with their advisors.

### Curriculum for BS (CE)

The civil engineering program has been separated into two tracks, general civil engineering and environmental/water resources. The first four semesters are common to both tracks.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers	4
AREN 1017 Engineering Drawing	2
CHEM 1221 General Chemistry Laboratory for Engineers	2
CHEN 1211 General Chemistry for Engineers	3
CVEN 1317 Introduction to Civil and Environmental Engineering	1
Humanities or social science elective	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers	4
CVEN 2012 Plane Surveying	3
CVEN 3698 Engineering Geology	3
PHYS 1110 General Physics 1	4
Humanities or social science elective	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers	4
AREN 2110 Thermodynamics	3
CVEN 2121 Analytical Mechanics 1	3
PHYS 1120 General Physics 2	4
PHYS 1140 Experimental Physics	1
Humanities or social science elective	3

### Spring Semester

APPM 2360 Introduction to Differential Equations with Linear Algebra	4
AREN 2300 Engineering Computing	3
CVEN 3111 Analytical Mechanics	3
CVEN 3161 Mechanics of Materials 1	3
CVEN 3313 Theoretical Fluid Mechanics	3

### Curriculum for BS (CE) General Civil Engineering

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Junior Year</b>	
<b>Fall Semester</b>	
CVEN 3256 Construction Equipment and Methods	3
CVEN 3323 Hydraulic Engineering	3
CVEN 3414 Introduction to Environmental Engineering	3
CVEN 3525 Structural Analysis	3
CVEN 3708 Geotechnical Engineering 1	3
<b>Spring Semester</b>	
CVEN 3227 Probability, Statistics, and Decision for Engineers	3
CVEN 4161 Mechanics of Materials 2	3
CVEN 3718 Geotechnical Engineering 2	3
CVEN 4545/4555 Structural Design	3
WRG 3030 Writing on Science and Society	3
<b>Senior Year</b>	
<b>Fall Semester</b>	
CVEN 3246 Introduction to Construction	3
CVEN 3602 Transportation Engineering	3
ECEN 3030 Electrical Circuits	3
Technical elective (Note 1)	4
Humanities or social science elective	3
<b>Spring Semester</b>	
CVEN 4039 Senior Seminar	1
Capstone course (Note 2) or technical elective	3
Technical electives (Note 1)	9
Humanities or social science elective (3000- level or above)	3
Minimum hours for degree	128

### Curriculum for BS (CE) Environmental Option

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Junior Year</b>	
<b>Fall Semester</b>	
CVEN 3246 Introduction to Construction	3
CVEN 3323 Hydraulic Engineering	3
CVEN 3414 Introduction to Environmental Engineering	3
CVEN 3525 Structural Engineering 1	3
CVEN 3708 Geotechnical Engineering 1	3
<b>Spring Semester</b>	
CVEN 4333 Engineering Hydrology	3
CVEN 3227 Probability, Statistics, and Decision for Engineers	3
CVEN 3424 Water and Wastewater Treatment	3
CVEN 3256 Construction Equipment and Methods or CVEN 3525 Structural Analysis	3
CVEN 3454 Water Quality	4
WRG 3030 Writing on Science and Society	3
<b>Senior Year</b>	
<b>Fall Semester</b>	
CHEM 3311 Organic Chemistry or CVEN 4424 Aquatic Organic Contaminants	3
CHEM 4511 Physical Chemistry or CVEN 4353 Groundwater Engineering	3
CVEN 4147 Engineering Economy and System Design	3
CVEN 4434 Environmental Engineering Design	3
Technical elective	3
<b>Spring Semester</b>	
CHEM 4039 Senior Seminar	1
CVEN 4423 Water Sources Engineering Design	3
CVEN 4474 Hazardous and Industrial Waste Management	3
Technical electives (Note 1)	6
Humanities or social science elective (3000-level or above)	3
Minimum hours for degree	128

**Curriculum Notes**

1. *Not more than 6 hours of technical electives may be taken outside the department, and then only for defensible reasons.*
2. *The capstone course requirement may be satisfied by CVEN 4423, 4434, 4545, 4555, or 4728 and may be taken in fall or spring, since each of these courses is normally offered only once per academic year.*

**Double Degree with Business**

Students interested in pursuing a BS degree in business in addition to the BS degree in civil engineering should be prepared to spend at least three additional semesters in school. A faculty advisor should be consulted in the student's freshman year so that social sciences and humanities courses required of business students can be taken.

Academically qualified students may want to consider working toward the master of business administration degree upon completion of the baccalaureate in engineering as an alternative to a BS in business.

**Graduate Degree Programs**

A pamphlet on the requirements for graduate study in civil engineering is available from the departmental office. The Graduate Record Examination, consisting of the aptitude tests and advanced test in engineering, is used in the evaluation of candidates and competition for university and other fellowships. Therefore, students who wish to be considered for fellowships are advised to take this examination prior to their arrival on campus. There is no other qualifying examination required by the department for the master of science degree.

The department offers the master of science, master of engineering, and doctor of philosophy degrees with study emphasis in seven major areas: building energy systems, construction engineering and management, environmental engineering, life cycle engineering, geotechnical engineering, geoenvironmental, structural engineering and structural mechanics, and water resources engineering. A major in transportation and planning is available through the Denver campus.

**Master of Science Degree**

Requirements for this master's degree can be fulfilled in two ways. Under Plan I, the candidate presents 30 semester hours of course work including thesis, and under Plan II, 30 credit hours of course work are required.

**Master of Engineering Degree**

Requirements for this professionally oriented degree are available from the Office of the Dean, College of Engineering and Applied Science.

**Doctor of Philosophy Degree**

This degree requires a minimum of 30 semester hours of graduate-level work (5000 level or above), the last 15 of which must be taken at this university. The doctoral dissertation likewise requires 30 semester hours. The applicant for this degree normally has completed a master's degree in civil engineering or a closely related field and must demonstrate the capability for both rigorous academic accomplishments and independent research.

**Research Interests and Facilities**

The department has a wide variety of research facilities, including a 15g-ton centrifuge for geotechnical and structural model studies and a large 440g-ton geotechnical centrifuge for use in model testing. Also available is an instructional computing facility, the Bechtel Laboratory, equipped with 40 SUN workstations, and the M.Y. Leung Computational Laboratory for Soils and Structures.

In addition, extensive structural engineering, engineering mechanics, and geotechnical capabilities exist such as a one-million-pound universal testing machine and several cubical cells for multi-axial testing of materials. A 40 ft. by 80 ft. structural strong floor with associated equipment permits the testing of a wide variety of structural configurations under controlled conditions, both static and quasi-static. The hydraulics and water resources research laboratories include excellent facilities in water quality and environmental engineering. A unique workstation laboratory for advanced decision support systems is available. Programs in construction management and building energy are well supported. A state-of-the-art HVAC laboratory is capable of testing full-scale, commercial building HVAC systems and their controls using a one-of-a-kind data acquisition and experimental control system.

The Center for Advanced Decision Support for Water and Environmental Systems (CADSWES) is an interdisciplinary center of excellence, housed within the Department of Civil, Environmental, and Architectural Engineering. CADSWES focuses on applying advanced computing techniques to provide decision makers with decision support systems (DSSs) to help them more effectively manage water and environmental systems.

Current research covers such topics as water and wastewater treatment, surface and subsurface contaminant transport, decision support systems, hydraulic research, land treatment, rapid infiltration, and activated sludge processes. Cost prediction in construction, construction management, energy conservation in buildings, solar applications, and lighting systems are included. Also, offshore structures, centrifugal modeling, excavations, and rock and soil mechanics are being studied. In structures, research focuses include stability and fracture, finite element techniques, reinforced concrete, earthquake behavior, reinforced masonry structures, and prestressed concrete.

**Computer Science**

The Department of Computer Science, in cooperation with other departments in the university, offers a wide range of opportunities for students interested in computing. The department offers a BS degree in computer science. This program is designed to prepare students for careers as computer specialists and for graduate study in computer science. It culminates in a course in which students carry out year-long software engineering projects for industry. A minor in computer science is available as well. Computer options are also offered by several departments, including electrical and computer engineering, business, and mathematics; students interested in these programs should contact the appropriate department.

Additional information about the department's programs is available on the Web at [www.cs.colorado.edu](http://www.cs.colorado.edu) or by contacting the department at **303-492-7514**.

The Department of Computer Science also offers MS and PhD degrees.

The undergraduate degree in computer science emphasizes knowledge and awareness of:

- computing at all levels, from circuits and computer architecture through operating systems and programming languages to large application systems;
- the theoretical and mathematical aspects of computing;
- the interdependence of hardware and software; and
- the challenge of large-scale software production and engineering principles used to meet that challenge.

In addition, students completing the degree acquire the ability and skills to:

- communicate effectively with users as well as fellow computer professionals about computing issues;
- adapt techniques drawn from a large standard repertoire to new problems; and
- understand, assess, and use new and existing technologies.

## Minor Program

The department offers a minor in computer science that is available to undergraduates on the Boulder campus. The minor offers a basic introduction to the field of software engineering. Admission to the minor is determined by the department undergraduate committee. Visit [www.cs.colorado.edu](http://www.cs.colorado.edu) for details.

## Bachelor's Degree Requirements

Computer science majors begin their studies with five foundation courses chosen to provide a background for more advanced courses. They then complete five core courses selected from a list of eight offerings covering a wide variety of computer science topics. A two-semester sequence in the senior year involves students in all aspects of a major software development project, from requirements analysis to finished product. An alternative is Senior Thesis in which a student performs independent research for two semesters.

It is also vital for the socially responsible computer professional to have a broad background in the liberal arts. Consequently, students are encouraged to pursue interests in nontechnical, as well as technical, areas outside of computer science. Twenty-four hours of courses in the humanities and social sciences are required. The program also includes a broad sampling of mathematics and basic science courses.

A minimum of 128 hours is required for graduation. The requirements of the College of Engineering and Applied Science must be satisfied for graduation.

The following curriculum is only a sample. It can be adjusted to the needs and interests of individual students (e.g., transfer students, open option students, and students interested in the junior year abroad). The curriculum can also be augmented by two semesters of co-op work in industry. Visit [www.cs.colorado.edu](http://www.cs.colorado.edu) or contact the Department of Computer Science for more detailed and up-to-date information on the degree program.

### Curriculum for BS (CS)

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 .....	4
CSCI 1300 Computer Science 1: Programming .....	4
CSCI XXXX Freshman Seminar for Computer Science .....	1
Science elective .....	4
Humanities or social science elective .....	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 .....	4
CSCI 2270 Computer Science 2: Data Structures .....	4
Science elective .....	5
Humanities or social science elective .....	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
CSCI XXXX Computer science core course .....	3
ECEN 2120 Computers as Components .....	5
Upper-division math or linear algebra .....	4
Free elective .....	3
<b>Spring Semester</b>	
CSCI 3104 Algorithms .....	4
CSCI XXXX Computer Science Core Course .....	5

Upper-division math or linear algebra elective .....	3
Humanities or social science elective .....	3

## Junior Year

### Fall Semester

CSCI 3155 Principles of Programming Languages .....	4
CSCI XXXX Computer science core course .....	4
Humanities or social science elective .....	3
Statistics elective .....	3
Free elective .....	3

### Spring Semester

CSCI XXXX Computer science core course .....	4
CSCI XXXX Computer science core course .....	3
CSCI XXXX Computer science elective .....	3
WRTG 3030 Writing on Science and Society .....	3
Science elective .....	4

## Senior Year

### Fall Semester

CSCI XXXX Computer Science Capstone .....	4
Computer science elective .....	3
Humanities or social science elective .....	3
Science elective .....	4
Free elective .....	2

### Spring Semester

CSCI XXXX Computer Science Capstone .....	4
Computer science elective .....	3
Upper-division humanities or social science elective .....	3
Humanities or social science elective .....	3
Free elective .....	3
Total credit hours .....	128

## Graduate Degree Programs

### General Admission Requirements

Graduate students should consider a major in computer science if they are primarily interested in the general aspects of computational processes, both theoretical and practical, e.g., methods by which algorithms are implemented on a computer, techniques for using computers accurately and efficiently, design of computer systems, and languages and interfaces. A student who is primarily interested in the results of a computer process and its relation to a particular area of application should major in another field and consider a minor in computer science.

Applicants are considered for graduate study in computer science if they hold at least a bachelor's degree or its equivalent from an institution comparable to the University of Colorado. They should have considerable programming experience, sufficient mathematical maturity to understand pure mathematics courses at the upper-division level, and a number of academic computer science courses.

Applicants should satisfy the following requirements for mathematics courses: at least three semesters of mathematics at the level of sophistication of calculus or above, courses such as: differential equations, linear algebra, probability, statistics, and abstract algebra. These courses need not be in a mathematics department; however, they should require mathematical maturity expected of a junior or senior mathematics undergraduate.

In computer science, applicants should have the equivalent of the following University of Colorado courses: CSCI 1300 Computer Science 1: Programming; ECEN 2120 Computers as Components; one course out of CSCI 3155 Programming Languages or CSCI 3753 Operating Systems; CSCI 2270 Computer Science 2: Data Structures; and either CSCI 3104 Algorithms or CSCI 3434 Theory of Computation; and one other upper-division computer science course. Upper-division courses in areas such as artificial intelligence, databases, numerical computation, operating systems, parallel processing, software engineering, and others can

be substituted for courses on the above list. However, courses on the list are prerequisites to many of the graduate-level offerings and admitted students lacking their equivalent are usually required to make them up, without graduate credit. Students who lack this computer science background but who have exceptionally strong credentials in another field should contact the department for individual consideration.

Applicants should have a grade point average of at least 3.00 (on a scale of 4.00). Applicants having the listed qualifications are, if accepted, classified as regular degree students. Applicants with an average below 3.00 and above 2.75 and/or lacking certain of the prerequisites listed above are sometimes considered for admission as provisional students.

These requirements apply to both the master's and PhD programs. Applicants should be aware that admission to both programs is very competitive, and meeting the requirements does not ensure admission. Admission to the PhD program is especially competitive, and successful applicants, in general, have records considerably stronger in breadth and quality than these minimum standards suggest.

PhD applicants are required to submit scores from the aptitude portion of the Graduate Record Examination (GRE). GRE scores are optional for master's applicants but are required if the undergraduate GPA is less than 3.00 (but above a 2.75). These scores are encouraged if previous study was at an institution lacking a strong national reputation.

Financial aid is available to PhD students in the form of teaching and research assistantships and fellowships. Aid is sometimes available for master's students as teaching assistants or graders, but positions are assigned only at the beginning of a semester.

Applications from domestic U.S. students for the master's program should be received by February 28 for fall admission and by October 15 for spring admission. For international students, applications for the MS and PhD programs should be received by December 1 for fall admission and September 1 for spring admission.

Applications from domestic U.S. students for the PhD program should be received by January 2 for fall admission and by October 1 for spring admission. For international students, applications for the PhD program should be received by December 1 for fall admission and by September 1 for spring admission.

### *Master's Degree*

Admission requirements for this program are given above under General Admission Requirements. Plan I (thesis) or Plan II (no thesis) may be followed. In either plan, students must complete 30 credit hours of course or thesis work. The requirements for Plan I are as stated under the general requirements of the Graduate School section in this catalog. Students in Plan I receive 6 credit hours for thesis work and are examined orally on their thesis. Students in Plan II must pass the master's comprehensive exam. Under either plan a student may take 6 hours in a minor field. Students are expected to work out an acceptable program of course work with their advisor. Specific courses depend on the student's background and field of specialization, but four of the courses must satisfy a distribution requirement.

### *Doctor of Philosophy Degree*

Admission requirements for this program are listed under General Admission Requirements. Students in this program must pass preliminary examinations in three subareas of computer science to be eligible for admission to PhD candidacy. The foreign language requirement is the equivalent of four college semesters; a detailed statement is available from the computer science department. A minimum of 30 semester hours in courses

numbered 5000 or above is required for the degree, but the number of hours in formal courses are ordinarily greater than that total. Specific courses depend on the student's background and field of specialization.

Following the formal course work, a student must pass a comprehensive examination aimed primarily at determining whether the student is adequately prepared to begin doctoral thesis work.

Finally, students who have completed a minimum of 30 semester hours are expected to prepare a doctoral thesis based on original research in the field of computer science. After the thesis has been completed, an oral final examination on the thesis and related topics is conducted by a committee of at least five graduate faculty members.

Further details on either the master's or PhD degree programs are available at [www.cs.colorado.edu](http://www.cs.colorado.edu).

## Department Computing Facility

The Department of Computer Science supports its own domain, [cs.colorado.edu](http://cs.colorado.edu), which is a 10/100/1000 mb network connected to the campus and the rest of the world by gigabit and fast ethernet. The department has been instrumental in pushing the campus to a faster networking model through our research. Research computing needs are handled in the department by our own staff. We support most architectures and operating systems, giving research students the opportunity to learn about and use the latest, greatest equipment and software.

The current hardware inventory includes Linux PC workstations and servers, HP workstations, a Linux Beowulf cluster and DS20 parallel processing cluster, Macintoshes and Windows 2000/XP desktop workstations, and various other computers. All are networked with 10/100/1000 mb networks connected with switches and hubs to our firewalled gateway.

## Electrical and Computer Engineering

Electrical and computer engineering is about the science and technology of information and energy. Two undergraduate curricula lead to bachelor's degrees: one in electrical engineering, and another in electrical and computer engineering. These curricula are revised frequently to keep pace with changes in this dynamic field.

Up-to-date curricula and policies are contained in the department's *HELP! Guide*, available through the department and on the Web at [ece.colorado.edu](http://ece.colorado.edu).

## Bachelor's Degree Requirements

A minimum of 128 semester hours must be completed for either the BS in electrical engineering (EE) or the BS in electrical and computer engineering (ECE).

Students in both undergraduate degree programs take the same courses in their freshman and sophomore years. They also begin the sequence of core courses that covers the sophomore and junior years. With this background, students are then able to specialize—or diversify—beginning in the second semester of the junior year or in the senior year. EE majors take two junior-level elective courses that prepare them for three senior theory and two senior lab elective courses in addition to the electrical engineering capstone design lab or the electrical and computer engineering design lab. These senior courses may be chosen from the following areas: biomedical engineering; communication and digital signal processing; computer engineering and VLSI; electromagnetic fields; electronics; optics; power and power electronics; solid-state materials and devices; and systems and controls.

For ECEN majors, the senior elective courses are: two computer science courses; computer organization; switching and finite automata; and the appropriate capstone design lab course.

Practical experience in well-equipped laboratories augments the theoretical approach throughout the program. Students are encouraged to develop interests outside their electrical engineering specialties by enrolling in nontechnical courses in other colleges of the university. They are encouraged to participate in college and university activities, as well as in meetings of the two very active electrical engineering technical societies (IEEE and HKN).

In just four years it is impossible to study all areas in detail. Qualified students may specialize further by pursuing a graduate program or by taking continuing education courses after completing the BS degree requirements. A graduating senior with high scholarship can finish a master's degree in electrical engineering with about one additional full year of work at any of the nation's major universities. Another option for especially well-qualified students is the department's BS/MS program, which allows early admission to the MSEE program during the junior year. This option is described below.

### *Program Objectives for a BS Degree in Electrical Engineering (EEEN)*

**1. Graduates will understand the physical and mathematical principles underlying electrical and electronic technology.**

The EE curriculum contains a broad core of classes focused on mathematical and physical principles that are fundamental to the electrical engineering field. In addition to basic classes in mathematics, science, and computing, the curriculum includes a sequence of courses in analog and digital electronic circuits and systems, as well as electromagnetic fields and probability. Further selective depth in the principles underlying semiconductor devices, energy systems, and/or propagation of electromagnetic waves is also required.

**2. Graduates will be well prepared to pursue careers in industry, or to enter graduate programs, involving the design or advancement of new electrical or electronic systems, devices, instruments, or products.**

The EE curriculum provides a foundation in concepts and design relating to electrical and electronic systems, devices, and circuits. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. Moreover, the curriculum provides opportunities for specialization in areas such as communications and digital signal processing, control systems, analog and digital integrated circuit design, semiconductor devices and optoelectronics, electromagnetics and wireless systems, power electronics and renewable energy, bioelectronics, and digital systems.

In addition, the EE curriculum prepares graduates with other professional skills that they will require throughout their careers, including communicating, functioning on multi-disciplinary teams, and understanding contemporary issues and ethics.

The EE curriculum is rich in laboratory work. This not only reinforces theoretical concepts, but also develops laboratory skills and provides a setting for development of professional skills.

**3. Graduates will possess a foundation that allows future professional and personal growth.**

To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the EE curriculum through a sequence of required classes in mathematics, physics, chemistry, and the electrical and computer engineering core. In addition, the graduate must be capable of lifelong learning; this is taught

through assignments that require independent research and study. Finally, the curriculum includes a significant component of electives in the humanities and social sciences.

### *Program Objectives for a BS Degree in Electrical and Computer Engineering (ECEN)*

**1. Graduates will understand the physical and mathematical principles underlying electrical and electronic technology and computer systems.**

To develop the high-performance computing and information systems of the future, electrical and computer engineers will be required to address issues such as high-speed interconnections, transmission of data through bandwidth-limited channels, power dissipation in digital CMOS circuitry, etc. Hence our graduates will need a background not only in digital circuits and systems, but also in mathematical and physical areas of electrical engineering such as electronic circuits, fields, and linear systems. Hence our ECE degree curriculum includes the same core courses required of the EE degree.

**2. Graduates will be well prepared to pursue careers in industry, or to enter graduate programs, related to computer hardware, software, design, and applications.**

The ECE curriculum provides a foundation in computer systems and their design. As well as emphasizing computer hardware, the ECE curriculum also emphasizes design, integration, implementation, and application of both large-scale and small-scale computer systems. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. Moreover, the curriculum provides opportunities for specialization in areas such as compiler design, embedded systems, software engineering, and VLSI design.

In addition, the ECE curriculum prepares graduates with other professional skills that they will require throughout their careers, including communicating, functioning on multi-disciplinary teams, and understanding contemporary issues and ethics.

The ECE curriculum is rich in laboratory work. This not only reinforces theoretical concepts, but also develops laboratory skills and provides a setting for development of professional skills.

**3. Graduates will possess a foundation that allows future professional and personal growth.**

To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the ECE curriculum through a sequence of required classes in mathematics, physics, chemistry, and the electrical and computer engineering core. In addition, the graduate must be capable of lifelong learning; this is taught through assignments that require independent research and study. Finally, the curriculum includes a significant component of electives in the humanities and social sciences.

### *Biomedical Engineering Option and Premedical Studies in ECE*

The biomedical engineering option, available to both EEEN and ECEN majors, focuses on the application of engineering concepts to the improvement and protection of health. Successful completion of this option is noted on a student's transcript, and may meet medical school requirements. Course work in the ECEN/EEEN curriculum is coupled with specialized courses linking electrical engineering to such biomedical applications as neural signals and systems, bioeffects of electromagnetic fields, and therapeutic and diagnostic uses of bioelectric phenomena. Undergraduates may also undertake independent study in these areas.

Students interested in biomedical engineering may receive elective credit for two semesters of biology if they also complete two bioengineering courses from the ECEN/EEEN offerings. One of these ECEN/EEEN courses can also be used to satisfy course distribution requirements. The basic biomedical engineering option is thus composed of two semesters of biology and two ECEN/EEEN bioengineering courses taken in lieu of electives.

Students who wish to complete course requirements for medical (or dental, veterinary, etc.) school should add two semesters of organic chemistry to the ECEN/EEEN biomedical engineering option. Premedical ECEN/EEEN students may petition to have these courses substituted for other electives.

Interested students are urged to contact the departmental biomedical engineering advisor for additional information.

### BS/MS Program in Electrical and Computer Engineering

The concurrent BS/MS program in electrical and computer engineering enables especially well qualified EEEN and ECEN majors to be admitted to the MS program during the junior year of their BS program, and to work simultaneously towards BS and MS degrees in electrical engineering. This program allows for early planning of the MS portion of the student's education, taking graduate courses as part of the BS degree, more flexibility in the order in which courses are taken, and more efficient use of what would otherwise be a final semester with a light credit-hour load.

### Curriculum for BS (EE)

The following information may be changed by the time this catalog is printed and distributed. Up-to-date policies are contained in the department's *HELP! Guide*, which is given to students who enter the program.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers	4
CSCI 1300 Introduction to Computing	4
ECEN 1000 Freshman Seminar	1
PHYS 1110 General Physics	4
Humanities or social science elective (Note 1)	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers	4
CHEM 1221 General Chemistry Lab for Engineers	2
CHEN 1211 General Chemistry for Engineers	3
Freshman elective (Note 2)	3-4
Humanities or social science elective	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra	4
ECEN 2120 Computers as Components	5
ECEN 2250 Circuits/Electronics 1	5
Humanities or social science elective	3
<b>Spring Semester</b>	
APPM 2350 Calculus 3 for Engineers	4
ECEN 2260 Circuits/Electronics 2	5
ECEN 3100 Digital Logic	5
Humanities or social science elective	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
ECEN 3300 Linear Systems	5
ECEN 3400 Electromagnetic Fields and Waves	5
ECEN 3810 Introduction to Probability Theory	3
Free elective	2
<b>Spring Semester</b>	
ECEN 3250 Circuits 3	5
ECEN elective (Note 3)	3

PHYS 2130 Modern Physics	3
WRTG 3030 Writing on Science and Society	3
Free elective	3

### Senior Year

#### Fall Semester

ECEN elective	3
Humanities or social science elective	3
Two senior-level ECEN theory courses, one of which may be the ECE elective	6
Senior-level ECEN laboratory course	2
Technical elective (Note 4)	3

#### Spring Semester

ECEN 4610 or ECEN 4573 Capstone Design Lab (Note 5)	3
Senior-level ECEN theory course	3
Senior-level ECEN lab course	2
Humanities or social science elective	3
Technical electives (Note 4)	4
Minimum total hours for degree	128

### Curriculum for BS (ECE)

Freshman and sophomore years are the same as for BS (EE).

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Junior Year</b>	
<b>Fall Semester</b>	
CSCI 2270 Data Structures	4
ECEN 3300 Linear Systems	5
ECEN 3400 Electromagnetic Fields and Waves	5
ECEN 3810 Introduction to Probability Theory	3
<b>Spring Semester</b>	
CSCI 3155 Programming Languages	4
ECEN 3250 Circuits/Electronics 3	5
ECEN 4593 Computer Organization	3
WRTG 3030 Writing on Science and Society	3

### Senior Year

#### Fall Semester

ECEN 4573 Electrical and Computer Engineering Capstone Design Lab (Note 5)	3
One senior-level ECEN theory course or one of the ECE electives	3
Senior-level ECEN laboratory	2-3
PHYS 2130 Modern Physics	3
Humanities or social science elective	3
Free elective	2

#### Spring Semester

Technical elective (Note 4)	3
ECEN 4703 Switching and Finite Automata	3
Humanities or social science elective	3
Free elective	2
Technical elective	3
Minimum total hours for degree	128

### Curriculum Notes

- Humanities or social science elective courses must be selected from a list of approved courses available from the engineering dean's office. Of the 21 hours of required humanities or social science courses, at least 6 credit hours must be at the upper-division level (3000 or 4000 level).
- The freshman elective is chosen from ECEN 1400 Methods and Problems in ECE; EPOB 1210 and 1230 General Biology with Laboratory 1; GEEN 1400 Freshman Projects; CHEM 1131 General Chemistry 2; or the introductory course from any other engineering department.
- ECEN electives for the EE degree include a minimum of two of the following three courses: ECEN 3170 Energy Conversion 1, ECEN 3320 Semiconductor Devices, and ECEN 3410 Electromagnetic Waves and Transmission. The unused ECEN elective can be used as one of the three senior-level theory courses.
- The senior year technical electives provide breadth in the program and usually include courses in electrical engineering at the 3000, 4000, or 5000 levels. Courses in mathematics, physics, and other engineering areas at the same levels may be included with the permission of the student's advisor. A minimum grade point average of 2.85 is required for enrollment in any 5000-level course, and courses above this level are open to qualified graduate students only. The approval of the student's undergraduate advisor is required for all technical electives.

5. No EEEN or ECEN major is allowed to register for a capstone course (ECEN 4573 or 4610) until they have successfully completed all eight core courses (ECEN 2120, 2250, 2260, 3100, 3250, 3300, 3400, and 3810) with a grade of C- or better. ECE majors must also complete ECEN 4593 with a grade of C- or better before registering for the ECE Capstone course. Rosters for both capstone courses are checked at the beginning of each semester, and students who have not met the prerequisite requirement will be administratively dropped from the course for that semester.

### Career Opportunities

A degree in electrical engineering or electrical and computer engineering provides graduates the opportunity to enter the profession of engineering and to engage in work as a design, production, testing, consulting, research, teaching, or management professional in a wide variety of careers in the computer industry, telecommunications, instruments, the biomedical industry, aerospace, and academia. Some graduates also go on to develop careers in other professions like law and medicine.

Examples of career opportunities include development of new electrical or electronic devices, instruments, or products; design of equipment or systems; production and quality control of electrical products for private industry or government; sales or management for a private firm or government; and teaching and research in a university.

### Graduate Degree Programs

Electrical engineering graduate programs leading to ME, MS, and PhD degrees include the areas of communications and signal processing; system architecture of computers and other digital systems; control systems and robotics; electromechanical energy conversion and power electronics; electromagnetic fields and propagation; optics and microwave systems; optoelectronics; signal processing and biomedical applications; and integrated circuit design automation.

Close cooperation with the National Institute of Standards and Technology (NIST), the National Oceanographic and Atmospheric Administration (NOAA), and Colorado Front Range industrial organizations in communications, computers, and instrumentation enhances the graduate program, and both teaching and research capabilities are strengthened by the addition of adjunct faculty members from these institutions.

### Requirements for Advanced Degrees

A minimum undergraduate grade point average of 3.00 is required for application to the master's program. Minimum requirements for admission to the PhD program include a 3.35 undergraduate GPA, good GRE scores, and demonstration of research ability. Exceptional students with a BS degree can be directly admitted into the PhD program. Information and application forms may be obtained by writing to the University of Colorado at Boulder, Director of Graduate Admissions, Department of Electrical and Computer Engineering, 425 UCB, Boulder, CO 80309-0425. Qualified students in their senior year at the University of Colorado and within 18 hours of graduation may be admitted into the graduate program and apply graduate-level credit hours above the 128-semester-hour BS requirement toward an advanced degree. Students formally accepted into the graduate program are assigned to program advisors.

Master's students may choose either an MS thesis option under Plan I or a nonthesis option of 30 hours under Plan II. The ME program is discussed in the College of Engineering and Applied Science general section on graduate study.

All students accepted into the PhD program must take the PhD preliminary examination the first time it is offered (usually in January). The exam covers undergraduate electrical and computer engineering, computer science, math and physics, and a student's designated area of specialization. Further information is available in the ECE graduate office.

## Professional Certificate Programs

Professional Certificate Programs are offered in embedded systems, power electronics, and software engineering. For more information, see Professional Certificate Programs in the Graduate School section.

## Research Centers

### Colorado Center for Information Storage (CCIS)

Information storage goes beyond disk drives—the explosive growth of storage has led to technologies that increase reliability, improve performance, and reduce management complexity. The main costs of large storage systems are now management and failure due to human faults. Computer and storage systems are critical to modern society, and the CCIS is working to develop tools that make storage easier to manage and more reliable.

Modern storage devices operate at the scale of microns and provide gigabytes of storage; future storage technologies use nanotechnologies and new materials that span all branches of engineering. Advances in magnetic RAM and atomic resolution storage will change the way we listen to music and watch movies, and will revolutionize information storage for medical images and other large databases.

The research and education at the Colorado Center for Information Storage is improving existing storage devices, exploring the storage systems of the future, and inventing software to make that storage more useful.

Established in 1998, the CCIS is an interdisciplinary academic center for education and research in all aspects of information storage. Faculty and student members span many departments in engineering, from electrical and computer engineering to computer science, mechanical engineering, engineering physics, and aerospace engineering. The goal of this educational and research center is to unite graduate students with faculty, undergraduate students, and practicing engineers to advance the state of the art of information storage. For more information call 303-492-0598 or visit [ccis.colorado.edu](http://ccis.colorado.edu).

### Colorado Power Electronics Center (CoPEC)

Since it was founded in 1983, the power electronics group at the University of Colorado has maintained a tradition of innovative design-oriented and application-driven research. Colorado Power Electronics Center (CoPEC) activities now span the range of applications from high-efficiency milliwatt converters for portable battery-operated systems, to hundreds or thousands of watts for computer, aerospace, telecommunications, medical, and automotive power conversion, to hundreds of kilowatts for wind generation systems.

Our current research activities include projects in high-efficiency, high-power converter technology, power electronics for portable, battery-operated systems, converter modeling and computer-aided analysis, low harmonic rectifier technology for single-phase and three-phase applications, and advanced control techniques and their mixed-signal ASIC implementation. We collaborate with other research groups at the University of Colorado, including those in machines and power systems, microelectronics packaging, EMI, control, and semiconductor devices. For more information call 303-492-7327 or visit [ece.colorado.edu/~pwrelect](http://ece.colorado.edu/~pwrelect).

### Optoelectronics Computing Systems Center (OCSC)

The OCSC was founded in 1986 as a National Science Foundation engineering research center to exploit the advantages of optics and optoelectronics for computing and signal processing. It continues today as an interdisciplinary research center blending engineering, physics, and chemistry.



The OCSC integrates teaching and research in optics, optoelectronics, and photonics as they apply to nanotechnology, multi-dimensional signal processing, bioengineering, and telecommunications. Education is a primary focus within the center. The OCSC participates in the Optical Science and Engineering Program (OSEP) created by a National Science Foundation IGERT grant. This five year, \$2.5 million program is a graduate training regimen designed to train a future workforce in the field of optics. In-depth technical knowledge, laboratory problem solving skills, and teamwork are all stressed in this interdisciplinary PhD degree program. Innovative undergraduate education is also emphasized. The NSF currently sponsors a team of OCS researchers to develop novel multimedia educational modules for undergraduate education. These modules are intended to complement an already existing core optics curriculum.

The center's research has also resulted in numerous industrial interactions. The Rocky Mountain region has become internationally known for photonics and the OCSC has spawned many of these companies from its ranks. Faculty members work with industrial partners on joint research and development projects creating a synergy that often results in the advancement of optics technology. The OCSC founded the Center for Advanced Photonics Technology through a \$4.4 million state legislature appropriation and helped establish the Colorado Photonics Industry Association. For more information call 303-492-5069 or visit [www-ocs.colorado.edu](http://www-ocs.colorado.edu).

## Research and Instructional Equipment

The department's special equipment and facilities include a class 1000 clean room facility for epitaxial growth and fabrication of microwave and optical devices; high-vacuum and vacuum deposition equipment for thin-films research; an integrated circuits laboratory; ion implantation equipment; crystal growing facilities; a modern systems laboratory; a laboratory for data storage research; a digital system design laboratory; a power electronics design laboratory; undergraduate laboratories in circuits, electronics, and energy conversion; a holography and optics laboratory; an advanced optical metrology lab; numerous special purpose computers; mini- and microprocessors and a computer laboratory; a roof-mounted antenna range; a special microscope for laser manipulation of microorganisms *in vivo*; and a bio-microwave laboratory.

The Department of Electrical and Computer Engineering has a large variety of computing equipment to support its research and instructional activities. In addition to specialized computing equipment, this includes several hundred PC, Macintosh, and SUN computers. These machines are connected to the campuswide ethernet network.

## Engineering Physics

### Bachelor's Degree Requirements

The engineering physics program focuses on the foundations of modern technology. The program prepares students for research, development, and entrepreneurial careers in many frontier areas of engineering, including quantum devices, ultra fast lasers, adaptive optics, cryogenic electronics, computer simulation of physical systems, solar cells, magnetic storage technology, micro-mechanical systems, and molecular electronics. All students study the core theoretical subjects of mechanics, electricity and magnetism, thermal physics, and quantum mechanics, supplemented by courses in mathematics, computation, and laboratory technique. The program can be tailored to a student's interests through electives in engineering, physics, or other sciences.

During the freshman and sophomore years, students receive a broad introduction to physics and chemistry as well as five semesters of applied mathematics and mathematical methods in physics. Starting in the junior year, students take a full year of electrodynamics, a year of quantum mechanics, a semester of classical mechanics, a semester of thermodynamics and statistical mechanics, a year of physical chemistry, and an additional semester of advanced mathematics. Significant laboratory experience is available through the required Junior Laboratory (PHYS 3330) and through elective laboratories in physical optics and modern physics. The Advanced Laboratory (PHYS 4340) provides students with hands-on experience with optical spectroscopy, nuclear magnetic resonance, scanning tunneling microscopy, and laser cooling and trapping of atoms, among many other experiments. Laboratory courses emphasize student-developed and -designed independent projects where students use the knowledge acquired to build apparatus of their own choosing. The program encourages the formation of student research collaborations with faculty in the pursuit of senior thesis projects. Recent projects include research in pulsed laser deposition of high-temperature superconductors, electron diffraction studies of protein structure, and lattice distortion theory of colossal magnetoresistance materials.

The College of Engineering and Applied Science, in cooperation with the Leeds School of Business, offers two different engineering physics degree plans. The first leads to a bachelor of science (BS) degree in four years; the purpose of this plan is to give the engineering student thorough and fundamental training in physics and its applications. The second program leads to a dual BS degree in engineering physics and business in five years. Dual advising is provided for the five-year program.

Additional information about the bachelor's degree in engineering physics may be obtained from the physics department, Duane Physics E-1B32, by phone at 303-492-6952, or via the Web at [www.colorado.edu/physics](http://www.colorado.edu/physics).

For purposes of federal civil service requirements, this is an engineering degree from an accredited college of engineering. Students who plan to become registered professional engineers should check the requirements for registration in their state before choosing their engineering electives.

In order to earn a bachelor's degree in engineering physics, students must complete the curriculum in the undergraduate major programs available through the Department of Physics. (Some variations may be possible; see an engineering physics advisor.) In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science. Specifically included in the general requirements is the achievement of a GPA of at least 2.00 in the student's physics courses.

The Department of Physics offers a minor in physics. A detailed plan can be obtained in the physics office, Duane Physics, E-1B32.

### Curriculum for BS (E Phys)

Below is a suggested schedule only. For a complete description of the engineering physics course requirements, see the booklet *Undergraduate Major Programs* available from the Department of Physics.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers .....	4
CSCI 1300 Computer Science 1: Programming .....	4
PHYS 1110 General Physics 1 .....	4
Humanities or social science electives (Note 1) .....	6

**Spring Semester**

APPM 1360 Calculus 2 for Engineers	4
AREN 1017 Engineering Drawing or MCEN 1025 Computer-Aided Drawing and Fabrication	2-3
PHYS 1120 General Physics 2	4
PHYS 1140 Experimental Physics	1
Humanities or social science elective (Note 1)	3

**Sophomore Year****Fall Semester**

APPM 2350 Calculus 3 for Engineers	4
CHEM 1221 General Chemistry Lab for Engineers (Note 4)	2
CHEM 1211 General Chemistry for Engineers (Note 4)	3
PHYS 2140 Methods of Theoretical Physics	3
Elective (Note 2)	3

**Spring Semester**

APPM 2360 Introduction to Differential Equations with Linear Algebra	4
PHYS 2150 Experimental Physics	1
PHYS 2170 Modern Physics	3
Elective (Note 2)	3
Humanities or social science elective (Note 1)	3

**Junior Year****Fall Semester**

CHEM 4511 Physical Chemistry 1 (Note 4)	3
PHYS 3210 Analytical Mechanics	3
PHYS 3310 Principles of Electricity and Magnetism 1	3
PHYS 3330 Junior Laboratory	2
Upper-division mathematics elective	3
Elective (Note 2)	3

**Spring Semester**

CHEM 4541 Physical Chemistry Lab (Note 4)	2
PHYS 3220 Quantum Mechanics	3
PHYS 3320 Principles of Electricity and Magnetism 2	3
Physics elective (Note 3)	6
Elective (Note 2)	3

**Senior Year****Fall Semester**

PHYS 4230 Thermodynamics and Statistical Mechanics	3
PHYS 4410 Atomic and Nuclear Physics	3
Electives (Note 2)	8
WR TG 3030 Writing on Science and Society	3

**Spring Semester**

Engineering electives (Note 2)	10-12
Physics electives (Note 3)	3-5
Humanities or social science elective (Note 1)	3
Minimum total hours for the degree	128

**Curriculum Notes**

- A total of 18 credit hours of humanities or social science courses is required. At least 6 of these semester hours must be at the upper-division (3000 or 4000) level and must include any 3000-level WR TG writing course or HUEN 3100 and HUEN 3200. The remaining courses are to be selected from the College of Engineering's list of approved humanities and social science courses.
- Engineering electives: 17–20 engineering elective hours above and beyond the required courses for engineering physics plan 4, including one upper-division laboratory course. Total hours required in engineering electives plus the required computer sciences and drafting hours: 25.
- Physics electives (9 hours minimum with a research participation component) must be chosen from the following list: PHYS 3340 (lab), 4430 (lab), 4150, 4340, 4420, 4450, 4510, 4610-4630, 4810-4830, 4840-4860, 4970, 5010, 5130, 5770.
- Chemistry requirements: 10 hours. First 5 credit hours: CHEM 1211-3 and CHEM 1221 (or CHEM 1111). Second 5 credit hours: CHEM 4511-3 and CHEM 4541-2 (or CHEM 1131).

**Environmental Engineering**

The bachelor of science degree program in environmental engineering includes course work in advanced mathematics, biology, chemistry, and physics. In common with other engineering fields, courses in solid mechanics, fluid dynamics, and thermal sciences are central to the environmental engineering degree.

Course work specific to environmental engineering includes water and wastewater treatment, hazardous waste storage and treatment, and air pollution control.

To cover the broad base of knowledge required of environmental engineers, the degree program at CU-Boulder draws on the expertise of more than 20 faculty from four departments: aerospace engineering; civil, environmental, and architectural engineering; chemical engineering; and mechanical engineering. The required engineering courses in the program are offered in these four departments.

Technical elective courses include three selected from a broad range of science and engineering courses, and four that are organized according to tracks in water and wastewater engineering, air quality engineering, chemical processing, applied ecology, and general environmental engineering.

Students in the program are also encouraged to participate in summer internships and in research at CU-Boulder through independent study projects, the Undergraduate Research Opportunities Program (UROP), or as research assistants in sponsored programs.

**Curriculum for BS (Environmental Engineering)****Required Courses** **Semester Hours****Freshman Year****Fall Semester**

APPM 1350 Calculus 1 for Engineers	4
CHEM 1221 General Chemistry Lab	2
CHEM 1211 General Chemistry	3
GEEN 1300 Introduction to Engineering Computing	3
EVEN 1000 First-Year Seminar in Environmental Engineering	1
Humanities or social science elective (Note 1)	3

**Spring Semester**

APPM 1360 Calculus 2 for Engineers	4
GEEN 1400 First-Year Engineering Projects	3
PHYS 1110 General Physics 1	4
Humanities or social science elective (Note 1)	3
Technical elective (Note 2)	3

**Sophomore Year****Fall Semester**

APPM 2350 Calculus 3 for Engineers	4
CHEM 2120 Material and Energy Balances	3
PHYS 1120 Physics 2	4
PHYS 1140 Experimental Physics	1
Humanities or social science elective (Note 1)	3

**Spring Semester**

APPM 2360 Differential Equations	4
CHEM 4511 Physical Chemistry	3
CVEN 3414 Introduction to Environmental Engineering	3
Mechanics (Note 3)	3
Humanities or social science elective (Note 1)	3

**Junior Year****Fall Semester**

CHEM 3311 Organic Chemistry 1	4
CHEM 3321 Organic Lab	1
CHEM 3320 Thermodynamics (Note 4)	3
Fluid Mechanics 1 (Note 5)	3
Probability and Statistics (Note 8)	3
Required communication course (Note 1)	3

**Spring Semester**

CHEM 3220 Chemical Engineering Separations and Mass Transfer	3
CVEN 3454 Water Chemistry	4
Heat Transfer (Note 7)	3
Option course (Note 6)	3
Humanities or social science elective (Note 1)	3
Free elective (Note 1)	1

**Senior Year****Fall Semester**

CVEN 4434 Environmental Engineering Design .....	3
CVEN 4484 Environmental Microbiology .....	3
Numerical Methods (Note 10) .....	3
Option course (Note 6) .....	3
Technical elective (Note 2) .....	3

**Spring Semester**

CVEN 4333 Hydrology .....	3
MCEN 4121 Air Pollution Control .....	3
Option course (Note 6) .....	3
Option course (Note 6) .....	3
Technical elective (Note 2) .....	3
Minimum total hours for all tracks .....	128

**Curriculum Notes**

1. A total of 18 credit hours of humanities and social sciences electives is required. At least 6 hours must be at the upper-division (3000 or 4000) level. WRTG 3030 or GEEN 3000 may be counted toward 3 hours of upper-division humanities and social science elective credit.
2. The first technical elective course may be a lower-division environmental science elective in atmospheric science, biology, ecology, or geology. The remaining technical elective courses should be 3000/4000 level courses in engineering, mathematics, or the sciences, and have substantially different content than required courses.
3. Mechanics: CVEN 2121 Analytical Mechanics 1 or MCEN 2023 Mechanics of Particles.
4. Thermodynamics Option: CHEN 3320 required for the Chemical Processing Option; MCEN 3012 required for the Air Quality Option.
5. Fluid Mechanics 1: CVEN 3313, MCEN 3021, or CHEN 3200.
6. A list of option courses for the water and wastewater, air quality, and chemical processing tracks is available in the program office.
7. Heat Transfer: MCEN 3022 or CHEN 3210.
8. Probability and Statistics: CVEN 3227, CHEN 3010.
9. Numerical Methods: MCEN 4030, CHEN 4580.

**Mechanical Engineering****Bachelor's Degree Requirements**

Mechanical engineering is a broad engineering discipline that incorporates skills and expertise in the areas of design, manufacturing, mechanics, and thermal sciences that are essential to most sectors of industry and society. The overall objective of the undergraduate program in mechanical engineering is to prepare graduates to practice effectively in the field or to further their careers through advanced study.

Each graduate of the mechanical engineering program is expected to possess the abilities and knowledge to:

- apply knowledge of mathematics, science, and engineering;
- identify, formulate, and solve engineering problems;
- use computers to solve engineering problems;
- use modern instrumentation;
- design and conduct experiments;
- analyze and interpret data;
- design thermal systems, components, or processes to meet desired needs;
- design mechanical systems, components, or processes to meet desired needs;
- understand the processes used to manufacture products;
- understand contemporary issues in mechanical engineering;
- make effective oral presentations;
- write effectively;
- function effectively on multi-disciplinary teams;
- understand professional and ethical responsibility;

- understand the impact of engineering in a global and societal context; and

- engage in lifelong learning.

The undergraduate curriculum in mechanical engineering incorporates engineering science, physical science, mathematics, and the humanities and social sciences. The engineering science component provides basic theoretical and practical concepts in solid mechanics, materials, thermodynamics, fluid mechanics, design, and manufacturing. Required courses in engineering science, physical science, and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the profession and comprise three-fourths of the minimum curriculum requirement of 128 semester hours; they are complemented by four technical electives, six electives in the humanities and social sciences, and a free elective.

Options in environmental and biomedical engineering are available for students interested in these interdisciplinary areas. Space in the mechanical engineering program is limited; some restrictions may apply.

**Minor in Mechanical Engineering**

A minor in mechanical engineering can be earned in conjunction with any major in the College of Engineering and Applied Science and with some majors in other colleges. Space in the mechanical engineering program is limited; some restrictions may apply. Eighteen credits are required in mechanical engineering, including 9 credits in three required courses. The other 9 hours may be satisfied by mechanical engineering prerequisites, or by other mechanical engineering courses of the student's choosing, if prerequisite requirements are met by the equivalent courses.

<i>Required Courses</i>	<i>Semester Hours</i>
MCEN 2063 Mechanics of Solids .....	3
MCEN 3022 Heat Transfer .....	3
MCEN 3025 Component Design .....	3

At least four mechanical engineering courses must be taken at CU-Boulder.

A cumulative grade point average (GPA) of 2.00 or better is required in the courses that are used to satisfy this requirement. Each individual course that is counted toward these degree requirements must be passed with a D- or better. Note, however, that a C- or better is required in all prerequisite courses to go on to a subsequent course.

To sign up for this program, obtain a form from the mechanical engineering undergraduate advising coordinator in ECME 132, **303-492-8483**.

**Curriculum for BS (ME)**

The following constitutes a representative course schedule for freshmen entering the program in fall 2001 or later.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers .....	4
CHEM 1221 General Chemistry Laboratory for Engineers .....	2
CHEN 1211 General Chemistry for Engineers .....	3
GEEN 1300 Introduction to Engineering Computing .....	3
MCEN 1000 Introduction to Mechanical Engineering .....	1
Humanities or social science elective .....	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers .....	4
GEEN 1400 First-Year Engineering Projects .....	3
MCEN 1025 Computer-Aided Drawing and Fabrication .....	3
PHYS 1110 General Physics 1 .....	4

Humanities or social science elective .....	3
<b>Sophomore Year</b>	
<i>Fall Semester</i>	
APPM 2350 Calculus 3 for Engineers .....	4
MCEN 2023 Statics and Structures .....	3
PHYS 1120 General Physics 2 .....	4
PHYS 1140 Experimental Physics .....	1
Humanities or social science elective .....	3
<i>Spring Semester</i>	
APPM 2360 Introduction to Differential Equations with Linear Algebra ...	4
MCEN 2024 Materials Science .....	3
MCEN 2063 Mechanics of Solids .....	3
PHYS 2130 General Physics 3 or general science elective .....	3
Humanities or social science elective .....	3
<b>Junior Year</b>	
<i>Fall Semester</i>	
MCEN 3012 Thermodynamics .....	3
MCEN 3017 Circuits and Electronics .....	3
MCEN 3021 Fluid Mechanics .....	3
MCEN 3043 Dynamics .....	3
WRGT 3030 Writing on Science and Society .....	3
Free elective .....	3
<i>Spring Semester</i>	
MCEN 3022 Heat Transfer .....	3
MCEN 3025 Component Design .....	3
MCEN 3027 Measurements Laboratory .....	3
MCEN 3030 Computational Methods .....	3
Humanities or social science elective .....	3
<b>Senior Year</b>	
<i>Fall Semester</i>	
MCEN 4026 Manufacturing Processes and Systems .....	3
MCEN 4042 Thermal Systems Design .....	3
MCEN 4043 System Dynamics .....	3
Technical electives .....	3
<i>Spring Semester</i>	
MCEN 4027 Mechanical Engineering Laboratory .....	3
MCEN 4085 Mechanical Engineering Design Project 2 .....	4
Technical electives .....	9
Minimum total hours for degree .....	128

## Graduate Degree Programs (ME)

The department offers master of science (MS) and doctor of philosophy (PhD) degree programs to students whose career plans include advanced practice, research and development, and/or teaching at the college or university level.

The combined BS/MS program allows qualified students to simplify obtaining the MS degree. Up to 6 hours of appropriate courses may be used to satisfy both degrees. Students may apply for this program in their junior year.

Students pursuing the degree of master of science in mechanical engineering may follow either Plan I, which requires the writing of a thesis, or Plan II, which involves only course work. A student following Plan I must complete a minimum of 21 semester hours of course work and 6 semester hours of thesis work; at least 15 semester hours of the course work must be in the mechanical engineering department. A student following Plan II must complete a minimum of 30 semester hours of course work, of which at least 18 semester hours must be in the mechanical engineering department. Up to 9 semester hours of graduate course work may be transferred from another accredited institution as long as those hours were not used to satisfy another degree requirement. All students must pass a comprehensive examination covering the course work and, if applicable, the thesis. Students should consult with an academic advisor to decide what course of study best meets their academic objectives.

A student pursuing the PhD in mechanical engineering must complete a minimum of 12 semester credit hours in courses numbered 5000 or above, beyond the MS degree requirements, as well as 30 semester hours of thesis work; at least 21 semester hours of the course work must be in the mechanical engineering department. Up to 21 semester hours of graduate course work may be transferred from another accredited institution; there is no credit limit for appropriate courses taken at the University of Colorado, such as those taken for the master of science degree.

Every student desiring to pursue the PhD degree must first pass a preliminary examination. As a part of this evaluation, students must do well in a number of required courses and pass an oral examination designed to test research and fundamental mechanical engineering competency. The examination will be given by committees of at least three faculty members. Overall performance in the required course work and oral examination will determine *pass/fail* status. The oral examination may be taken in lieu of the comprehensive examination required for the master of science degree.

After passing the preliminary examination, students continue their course work and prepare a written thesis prospectus. When ready, they take an oral comprehensive examination covering the graduate course work and the thesis prospectus. After passing the comprehensive examination, students are admitted into the PhD program and conduct original research required to satisfy the thesis requirement. This research culminates in the writing of the thesis, which students defend in a final examination.

PhD students are assigned an academic advisor to review their progress toward the degree. Students are expected to meet with the advisor at least once each semester prior to registration. Once students have selected a research topic for the thesis, academic advising is done by their thesis advisor. Additional information on graduate study may be found in the Graduate School section.

## Graduate Research

Research activities focus on the three major disciplinary areas of the department: fluid mechanics/thermal sciences, solid mechanics/material sciences, and design and manufacturing. There are three interdisciplinary research centers hosted by the department involving faculty from mechanical engineering and other departments, postdoctoral researchers, and graduate students.

**The Center for Advanced Manufacturing and Packaging for Microwave, Optical, and Digital Electronics** is an NSF Industry-University Cooperative research center funded by NSF and a consortium of contributing companies to support path-finding research and educational programs on the manufacturing and packaging of integrated microwave, optical, and digital electronic systems. The focus of effort is in electrical and mechanical modeling, thermal management, fabrication and assembly, functional design and analysis, run-to-run and real-time process control, test and measurement, and reliability and cost prediction. In addition, the center has established a leading research program in micro-electro-mechanical systems (MEMS).

**The Interdisciplinary Research Center for MicroElectronic Devices in Cardiovascular Applications (MEDICA)** fosters excellence and scientific advancement in the study and use of microdevices in cardiovascular applications. In fulfillment of the center's mission, the faculty from CU-Health Sciences Center are combining their clinical experience with the engineering expertise of the faculty in the college at CU-Boulder to develop enabling tools for early diagnosis and improvement in cardiovascular treatment. State-of-the-art MEMS (micro-electro-mechanical systems) will be deployed as sensors and actuators.

**The Joint Center for Combustion and Environmental Research** advances combustion and environmental science and technology through research and educational activities. Current research

includes projects in the areas of wildfire modeling, flame treatment of materials, large-scale numerical modeling of flames, urban air pollution modeling, indoor air pollution, biomass fuels, microgravity combustion, micro-mechanical power generation systems, and disease transmission.

## Telecommunications

This interdisciplinary graduate curriculum offers a master of engineering or master of science degree to students from a variety of undergraduate backgrounds. Both degree programs ensure that students obtain an understanding of the latest aspects of technology, as well as social, economic, and business applications in the expanding field of telecommunications. This understanding is gained through course work, research, and laboratory studies. For information about the Interdisciplinary Telecommunications Program, see the Interdisciplinary Programs in the Graduate School section.

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# Graduate School

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school web site: [www.colorado.edu/graduateschool](http://www.colorado.edu/graduateschool)

**G**RADUATE WORK at the University of Colorado began on a small scale in 1892. Following years of development, the Graduate School was organized in 1909 with a separate faculty. Each of the four campuses of the University of Colorado system now offers graduate degree programs, and a dean is in residence on each campus. The Graduate School at CU-Boulder is governed by its own set of Graduate School Rules.

## Degrees

The Graduate School of the University of Colorado at Boulder offers instruction leading to the following advanced degrees:

- Master of Arts (MA)
- Master of Engineering (ME)
- Master of Fine Arts (MFA)
- Master of Music (MMus)
- Master of Music Education (MMusEd)
- Master of Science (MS)
- Doctor of Musical Arts (DMusA)
- Doctor of Philosophy (PhD)

### MA degree programs in:

- Anthropology
- Art History
- Classics
- Communication
- Comparative Literature
- East Asian Languages and Cultures
- Economics
- Education
- English
- Environmental, Population, and Organismic Biology
- Fine Arts
- French
- Geography
- German
- History
- Journalism
- Linguistics
- Mathematics
- Molecular, Cellular, and Developmental Biology
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Sociology
- Spanish
- Speech, Language, and Hearing Sciences
- Theatre

### ME degree programs in:

- Aerospace Engineering Sciences
- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering
- Engineering Management
- Mechanical Engineering
- Telecommunications

### MFA degree programs in:

- Dance
- Fine Arts

### MMus

### MMusEd

### MS degree programs in:

- Aerospace Engineering Sciences
- Applied Mathematics
- Astrophysical and Planetary Sciences
- Atmospheric and Oceanic Sciences
- Business Administration
- Chemical Engineering
- Chemistry
- Civil Engineering
- Computer Science
- Electrical Engineering
- Environmental Studies
- Geological Sciences
- Kinesiology
- Mathematics
- Mechanical Engineering
- Museum and Field Studies
- Physics
- Telecommunications

### DMusA

### PhD degree programs in:

- Aerospace Engineering Sciences
- Anthropology
- Applied Mathematics
- Astrophysical and Planetary Sciences
- Atmospheric and Oceanic Sciences
- Business Administration
- Chemical Engineering
- Chemical Physics
- Chemistry
- Civil Engineering
- Classics
- Cognitive Science
- Communication
- Comparative Literature
- Computer Science
- Economics



Education  
 Electrical Engineering  
 English  
 Environmental, Population, and Organismic Biology  
 Environmental Studies  
 French  
 Geography  
 Geological Sciences  
 Geophysics  
 History  
 Journalism (through Communication track)  
 Kinesiology  
 Linguistics  
 Mathematics  
 Mechanical Engineering  
 Molecular, Cellular, and Developmental Biology  
 Music  
 Neuroscience  
 Philosophy  
 Physics  
 Political Science  
 Psychology  
 Sociology  
 Spanish  
 Speech, Language, and Hearing Sciences  
 Theatre

Inquiries regarding admission to graduate programs should be addressed to the graduate department in which the applicant wishes to study (see the *University of Colorado at Boulder Directory* for campus addresses or see [www.colorado.edu](http://www.colorado.edu)).

### Concurrent Bachelor's/Master's Degree Programs

Concurrent BS/MS and BA/MA degree programs are offered in several departments at CU-Boulder. These programs allow a student to receive both a bachelor's and master's degree in five years of study without compromising the academic integrity of either degree.

Currently approved concurrent degree programs in arts and sciences include: applied mathematics, classics, cognitive psychology, East Asian languages and cultures, EPO biology, Germanic studies, French, linguistics, kinesiology, and mathematics; in business, accounting/accounting, finance/accounting, information systems/accounting, information systems/telecommunications; and all departments in engineering.

These concurrent degree programs are open only to highly qualified CU-Boulder undergraduates. Students are formally admitted at the end of their sophomore year or the beginning of their junior year. They are admitted through the admission procedure of their department and do not go through the normal process of admission to Graduate School. When students have completed the program requirements, they receive both a bachelor's and a master's degree simultaneously. Students wishing to continue studying toward a doctorate must formally apply for admission to the Graduate School.

Students interested in a concurrent bachelor's/master's program should inquire in the department.

### Academic Excellence

#### Scholarships and Fellowships

CU-Boulder administers various forms of financial assistance for graduate students: fellowships, traineeships, scholarships, research and teaching assistantships, and awards from outside agencies.

The Graduate School offers University of Colorado fellowships, diversity fellowships, chancellor's graduate fellowships, and Colorado graduate need grants.

**University of Colorado fellowships** are awarded to entering and continuing regular degree-seeking graduate students on the basis of academic promise or academic success. Students holding these fellowships must reapply each year to their department for renewal.

**The Chancellor's Graduate Fellowship Program**, instituted in 1984–85, attracts outstanding students for graduate study at the University of Colorado. Selected students receive a stipend of \$16,500 for two academic years and a full waiver of all tuition and fees. Recipients must be entering master's or doctoral degree students and be nominated by their department.

Additional fellowships are available from private sources. Fellowships, traineeships, and scholarships are also offered by some departments. Applications for financial support are due in the departments by the announced deadlines; most departments must receive applications by January 15.

For more about assistantships, see Financial Aid for Graduate Study. For information, contact the fellowship coordinator in the Graduate School.

### Academic Standards

#### Grade Point Average

A student is required to maintain at least a *B* (3.00) average in all work attempted while enrolled in the Graduate School, and must have at least a 3.00 cumulative average to receive a graduate degree.

#### Nonacceptable Grades

1. A student who receives a grade of *C* or below in a course may petition to repeat that course once, provided the course has not been previously applied toward a degree.
2. Courses in which grades below *B-* (2.70) are received are not accepted for doctoral programs.
3. Courses in which grades below *C* (2.00) are received are not accepted for master's degree programs or for the removal of academic deficiencies.
4. Courses taken toward the fulfillment of requirements for graduate degrees may not be taken *pass/fail*.

#### Probation and Suspension

A student whose cumulative grade point average (GPA) falls below 3.00 is placed on academic probation. The student has two semesters in which to raise the cumulative GPA to 3.00 or above. If the student's cumulative GPA is at or below 2.50, a dean's administrative stop is placed on the student's record, and the student may be withdrawn from course work for upcoming semesters.

If, after the two-semester probationary period, the student's cumulative GPA is still below 3.00 or if other conditions placed by the major department or Graduate School are not met, a dean's administrative stop will be placed on the student's record and he or she may be subject to dismissal.

A provisionally admitted student whose GPA falls below 3.00 has a dean's administrative stop placed on his or her record pending a review by the major department and the Graduate School.

## No Credit

Course work to be applied toward an advanced degree may not be taken for *no credit*. Courses taken for *no credit* cannot be used toward the minimum credit load requirement for full-time or half-time status.

## Pass/Fail

No course work to be applied toward an advanced degree may be taken *pass/fail*.

## Student Ethics

Students are expected to adhere to the highest codes of personal and professional ethics. Students who do not adhere to written guidelines regarding academic honesty and/or academic or research ethics may be dealt with according to the appropriate policy documents. Students found guilty of misconduct in any of these areas may have sanctions imposed, or may be dismissed from CU-Boulder.

## Admission and Enrollment Policies

### Application Procedures

Students seeking admission to a CU-Boulder master's or doctoral program apply directly to the appropriate department, not the Graduate School. An applicant for admission must present complete application materials that include:

1. Part I and part II of the graduate application, available from academic departments.
2. Two official transcripts of all academic work completed to date.
3. A \$50 nonrefundable application fee (check or money order). No application will be processed unless this fee is paid. The fee for the application for international students is \$70.
4. Four letters of recommendation.
5. Test scores and other materials as required by specific departments.

A completed application must be in the major department by the published deadline for the term for which admission is sought. Most departments require a much earlier application deadline. Qualified applicants may find that their application cannot be processed for a specific term if enrollment levels have been reached.

International students coming from abroad should have complete applications on file in the Office of Admissions before December 1 for the fall semester and October 1 for the spring semester. International students currently studying in the United States should follow deadlines set for U.S. citizens.

### Admission Requirements

A graduate student may be admitted to CU-Boulder as either a regular degree student or a provisional degree student.

#### *Regular Degree Students*

Qualified students may be recommended for admission to regular degree status by approved programs of the Graduate School provided they meet the following criteria:

1. They hold a baccalaureate degree from an accredited college or university or have done work equivalent to that required for such a degree.

2. They show promise of ability to pursue advanced study and research, as judged by their scholastic record.

3. They have had adequate preparation to enter graduate study in the chosen field.

4. They have at least a 2.75 (on a 4.00 scale) undergraduate grade point average (for engineering, 3.00). (Note: Applicants who cannot meet criterion 4 may still secure regular admission if they have completed 9 semester hours of relevant graduate course work with at least a 3.25 average.)

5. They meet additional requirements for admission established by the major department.

#### *Provisional Degree Students*

Students who do not meet the requirements for admission as regular degree students may be recommended for provisional degree status by their major department. With the concurrence of the dean of the Graduate School, these students are admitted for a probationary term of either one or two semesters of full-time study (or the equivalent for part-time students). At the end of the specified probationary period, provisional degree students must be either admitted to regular degree status or dismissed from the graduate program. Provisional students are subject to the same standards of performance required of regular degree students, plus any other requirements imposed by the program faculty as conditions of admission.

Credit earned by persons in provisional degree status may count toward a degree at CU-Boulder.

To meet the standard terms of provisional admission, the student must complete 12 hours in two semesters (or equivalent for part-time students) with a 3.25 cumulative GPA. Program faculty may recommend additional or alternative conditions as appropriate.

#### *Admission to a Concurrent Bachelor's/ Master's Degree Program*

A number of CU-Boulder departments offer concurrent bachelor's/master's degrees, which enable CU undergraduate students to pursue undergraduate and graduate programs simultaneously and to receive both degrees in a shorter time period than it would take to pursue them separately.

Highly qualified undergraduate students may be recommended for admission to a concurrent bachelor's/master's degree program at the end of their sophomore year or the beginning of their junior year. Such students are not formally admitted to the Graduate School. Standards for admission as well as eligibility to remain in the program are specified in each department's program guide.

#### *Admission to a Dual Master's Degree Program*

The Graduate School, in conjunction with the faculty of each department and the deans of schools and colleges where appropriate, approves dual master's degree programs that combine previously approved graduate degree programs in two areas or departments.

Qualified graduate students may be recommended for admission to an approved dual degree program upon meeting the qualifications of each graduate program and any special qualifications as outlined by each program's approved guidelines. Minimum standards and qualifications for admission and continuation may be found in each department's approved program guide. Students wishing to complete degrees in more than one department that have no approved dual degree program or interdisciplinary major combination must complete all the requirements for both degrees with no shared or overlapping course work.

### *Admission of Seniors*

A CU-Boulder senior who is not pursuing the concurrent bachelor's/master's degree, but who has satisfied the undergraduate residence requirement and does not need more than 6 semester hours of advanced subjects to meet the requirements for a bachelor's degree, may be admitted to the Graduate School.

### *Admission of Nondegree Students to Regular Degree Status*

Students with nondegree status who wish to apply for regular student status must complete their application for admission before completing 9 semester hours as nondegree students at CU-Boulder.

### *Admission of Former and Suspended Students*

Students who were previously admitted to a graduate degree program but who did not complete that degree and who have not been continuously registered at CU-Boulder must complete the following steps before being readmitted:

1. Clarify their status with the department to determine their eligibility to return and pursue the same degree.
2. Submit an application to the department (departmental approval is required) before enrollment levels are met or deadlines passed for the term in which they expect to return to CU-Boulder.

A regular degree student who is dismissed for failure to maintain a 3.00 grade point average is eligible to apply for readmission after one year. Approval or rejection of this application rests jointly with the student's major department and the dean of the Graduate School. The final decision will be made by the dean based on the recommendations of the department.

### *Students Transferring from Other CU Campuses*

Students transferring from another CU campus to CU-Boulder must apply to and be accepted by the Boulder campus.

### *Students Changing Major Departments*

Students who want to change major departments must apply to and be accepted by the new department. Students must also be released from their previous program by sending a notification signed by the previous program's faculty administrator to the Office of Admissions, except when adding a second major in an approved interdisciplinary major combination.

### *Admission of Faculty Members*

No member of the faculty above the rank of instructor may be working toward an advanced degree from CU-Boulder.

## Credit Policies

### *Transfer Credit*

Transfer credits from accredited institutions are accepted by CU-Boulder only after approval by the department chair/program director and the dean of the Graduate School, and under conditions outlined below. Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system. Students seeking a degree from CU-Boulder must complete the majority of their course work while enrolled as degree-seeking students.

The following rules apply to transferring credit to CU-Boulder graduate programs:

1. The maximum amount of work that may be transferred to CU-Boulder depends upon the graduate degree sought (individual departments may have more restrictive limits).

<i>Degree</i>	<i>Semester Hours</i>
MA, ME, MS, MMus, MMusEd, or DMA	9
MFA	18
PhD	21

2. Work already applied toward a graduate degree received from CU-Boulder or another institution cannot be accepted for transfer toward another graduate degree of the same level at CU-Boulder. In addition, work completed for a doctoral degree may not be applied toward a subsequent master's degree. Extension work completed at another institution cannot be transferred, and correspondence work, except to make up deficiencies, is not recognized.

3. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer course work that is to be applied to a graduate degree at CU-Boulder and was completed more than five years prior to being accepted to the program will be evaluated by the major department as to current relevance and applicability to the degree requirements. At the discretion of the department, a student may be asked to validate transfer credits prior to approval.

4. Credit may not be transferred until the student has completed 6 credits of graduate course work as a regular, degree-seeking student at the Boulder campus with a 3.00 GPA. Transferred credits do not reduce the minimum registration requirement, but may reduce the amount of work to be done in formal courses.

5. Excess undergraduate credits from another institution may not be transferred to the CU-Boulder Graduate School.

### *Graduate Credit for CU-Boulder Seniors*

With the exception of students enrolled in a concurrent bachelor's/master's degree program, seniors at CU-Boulder may earn graduate credit for a limited amount of graduate-level work (up to 9 semester hours), provided such work is completed with a grade of B or above in course work at CU-Boulder; comes within the five-year course time limit; has not been applied toward another degree; and is recommended for transfer by the department concerned, and such transfer is approved by the dean of the Graduate School.

## Registration

Registration procedures are sent to new graduate students when they confirm their intent to enroll. Please refer to Registration in the General Information section for further information.

Late registration is held only if enrollment levels have not been reached. Graduate students (including candidates for degrees and students taking only thesis hours) who fail to complete registration and pay fees during regular registration may be charged a late registration fee.

### *Concurrent Registration*

Boulder campus students unable to obtain courses required for their degree program on the Boulder campus may register for up to two courses or 6 credit hours, whichever is greater, on another University of Colorado campus. The course work must be required for their degree program; they must have their dean's permission; they must be enrolled for at least one course on the Boulder campus; and enrollment levels must not have been reached on the other campus. Contact the Office of the Registrar for additional information.

### ***Reciprocal Exchange Agreement Program***

Reciprocal registration enables University of Colorado graduate students to attend classes at other northern Colorado institutions, including Colorado School of Mines, Colorado State University, and the University of Northern Colorado. For more information, contact the Office of the Registrar.

### ***Withdrawal***

A graduate student who desires to withdraw from the university should go to Regent Administrative Center 125 for a withdrawal interview. A student who discontinues attendance in a course without officially withdrawing is marked as having failed that course. Except under extreme circumstances, graduate students are not permitted to withdraw after the last day of classes.

### **Financial Aid for Graduate Study**

The University of Colorado offers several types of financial assistance for graduate students who demonstrate financial need. Students apply for assistance by submitting a financial aid application (the FAFSA) as soon as possible after January 1.

The Colorado Graduate Grant Program is open to graduate students who are Colorado residents. Nonresidents are eligible for student fee grants. To receive assistance, students must be nominated by their departments.

Graduate students may apply for long-term loans through the Stafford Loan (formerly GSL) program or the Perkins Loan program (formerly the National Direct Student Loan) and for part-time jobs through the College Work-Study program.

### **Graduate Part-Time Instructors and Teaching Assistants**

Many departments employ graduate students as graduate part-time instructors (GPTIs) or as teaching assistants (TAs). GPTIs are full-time, regular degree-seeking graduate students who have a master's degree or the equivalent and who have demonstrated competence in classroom teaching. Teaching assistants are also full-time regular degree-seeking graduate students, but they are not required to have previous experience. GPTIs and TAs must have a cumulative GPA of at least 3.00. Students are compensated for teaching on the basis of the percentage of time worked. Tuition credits are also based on the student's percentage of time worked. Assistants are eligible for the nonresident tuition differential waiver only for their first-year appointment, with the exception of international students. Exceptions beyond the first year must be approved in advance by the dean.

### **Research Assistants**

In many departments, research activities provide opportunities for graduate students to work part-time as research assistants. All research assistants must maintain a cumulative GPA of at least 3.00. Students are compensated and receive tuition credits based on the percentage of time they work. Research assistants, except for international students, are eligible to receive the nonresident tuition differential for only one year. Research assistants must be full-time regularly enrolled graduate students.

### **Graduate Teacher Program**

The Graduate Teacher Program (GTP) offers teacher training to all graduate and postdoctoral students who teach courses, labs, and recitations, or who assist with office hours and grading. The GTP conducts workshops before the beginning of fall and spring semesters and follow-up workshops throughout the year. Topics covered include effective teaching and grading strategies, communication skills, ethics, and professional development. A special cultural intensive is conducted for international teaching assistants that focuses on issues involved in teaching American students. The GTP also offers a Graduate Teacher Certificate for graduate and postdoctoral students who teach and who complete all requirements.

Additionally, the GTP provides academic leadership training through the Lead Graduate Teacher Network to approximately 50 lead graduate teachers who assist their home departments with discipline-specific teacher training. Finally, the GTP and Career Services collaborate to offer a Professional Development Certificate for graduate and postdoctoral students who complete all requirements and who pursue internships in business, government, or industry, or mentorships in the Colorado Preparing Future Faculty Network.

### **Requirements for Advanced Degrees**

A graduate student is responsible for becoming informed about and observing all regulations and procedures required by the graduate program pursued. Ignorance of a rule does not constitute a basis for waiving that rule. Any exceptions to the policies stated in this catalog must be approved by the dean of the Graduate School.

#### ***Animal Research and Human Research***

Research involving the use of animals and/or the observation or participation of human subjects must have approval from the Animal Care and Use Committee (IACUC) and/or the Human Research Committee (HRC) *prior* to the beginning of the project. Forms are available from the office of the vice chancellor for research/dean of the Graduate School or from the web site at [www.colorado.edu/GraduateSchool/HRC](http://www.colorado.edu/GraduateSchool/HRC) or [www.colorado.edu/Research/animal\\_resources](http://www.colorado.edu/Research/animal_resources).

### **Graduate Faculty Appointments for Courses and Exams**

All courses, 5000-level or above, completed to fulfill graduate degree requirements must be taught by members of the graduate faculty. In addition, any faculty member serving on a master's or doctoral examination/defense committee must hold a current graduate faculty appointment. Membership on the university faculty does not automatically constitute an appointment to the graduate faculty. Contact your departmental graduate program assistant for questions concerning these appointments.

### **Master's Degrees**

A student enrolled in a master's program must satisfy the degree requirements of both the Graduate School and the major department. The requirements listed below are the minimum standards of the Graduate School; additional requirements are set forth by the major department.

### Minimum Requirements

The minimum requirement for the master's degree is 30 credit hours. A student may complete a Plan I (thesis) option, or a Plan II (course work) option. At least 24 hours must be completed at the 5000 level or above; these 24 hours may include a minimum of 4, but not more than 6, thesis hours for those students completing a Plan I degree. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the academic department.

Independent study course work cannot exceed 25 percent of the course work required for the master's degree.

### Master's Thesis

A thesis, which may be research or expository, critical, or creative work, is required of every master's degree candidate under Plan I. Every thesis presented in partial fulfillment of the requirements for an advanced degree must accomplish the following:

- represent the equivalent of 4-6 semester hours of work, and
- comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.

The final grade is withheld until the thesis is completed; if the thesis is not finished at the end of the term in which the student is registered, an in-progress (*IP*) grade is reported.

### Language Requirement

There is no campuswide foreign language requirement for the master's degree. The decision regarding the foreign language requirement for each graduate degree is the responsibility of the graduate program.

### Time Limit

Master's degree students have four years (six years for students pursuing an ME) from the semester in which they are admitted and begin course work to complete all degree requirements. The phrase "all degree requirements" includes the filing of the thesis with the Graduate School if Plan I is followed. Students who fail to complete the degree in this four-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year. Students who do their work exclusively in summer sessions must complete all degree requirements within six years from the start of course work.

Students who have not completed the degree within their time limit, and who have received approval for an extension, must have any course work completed more than five years prior to the completion of the degree requirements evaluated by their department for relevance and applicability. At the discretion of the department the student may be required to validate these courses as part of the completion of their degree requirements.

Students who need to leave CU-Boulder for a period of time may apply to the Time Out Program for up to one year. Participation in the Time Out Program does not extend the student's time limit, but may be used as a reason to request an extension.

Students whose registration at CU-Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension.

### Minimum Registration Requirement

Master's degree minimum registration requirements can be met only by full-time registration at CU-Boulder for at least two semesters, at least three summer sessions, or a combination of at least one semester and two summer sessions/part-time semesters.

For purposes of deciding minimum registration credit toward a graduate degree, a student must be registered as a full-time student. One semester of minimum registration credit may be earned for full-time registration during the fall or spring semesters or two summer semesters/part-time semesters.

To be a full-time master's student, a student must carry one of the following course loads: a minimum of 5 credits of graduate course work, 8 credits of combined undergraduate and graduate course work, 12 hours of undergraduate course work, at least 1 master's thesis hour, or at least 1 hour of "Master's Candidate for Degree."

### Candidacy

To be granted a master's degree, a student must become a candidate for that degree by filing an Application for Admission to Candidacy with the Graduate School no later than the posted graduation deadlines during the semester in which he or she plans to have the degree conferred.

### Comprehensive-Final Examination

Each candidate for a master's degree is required to take a comprehensive-final examination/thesis defense after the requirements for the degree have been substantially completed or to present an approved degree plan which meets the requirements of the field and represents an intellectually coherent graduate education as determined by the major department. The examination/defense may be given near the end of the student's last semester while the candidate is still taking required courses for the degree, provided satisfactory progress is being made in those courses. The approved degree plan must be approved by the department chair, graduate director, and major advisor on the Degree Plan Approval Form. The Degree Plan Approval option is available only in select departments.

The following rules apply to the comprehensive-final examination:

1. A student must be registered on the Boulder campus as a regular degree-seeking student during the semester the examination is passed.
2. Notice of the examination/defense must be filed by the major department in the Graduate School at least two weeks prior to the examination/defense. The examination/defense must be scheduled no later than the posted deadline for the semester in which the degree is to be conferred.
3. The exam is given by a committee of three graduate faculty members appointed by the department with approval of the dean of the Graduate School. The chair of the committee must have a regular or tenured graduate faculty appointment.
4. The examination, which may be oral, written, or both, must cover the thesis (which should be essentially complete), other work completed in courses and seminars in the major field, and all work presented for the degree.
5. A student must have an affirmative vote from the majority of the committee members to pass. A student who fails the comprehensive-final examination may attempt it once more after a period of time determined by the examining committee.

## Doctor of Philosophy and Doctor of Musical Arts

The doctor of philosophy (PhD) and the doctor of musical arts (DMusA) are the highest academic degrees conferred by CU-Boulder. The requirements stated below are minimal requirements for all candidates for the PhD degree; additional conditions are found in department announcements. Additional requirements for the doctor of musical arts are available from the College of Music.

### *Admission*

A student admitted to the Graduate School for the master's program must reapply for admission for the doctoral program.

### *Minimum Course Requirement*

The minimum requirements for the PhD or DMusA degree are 30 credit hours of course work at the 5000 level or above. Those students pursuing the PhD shall complete a minimum of 30 credit hours of dissertation work beyond the minimum course work requirement.

Unless otherwise specified by departmental requirements, all courses taken at the 5000 level or above that were taken for the master's degree at CU-Boulder may be applied toward the PhD degree. Course work taken in pursuit of a doctoral degree cannot be applied toward a subsequent master's degree.

### *Dissertation Credit-Hour Requirement*

To complete the requirements for the PhD degree, a student must register for a minimum of 30 dissertation credit hours. Distribution of those hours is as follows:

1. A student may not register for more than 10 dissertation credit hours in any one semester.
2. Not more than 10 dissertation credit hours taken in semesters prior to the semester in which the comprehensive examination is passed may be counted in the 30 dissertation hours required for the degree.
3. Not more than 10 dissertation hours of credit taken the semester in which the comprehensive examination is passed may be included in the 30 dissertation credit hours required for the degree.

### *Minimum Registration Requirement*

The minimum registration requirement for doctoral students is six semesters beyond the attainment of an acceptable bachelor's degree. Two semesters of minimum registration credit may be allowed for a master's degree from an accredited institution; however, at least four semesters of minimum registration credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder.

For purposes of deciding minimum registration credit toward a graduate degree, a student must be registered as a full-time student. One semester of minimum registration credit may be earned for full-time registration during the fall or spring semester or during two summer semesters. To be a full-time doctoral student, a student must carry one of the following course loads: a minimum of 5 credits of graduate-level course work before passing the comprehensive exam; 8 credits of combined undergraduate and graduate course work before passing the comprehensive exam; 12 hours of undergraduate course work before passing the comprehensive exam; at least 1 doctoral dissertation hour before passing the comprehensive exam; or a minimum of 5 dissertation hours after passing the comprehensive exam.

### *Preliminary Examination*

Each department determines for itself (by examination or other means) that students who wish to study for the doctoral degree are qualified. The means by which each department makes this evaluation are specified in departmental requirements. Students who are thus evaluated are notified immediately of the results.

### *Language Requirement*

There is no campuswide foreign language requirement for the doctoral degree. The decision regarding the foreign language requirement for each graduate degree is the responsibility of the graduate program.

### *Comprehensive Examination*

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination in the field of concentration and related fields.

The following rules apply to the doctoral comprehensive examination.

1. Students must be registered (*P/F* or credit) on the Boulder campus as regular degree-seeking students when they pass the comprehensive examination.
2. Notice of the examination must be filed by the major department with the Graduate School at least two weeks before the examination.
3. The examination is conducted by an examining board appointed by the chair of the major department and approved by the dean of the Graduate School. The board consists of the major advisor and additional members as necessary to a minimum of five. The chair must have a regular or tenured graduate faculty appointment. Successful candidates must receive affirmative votes from a majority of the members of their examination board. A candidate who fails the examination may attempt it once more after a period of time determined by the examination board.
4. The examination, which may be oral, written, or both, tests mastery of a broad field of knowledge, not merely formal course work. The oral part is open to members of the graduate faculty.

### *Admission to Candidacy*

A student must formally apply for admission to candidacy for the doctoral degree on forms supplied by the Graduate School at least two weeks before attempting the comprehensive examination. Before being admitted to candidacy a student must earn at least three semesters toward the minimum registration requirement, and pass the comprehensive examination.

### *Continuous Registration Requirement*

A PhD student is required to register continuously for a minimum of 5 dissertation hours in the fall and spring semesters of each year, beginning with the semester following the passing of the comprehensive examination and extending through the semester in which the dissertation is successfully defended (final examination). DMusA students must maintain continuous registration for at least 1 credit of course work numbered 8200 to 8399 (or TMUS 8029).

1. A student not required to maintain full-time status and not using campus facilities may claim off-campus status, which allows registration for 3 rather than the minimum of 5 dissertation credit hours. Off-campus status (3 credits of dissertation hours) is considered part-time. All CU-Boulder considerations for part-time status apply.

2. A student who fails to register continuously for dissertation credit hours after passing the comprehensive examination must retake and pass the comprehensive examination in order to regain status as a student in good standing in the Graduate School. The department may require that the student validate course work more than five years old. At its discretion, the department may petition the dean of the Graduate School for a time limit for completion of all degree requirements of up to one year after the retaking of the comprehensive exam. The department must petition the dean of the Graduate School to waive the requirement to retake the comprehensive exam.

3. A PhD student must be registered full time for a minimum of 5 dissertation hours during the semester (including summer session) in which the dissertation defense is passed. DMusA students must be registered full time in course work numbered 8200 to 8399 ( or TMUS 8029) during the semester in which the dissertation defense is passed.

### *Dissertation Requirements*

A PhD student must write a dissertation based upon original investigation, showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research. The subject must be approved by the student's major department.

1. Every dissertation presented in partial fulfillment of the requirements for an advanced degree must represent the equivalent of at least 30 semester hours of work.

2. The student is responsible for notifying the Graduate School of the exact title of the dissertation on or before the posted deadlines during the semester in which the doctoral degree is to be conferred.

3. The dissertation must comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.

The final grade is withheld until the dissertation is completed. In progress (IP) grades are assigned during each semester until the defense is successfully completed and the final copy of the dissertation is accepted by the examination committee, at which time the final grade for all dissertation hours is submitted to the Graduate School.

### *Dissertation Defense*

After the dissertation has been accepted for defense by the student's committee, a final examination on the dissertation and related topics is conducted.

The following rules apply to the dissertation defense.

1. A student must be registered as a full-time, regular degree-seeking student at CU-Boulder, for a minimum of 5 dissertation hours during the semester in which the final examination is passed. DMusA students must be registered full time in course work numbered 8200 to 8399 ( or TMUS 8029) during the semester in which the dissertation defense is passed.

2. Students must notify the Graduate School of their final oral examination at least two weeks before their scheduled examination date.

3. This examination is wholly or partly oral, the oral part being open to anyone.

4. The examination is conducted by a committee appointed by the chair of the major department and approved by the dean of the Graduate School, which consists of at least five persons, one of whom must be from outside the student's

major department. Three of the members must be CU-Boulder graduate faculty. The chair and outside member of the committee must have regular or tenured graduate faculty appointments. The other committee members must have either regular or special graduate faculty appointments. The chair and a majority of the committee must be present on the Boulder campus for the examination. More than one dissenting vote disqualifies the candidate in the final examination.

5. A student who fails the examination may attempt it once more after a period of time determined by the examining committee.

### *Time Limit*

Doctoral degree students are expected to complete all degree requirements within six years from the semester in which they are admitted and begin course work in the doctoral program. The phrase "all degree requirements" includes the filing of the dissertation and all accompanying forms with the Graduate School. Students who fail to complete the degree in this six-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year. If the dean of the Graduate School and the department chair/program director cannot agree on whether a student should continue, the Graduate School's executive advisory council makes the final decision.

Students who need to leave CU-Boulder for a period of time may apply to the Time Out Program for up to one year. Doctoral students who are required to maintain continuous registration may petition for an exception in order to participate in the Time Out Program for parental leave or other extenuating circumstances. Participation in the Time Out Program does not extend the student's time limit, but may be used as a reason if applying for an extension.

Students whose registration at CU-Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension of time.

### *Sequestration of Dissertations*

Dissertations approved by the departments and the Graduate School are released to University Microfilms Inc. and placed in Norlin Library, where they are kept on file.

Occasionally, the primary academic advisor, after consultation with the student, may find it necessary to sequester the student's dissertation to protect university rights to intellectual property. The university accepts the obligation to protect potentially patentable subject matter from premature public disclosure so as to preserve entitlement to patent protection while the technology is being evaluated. This sequestration should take place only when it is absolutely required and only for the minimum time necessary.

With just cause, the primary academic advisor may request that the Graduate School sequester his or her student's dissertation for one month. Any longer period will be only the minimum time necessary to protect university intellectual property rights under patent policy or to comply with the terms of grants and contracts. Normally this period will not exceed six months. The Graduate School shall provide an explanation to the student for the decision to sequester consistent with other university policies.



## Interdisciplinary Programs

### Applied Behavioral Science

The graduate certificate in applied behavioral science is offered by faculty from the Institute of Behavioral Science (IBS)—one of the nation's leading interdisciplinary social science research institutes—and the departments of anthropology, economics, geography, political science, psychology, and sociology. The goal of the certificate program is to train a new kind of social scientist who understands the social and economic changes that impact contemporary communities, can utilize a variety of research methodologies, is sensitive to ethical issues in applied behavioral research and teaching, and is comfortable in settings of ethnic, cultural, and racial diversity.

The general requirements for the certificate are four courses and participation in IBS research and scholarly activities. Students take a two-semester (6-credit) seminar in applied behavioral science, which focuses on the logic, theories, and methods of interdisciplinary inquiry, problem solving in research settings, methods of inquiry, and ethical issues. They also take a two-course graduate research methods sequence in a department other than their home department. Certificate students are required to spend one year as a participating member of an IBS research team and attend IBS research colloquia.

### Atmospheric and Oceanic Sciences

The interdisciplinary Program in Atmospheric and Oceanic Sciences (PAOS) provides an educational and research environment to examine the dynamical, physical, and chemical processes that occur in the atmosphere and the ocean. A major theme is the establishment of a physical basis for understanding, observing, and modeling climate and global change.

Graduate students, research staff, and faculty work together on a wide range of research topics, such as large-scale dynamics of ocean and atmosphere, air-sea interaction, radiative transfer and remote sensing of ocean and atmosphere, sea ice and its role in climate, cloud-climate interactions, atmospheric chemistry and aerosols, atmospheric technology, extended weather and climate prediction, hydrological processes, and boundary-layer measurement and modeling.

In addition to doctoral and master's degrees, PAOS offers a graduate certificate in atmospheric and oceanic sciences. Students majoring in atmospheric sciences or other associated departments may wish to consider obtaining the graduate certificate in atmospheric and oceanic sciences, known as the PAOS certificate, to emphasize on their vita that they have specialized in that additional area. Students who are not enrolled in a graduate degree program, but have received a BA or BS degree and meet the course prerequisites may also enroll in courses to obtain the PAOS certificate through the ACCESS program of Continuing Education.

Requirements for the graduate certificate in atmospheric and oceanic sciences are:

1. Completion of a total of four courses from the approved list of PAOS courses (below), each with a grade of *B* or better.
2. Upon completion of course work, complete the PAOS Graduate Certificate Request form and submit it with an official transcript to the PAOS Graduate Program assistant.

### Courses for the PAOS Certificate

ASEN 5215/ATOC 5215 Oceanography  
 ASEN/ATOC 5235 Remote Sensing of the Atmosphere and Ocean  
 ASEN 5315 Ocean Modeling  
 ASEN 5325 Small-Scale Processes in Geophysical Fluids  
 ASEN 5335 Aerospace Environment  
 ASTR/ATOC/GEOL 5810 Planetary Atmospheres  
 ATOC 5060 Dynamics of the Atmosphere  
 ATOC 5061 Dynamics of the Oceans  
 ATOC/CHEM 5151 Atmospheric Chemistry  
 ATOC/ASTR 5560 Radiative Processes in Planetary Atmospheres  
 ATOC 5600 Physics and Chemistry of Clouds and Aerosols  
 ATOC 5720 Introduction to Atmospheric Dynamics  
 ATOC 6100 Predicting Weather and Climate  
 GEOG 5231 Physical Climatology: Field Methods  
 GEOL 5060 Oceanography  
 ATOC 7500 TPC Physical Oceanography

Courses that may be taken if they are not in the student's home department include:

ASEN 5051 Fluid Mechanics  
 ASTR 5250 Planetary Aeronomy  
 ATOC/ASTR 5400 Introduction to Fluid Dynamics  
 ATOC/ASTR 5410 Fluid Instabilities, Waves, and Turbulence  
 ATOC/PHYS 5220 Nonlinear Dynamics  
 CHEM 5161 Analytical Spectroscopy  
 GEOG 5221 Synoptic and Dynamic Climatology  
 GEOG 5331 Mountain Climatology  
 GEOG 5961/ATOC 5960 Theories of Climate and Climate Variability

For additional information about the PAOS certificate, contact the Program in Atmospheric and Oceanic Sciences, University of Colorado at Boulder, 311 UCB, Boulder, CO 80309-0311, **303-492-7167**.

### Behavioral Genetics

The Institute for Behavioral Genetics (IBG) offers a training program in behavioral genetics. The goal of the program is to train scientists in the study of genetic contributions to individual differences in behavior. This is accomplished by requiring students to obtain strong training in a primary academic discipline, by instructing them in the interdisciplinary content of behavioral genetics, and by providing an atmosphere in which close interactions among scholars with different perspectives may be established.

The program features a core set of courses and continuous research apprentice training with one or more IBG faculty members, and furnishes valuable opportunities for interaction among scholars with widely varying academic backgrounds. A student wishing to specialize in behavioral genetics must be regularly enrolled as a graduate student in an academic department of the university.

The training program requires completion of six of the following nine courses (at least three of the courses must be from the first four listed): behavioral genetics, genetics, quantitative genetics, molecular genetics and behavior, biometrical methods in behavioral genetics, a graduate-level statistics course, concepts in behavioral genetics, research in behavioral genetics, and a seminar in behavioral genetics. Students must participate in a weekly journal club and monthly colloquia series.

Each trainee works as a teaching assistant for one semester in a course relevant to his or her professional specialty. An IBG trainee's doctoral dissertation research must be conducted on a topic directly relevant to animal or human behavioral genetics.

A student in the interdisciplinary certificate program must have an IBG faculty member as an advisor and an advisory committee composed of faculty from both IBG and the academic department. The advisory committee evaluates the student's progress and may impose additional requirements.

Information about the IBG interdisciplinary certificate program may be obtained by contacting the Institute of Behavioral Genetics, University of Colorado at Boulder, 447 UCB, Boulder, CO 80309-0447; **303-492-7362**; fax **303-492-8063**.

## Biotechnology

The graduate certificate program in biotechnology provides integrated, interdisciplinary training that encompasses both modern biological sciences and biochemical engineering. The goal of the program is to help students acquire the skills and credentials to undertake crossdisciplinary research in modern industrial, academic, and government biotechnology research laboratories and the perspective to serve as leaders in the advancement of beneficial applications of modern biotechnology.

The graduate biotechnology program is offered cooperatively by the Departments of Chemical and Biological Engineering, Chemistry and Biochemistry, and Molecular, Cellular, and Developmental Biology. The program awards a certificate, not a separate degree; each student enrolls in a participating department and meets the degree requirements for that department.

A student must take 6 semester credit hours of graduate biotechnology courses, including CHEN 5830 Introduction to Modern Biotechnology and CHEN 5831 Biotechnology Case Studies. For the remaining credits, bioscience graduate students choose from bioengineering courses, and bioengineering students choose from bioscience courses.

During their first year, students take laboratory rotations in participating faculty laboratories. At least one laboratory rotation must be outside the student's home department. Students receive up to 7 semester credit hours of independent study or laboratory-methods credit for these rotations.

All students are expected to undertake internships with local biotechnology companies. These internships usually take place during the summer after the first year of graduate study.

For more information on the biotechnology certificate program, contact Professor Christopher Bowman, Department of Chemical and Biological Engineering, University of Colorado at Boulder, 424 UCB, Boulder, CO 80309-0424; **303-492-7314**.

## Chemical Physics

The interdepartmental doctoral program in chemical physics prepares students for research in such interdisciplinary fields as atomic and molecular radiative processes, spectroscopy, laser chemistry and physics, atmospheric chemistry, molecular quantum mechanics, statistical mechanics, kinetics, chemistry and physics of the surface and condensed phase, semiconductors, and nanoscale processes.

Students wishing to pursue the doctoral degree in chemical physics should apply for admission to either the Department of Chemistry and Biochemistry or the Department of Physics.

Entering students take a qualifying examination in the area of their undergraduate major. The comprehensive examination tests their knowledge of both chemistry and physics. Certain requirements associated with the regular doctoral programs in the participating departments will be replaced by requirements in the complementary field; each student's program of course work and research will be individually planned according to the student's special needs.

The program is administered by an interdepartmental committee. For further information, contact the graduate program assistant in either the Department of Chemistry and Biochemistry or the Department of Physics.

## Cognitive Science

The cognitive science academic program includes a joint PhD degree between cognitive science and a core discipline, and a certificate at the graduate level of study. The cognitive science curriculum is designed to provide broad, in-depth training in cognitive sciences. The program is administered by the Academic Programs Committee of the Institute of Cognitive Science (ICS) of the University of Colorado at Boulder. Graduate students in cognitive science are admitted to graduate programs in participating departments that have cognitive science faculty and must meet the requirements for admission and degree completion in their home department.

Students wishing to attain a certificate in cognitive science must formally apply to the Academic Programs Committee of ICS. To be admitted they must be a student affiliate of ICS, which requires being a graduate student in good standing in a member department, and they must be sponsored by an ICS faculty member. Students who enter the Graduate School without a master's degree may be admitted to the program upon completion of their first year of study; students with a master's degree may be admitted during their first year.

The degree and certificate programs in cognitive science require students to demonstrate acceptable performance in interdisciplinary course work and courses outside their home department. The courses must be offered by the departments of computer science, education, linguistics, philosophy, psychology, and speech, language, and hearing sciences, or another department in which there is an ICS faculty member. Details about requirements for the degree and certificate programs can be obtained through the Director of Academic Programs for ICS, or by contacting the ICS main office at ICS, University of Colorado at Boulder, 344 UCB, Boulder, CO 80309-0344; **303-492-5063**.

## Environmental Policy

The graduate certificate program in environmental policy provides an interdisciplinary specialization for students in regular master's, doctoral, and JD programs. Environmental issues—water policy, wilderness preservation, air quality, energy development, and global climate change—transcend ordinary academic boundaries. Policy analysis that deals with these problems must integrate insights and information from many disciplines.

The program draws on courses in anthropology, economics, geography, philosophy, political science, psychology, sociology, the College of Architecture and Planning, the College of Engineering and Applied Science, the School of Journalism and Mass Communication, and the School of Law. Two capstone seminars are offered each year—Climate, Water Resources, and Environmental Sustainability, and Renewable Energy Policy. Each focuses on a policy research problem, emphasizing the contribution of different disciplines to the understanding of that problem and the integration of disciplinary perspectives in the analysis of alternative policy recommendations.

Admission to the certificate program is open to students in any regular graduate degree program at the University of Colorado. A limited number of individuals already holding master's or doctoral degrees from other institutions may be admitted, provided they meet the normal admission requirements of a participating department.

To qualify for the certificate, students must complete at least 18 hours of approved course work, including the two required capstone seminars. At least 12 of the 18 hours must be in courses outside the department in which the student is currently enrolled. The certificate is awarded to recognize the additional course work beyond that required for the student's regular degree program.

Questions about the certificate program in environmental policy should be directed to the Environmental Studies Program, University of Colorado at Boulder, 397 UCB, Boulder, CO 80309-0397; 303-735-4993; fax 303-492-5207.

## Environmental Studies

The interdisciplinary graduate degrees in environmental studies offer opportunities for education and research at the professional level to address the complex environmental issues facing Colorado, the Rocky Mountain west, and the global community. Students may pursue studies toward the master of science (MS) or doctor of philosophy (PhD).

Graduate students, faculty, and research staff work together on research topics such as: climate and atmospheric chemistry, water sciences, energy, environmental policy and sustainability, waste management and environmental remediation, and biogeochemical cycles.

Skills acquired through participation in the program will allow graduates to devise strategies for the use of natural resources that are sustainable and in compliance with environmental regulations; apply the environmental sciences to commercial and government work in environmental remediation; analyze environmental resources for private or public planning purposes; provide the interface between management and engineering/science in industry and government; propose and implement cost-effective solutions to environmental problems; and develop regulatory laws that have a sound physical basis.

Additional information about graduate degrees in environmental studies may be obtained by contacting: the Graduate Program Assistant, Environmental Studies Program, University of Colorado at Boulder, 397 UCB, Boulder, CO 80309-0397; 303-492-5478; or [envsgrad@colorado.edu](mailto:envsgrad@colorado.edu).

## Geophysics

The interdisciplinary doctoral program in geophysics encourages students with a variety of undergraduate backgrounds to pursue graduate study in the physics of the Earth, with special emphasis on the interior of the planet. Students specialize in one of the subfields of geophysics while gaining a broad, general background in the discipline and in-depth education in the relevant aspects of the parent fields of geology, physics, and engineering. Since 1993, the geophysics interdisciplinary program has offered a PhD track in hydrology.

Students enter the program by applying for admission to one of the following departments: aerospace engineering sciences; applied mathematics; astrophysical and planetary sciences; atmospheric and oceanic sciences; civil, environmental, and architectural engineering; electrical and computer engineering; geological sciences; mechanical engineering; or physics. Upon satisfactory performance on the doctoral preliminary examination given by the home department, the student may formally apply for admission to the geophysics doctoral program.

The program is administered by the geophysics graduate program committee, which includes representatives from each of the participating departments. The comprehensive examination and the dissertation defense are directed by this committee, with a faculty member of the home department normally chairing these procedures.

Exceptional research opportunities are available through the university research institutes, especially the Cooperative Institute for Research in Environmental Sciences (CIRES) and JILA, as well as within the special laboratories of the participating departments.

For further information, see [www.colorado.edu/geophysics](http://www.colorado.edu/geophysics), or call or write the Director, Geophysics Program, Department of Geological Sciences, University of Colorado at Boulder, 399 UCB, Boulder, CO 80309-0399; 303-492-1143.

## Human Language Technology

The recent growth of the World Wide Web and the vast improvements in computing power of the last decade have led to a greater need for education and research in human language technology. This interdisciplinary field includes key technological and scientific areas such as automatic speech recognition and synthesis, natural language understanding and generation conversational agents, augmentative and alternative communication, audio and text-based information retrieval, and grammar and spelling aids.

The curriculum for the certificate includes five core courses, consisting of a computer programming foundation course plus four courses in human language technologies (e.g., natural language processing, morphology and syntax, speech processing, and recognition). At least two of the language technologies courses must be outside the student's home department.

Students are required to major in computer science, electrical and computer engineering, linguistics, or speech, language, and hearing sciences. The program is available to master's or PhD students at CU-Boulder, including students in concurrent bachelor's/master's programs. For further information see [www.colorado.edu/ling/hltcurr.html](http://www.colorado.edu/ling/hltcurr.html) for the linguistics major and [cslr.colorado.edu/beginweb/courses/hltc.html](http://cslr.colorado.edu/beginweb/courses/hltc.html) for the speech, language, and hearing sciences major.

## Master of Engineering Program

The master of engineering (ME) degree program is administered by the Graduate School and the College of Engineering and Applied Science. The requirements for admission and for academic work are the same as those for the master of science degree awarded in the College of Engineering and Applied Science.

The master of engineering degree permits flexibility in course selection. It meets the needs of practicing engineers working full time outside the university. It allows participants to specialize in one engineering discipline and select courses from other engineering fields and business subjects related to the student's professional work.

The program is offered both on campus and through the Center for Advanced Engineering and Technology Education (CAETE), which delivers graduate courses taught on the Boulder campus to business, industry, and government agencies by live television with two-way audio communication. Courses are also available by videotape to sites outside the signal range. Each year, CAETE offers over 100 graduate courses to approximately 1,700 students at 250 industrial sites.

A prospective student is required to present a well-defined objective to be admitted to the program.

### Requirements

The requirements for the ME degree are 36 credit hours plus a written report on a creative investigation, which may be related to the student's professional work. The report must be defended orally or via teleconference. A student must be registered during the semester of the oral defense. Generally, 15 credit hours must be taken in a particular engineering discipline at the 5000 level or above. The additional 15 credit hours may be selected from the same discipline, other engineering fields, or business. At the discretion of the department, up to 6 credits taken at the 3000 or 4000 level may be applied toward degree requirements.

Requirements relating to the following are the same as those for the master of science degree awarded in the College of Engineering and Applied Science: admission to the Graduate School, application procedures, registration, quality of graduate work, status, credit by transfer, and admission to candidacy. Applicants may petition for credit for up to an additional 3 hours of transfer credit. The time limit to complete this program is six years.

The admission of each student to graduate study, approval of the degree program, admission to candidacy for the degree, and approval of the awarding of a degree originate through a specific department of the College of Engineering and Applied Science, or the appropriate degree program steering committee, in the same manner as for the master of science program. An advisor will be appointed for each student by the major department promptly upon the student's acceptance into the graduate program. At that time, a plan of study is completed and a copy placed on record with the department office. Changes in the plan must be approved by the advisor and reported to the department's graduate office.

An advisory committee consisting of the advisor and two other faculty members is responsible for approving the individual's degree program and admission to candidacy; it approves the student's written report and the awarding of the degree.

The student should also see the requirements of the departments involved.

## Molecular Biophysics

The goal of the molecular biophysics certificate program is to introduce graduate students to the field of biophysics, its methodologies, and the state-of-the-art biophysical research efforts being carried out in diverse laboratories and departments on the CU-Boulder campus. The program creates interdepartmental connections that provide the breadth of training needed to develop biophysical scholars.

Students must be admitted through the regular admissions process to a PhD program in one of the following departments: chemical engineering, chemistry and biochemistry, ecology and evolutionary biology, or physics. They must satisfy all of their home department's requirements to receive a PhD.

The first requirement of the molecular biophysics certificate is participation in one to three laboratory rotations outside the thesis lab, which provide experience with a range of biophysical methods.

The second component of the program is the completion of two courses chosen from a list of approved courses. Currently this list includes 15 courses in areas ranging from theoretical physics to molecular and cellular biophysics.

Students are expected to take part in a seminar series, which introduces internationally renowned speakers and their research. They also are required to participate in supergroup meetings and symposia, which provide forums for them to present their own research in front of their colleagues and advisory committee.

## Museum and Field Studies

The interdisciplinary museum and field studies program leading to a master of science degree is administered by the University Museum, in conjunction with the departments of anthropology; history; art history; ecology and evolutionary biology; and geological sciences; as well as other departments. The program provides a strong background in a chosen field as well as theoretical and practical grounding in museology.

Internships are offered at a variety of museums in the region, including natural history, history, and art museums. Students completing the MS are trained as collection managers, curatorial assistants, registrars, museum educators, exhibit technicians, and administrators.

## Program Tracks

Two tracks are available: a collection/field track and an administrative/public track.

**The collection/field track** offers training for students interested in the curatorial and research aspects of museum work, such as floristic or faunistic studies of the past and present, material culture of the past and present, and biological inventory. The curriculum gives students academic training as well as experience in all areas of museum work. Field experience is offered through the curatorial and field practica.

**The administrative/public track** offers education for students interested in the public aspects of the museum such as program development and evaluation, exhibition planning and design, education, and the organization and management of museums. The curriculum offers both academic training in a discipline and hands-on experience with all aspects of the public museum.

## Admission

Students must meet all university requirements for admission to graduate school and have a baccalaureate degree and at least a *B* (3.00) grade-point average in previous academic work. The baccalaureate degree should be in anthropology, biology, geology, geography, history (including archival studies), classics, fine arts, or education, although other majors will be considered. Acceptance to the program is decided by the admissions committee of the University Museum in consultation with the student's department. The student must be accepted by an advisor in his or her discipline.

## Requirements

The degree in museum and field studies is a two-year program requiring a total of 32 credit hours. Students may choose either the thesis or nonthesis plan. Depending on the track and plan, students complete from 9 to 15 credit hours in a department and from 13 to 22 credit hours in museology courses. One hundred fifty work hours of internship are required. The thesis plan requires the completion and successful defense of a thesis; the nonthesis plan requires the completion of a paper or a project.

For current course information, consult the Museum section under the College of Arts and Sciences. For new course or admissions information, please write the Museum and Field Studies Program, University Museum, University of Colorado at Boulder, 265 UCB, Boulder, CO 80309-0265; 303-492-5437; or [mfsinfo@colorado.edu](mailto:mfsinfo@colorado.edu).

## Neuroscience and Behavior

The graduate certificate program in neuroscience and behavior focuses on understanding the nervous system and its relationship to disease and behavior. This understanding encompasses the molecular, cellular, and behavioral aspects of neuroscience.

Students come from such graduate programs as ecology and evolutionary biology; behavioral genetics; molecular, cellular, and developmental biology; psychology; and integrative physiology. They receive a PhD in their department and a certificate in neuroscience.

The neuroscience core curriculum includes courses in the following areas: neuroscience methods laboratory, neuroanatomy (PSYC 5263), neurochemistry or neuropharmacology (e.g., PSYC 5062, PSYC 5132), neurophysiology or systems neuroscience (e.g., PSYC 5042, EPOB 5190), behavioral neuroscience or animal behavior (e.g., EPOB 5240, KINE 5610, PSYC—to be developed), molecular neuroscience or molecular genetics or developmental neuroscience (e.g., PSYC 5232, EPOB 5200, MCDB—to be developed).

Students are required to attend a weekly journal club or discussion group and neuroscience colloquia.

## Optical Science and Engineering

The graduate certificate program in optical science and engineering offers interdisciplinary training in optics. Participating academic departments include physics, chemistry and biochemistry, electrical and computer engineering, and JILA, a joint institute between CU and NIST. The program provides optics course work, research training, and an industry internship. This training helps students gain employment in academia or in the high-tech industry.

Course work for the certificate includes the Advanced Optics Laboratory class as well as two other full-semester optics courses such as:

- Introduction to Optics
- Fundamentals of Optics and Lasers
- Physical Optics
- Optoelectronic Devices
- Advanced Molecular Spectroscopy

Students are required to participate in an interdisciplinary Optics Seminar and take noncredit minicourses in technical communication, machine design shop, electronics design, ethics, and (optional) business basics for science and engineering graduate students. For information contact Barb Tennis, OSEP Director, University of Colorado at Boulder, 440 UCB, Boulder, Colorado 80309-0440; 303-492-0869; or [www.colorado.edu/OSEP](http://www.colorado.edu/OSEP).

## Population Studies

The graduate certificate program in population studies, offered through the Population Program of the Institute of Behavioral Science, recognizes master's and doctoral degree students for interdisciplinary work in demography. The population program, which is international in scope and has an applied and policy-oriented focus, fosters research on population trends and patterns and provides training in population analysis. Students who are earning graduate degrees through the Departments of Economics, Geography, or Sociology and are interested in majoring in demography are eligible to petition for admission to the program.

The population program emphasizes research training through direct faculty/student interaction and involvement in research projects. Students are required to take three core courses: ECON 8666 Economic Demography; GEOG 6732 Formal Population Geography; and SOCY 5012 Population Issues, Problems, and Policies. Students are granted a certificate on the basis of the three core courses, their applied research, and their thesis or dissertation.

Questions about the certificate program in population studies should be directed to the Population Program, Institute of Behavioral Science, University of Colorado at Boulder, 484 UCB, Boulder, CO 80309-0484; 303-492-7986.

## Remote Sensing

Remote sensing (satellite and ground-based) is increasingly used to probe the Earth's atmosphere, ocean, and land surfaces. Probing of other planets is accomplished largely by satellite remote sensing. Because of national priorities in climate and global change, the interest in remote sensing will continue to increase.

Graduate students, research staff, and faculty work on a wide variety of topics, ranging from the theory of remote sensing to its applications. These applications include: use of satellite remote sensing to determine ocean surface temperature and heat fluxes; use of surface radar to improve the determination of clouds and precipitation from satellite; determination of surface biological characteristics and productivity from satellite; mapping of land

use from satellite; mapping of surface landform and topographical features; searching for locations of buried artifacts; use of surface radar to determine upper atmosphere wind motions; and aircraft remote sensing to assess the validity of satellite retrieval algorithms of surface and atmospheric characteristics.

A certificate in remote sensing is offered by the Graduate School. In addition to earning a certificate while pursuing a graduate degree, students who are not enrolled in a graduate degree program but have a BA or BS degree and meet the course prerequisites may also obtain the remote sensing certificate through the ACCESS program of Continuing Education. The certificate is not a substitute for a degree.

A certificate in remote sensing is awarded based on a written request by the student to the Remote Sensing Graduate Committee, provided that the following course requirements have been met. Students must complete at least three remote sensing core courses with a grade of B or better and successfully complete the ATOC 7500 Remote Sensing Seminar, for at least one semester. The remote sensing graduate core courses are:

- ASEN 5168 Remote Sensing Instrumentation Design
- ASEN/ATOC 5235 Remote Sensing of the Atmosphere and Ocean
- ASEN 5337 Remote Sensing Data Analysis
- ATOC 5560 Radiative Processes in Planetary Atmospheres
- ECEN 5254 Radar and Remote Sensing
- ECEN 5274 Radar Science and Techniques
- GEOG/GEOL 5093 Remote Sensing of the Environment
- GEOL 5240 Remote Sensing Image Analysis
- GEOL 6340 Remote Sensing of Planetary Surfaces
- GEOL 5700/EPOB 6440/GEOG 6443 Remote Sensing Field Methods

For additional information about the remote sensing certificate, contact Yvonne Garcia, CIRES, University of Colorado at Boulder, 216 UCB, Boulder, CO 80309-0216; 303-492-8773; or [Yvonne.Garcia@colorado.edu](mailto:Yvonne.Garcia@colorado.edu).

## Telecommunications

The graduate interdisciplinary curriculum in telecommunications provides the opportunity for study in the fields of technology, planning, and management of telecommunications systems. Students may pursue studies toward the masters of science degree (MS) or the masters of engineering degree (ME).

The curriculum involves a number of university schools, colleges, and departments, including, electrical and computer engineering, computer science, business, economics, journalism and mass communication, and law. The department offers courses in technology of telecommunications systems, connectivity and internet, economics of telecommunications, business, policy, and law.

Students entering the ME program are required to have an undergraduate engineering degree. Students entering the MS program are expected to be adept in mathematics through trigonometry. Students without a year of calculus and a semester of computer science will be expected to attain these proficiencies as a part of their curriculum.

## Master's Degree Programs

Students selecting to receive an ME with an emphasis in telecommunications must have a 3.00 undergraduate GPA in electrical engineering, computer science, or engineering physics with proficiency in linear systems, probability, linear algebra, computer systems, and communications theory. In addition to course work in telecommunications technology, policy, management, and business, ME students must take at least 9 credit hours of graduate-level electrical engineering courses. The ME degree has no residency requirement; course work may be completed via CATECS or the National Technological University satellite delivery system. Students must complete 30 credit

hours of course work, submit a report on a creative investigation, and make an oral defense.

The minimum duration for either the MS or ME program is 12 months. Most students are expected to pursue a 16–24 month curriculum. For the MS degree, a minimum of 32 hours, including 6 hours of thesis, is needed to graduate, but students are encouraged to take at least 40 hours. For the ME degree, a minimum of 33 hours, including 3 hours for a project, is required. ME degree students work with their advisor to integrate three electrical and computer engineering graduate courses into their course work.

## Women's Studies

The graduate certificate in women's studies offers a graduate-level education in the systematic approach to the study of gender from an interdisciplinary perspective. It provides a coherent and intellectual context in which students study feminist theory and methodology at an advanced level. At the same time, the certificate program bridges the gap between discipline-centered studies and the interdisciplinary foundations of women's studies, thereby enhancing the student's ability to conduct gender-based research.

Students wishing to take part in the women's studies certificate program must be enrolled in a master's or doctoral degree program at CU-Boulder and have completed at least 6 hours of graduate study.

The certificate program has two components: course work based in the interdisciplinary women's studies curriculum, and course work drawing upon gender studies in other disciplines. The program's curriculum consists of two required courses:

- WMST 5010 Feminist Methodologies
- WMST 5090 Feminist Theories

Two elective courses on gender-related issues from different departments outside the student's discipline are also required.

Students in the program work with an advisor to develop an elective course plan and research emphasis that reflects a coherent and interdisciplinary plan. Departments in which electives may be taken include anthropology, economics, English, fine arts, history, journalism, law, music, philosophy, and sociology.

## Professional Certificate Programs

### Design and Manufacturing

Offered by the Department of Mechanical Engineering, the professional certificate in design and manufacturing provides training that addresses changes in this field, such as the evolution from sequential design processes to nonlinear team approaches, the integration of design and production, and the development of modeling based on CAD databases. The program is directed toward product design and manufacturing engineers, as well as project managers involved in design and manufacturing activities. The certificate program requires the successful completion of four graduate courses:

- MCEN 5045 Design for Manufacturability
- MCEN 5066 Principles and Practices of World Class Manufacturing
- MCEN 5025 Computer-Aided Design of Mechanical Systems
- MCEN 5173 Finite Element Analysis

### Electronics Packaging

The professional certificate in electronics packaging introduces students to the field of electronics packaging, including all thermal, mechanical, and electrical issues. Offered by the Department of Mechanical Engineering, the certificate is directed toward enhancing the knowledge and skills of engineers and managers engaged in the packaging and manufacture of electronics products. The certificate requires successful completion of four graduate courses:

- MCEN 5166 Electronics Packaging and Manufacturing
- MCEN 5173 Finite Element Analysis
- MCEN 5042 Heat Transfer
- MCEN 5208 Advanced Project in Electronics Packaging

### Embedded Systems

In the last few years, commercially available digital systems (microprocessors, microcontrollers, memory chips, interface systems, and systems that handle image, voice, music, and other types of signals) have experienced explosive growth in the electronics industry. These devices are increasingly powerful, cheap, and flexible as design components.

The certificate in embedded systems, which is offered by the Department of Electrical and Computer Engineering and the Center for Advanced Engineering and Technology Education, with support of the Division of Continuing Education, offers students the hardware and software knowledge and skills needed to design and implement these systems. The curriculum consists of two core courses and one elective course from an approved list. The two core courses are:

- ECEN 4613/5613 Embedded System Design
- ECEN 4623/5623 Real-Time Embedded Systems

The list of approved electives is periodically updated and currently includes:

- ECEN 4573 ECE Capstone
- ECEN 4543/5543 Software Engineering of Stand-Alone Programs
- ECEN 4633/5633 Embedded Systems Laboratory

Applicants for the certificate program must have been or currently be enrolled for a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through course work or work experience. They need not be enrolled in a degree-granting program at CU-Boulder.

### Engineering Management

The professional certification of advanced study in engineering management provides a focused technical education designed to prepare engineers and other professionals for the transition into technical/engineering management positions. The target populations are persons working in high technology environments who have a nontechnical undergraduate degree, and engineering professionals who wish to take only core technical management courses. The certificate, which is offered through the Engineering Management Program in the Center for Advanced Engineering and Technology Education, requires the successful completion of four courses in the engineering management curriculum. Students must complete EMEN 5010 Introduction to Engineering Management and EMEN 5050 Leadership and Management. Students may also select two other courses in one of the following areas of emphasis: quality (EMEN 5040 and EMEN 5042), project management (EMEN 5020 and EMEN 5030), research and development (EMEN 5300 and EMEN 5400), or operations and logistics (EMEN 5500 and EMEN 5600). No course substitutions are allowed.

## Interpreter Education in American Sign Language (ASL)

The professional certificate in interpreter education in ASL develops the linguistic and assessment skills necessary for interpreters, interpreter mentors, and faculty in interpreter education programs and ASL programs. The program provides a set of core courses in information fundamental to interpreting, which is lacking in many interpreter training programs. The program is offered by the Department of Speech, Language, and Hearing Sciences.

The certificate program requires completion of three 3-credit courses: SLHS 5035 Linguistic Structure of ASL; SLHS 5045 Discourse Analysis of ASL; and SLHS 5055 Assessing First and Second Languages. Each course includes a research component for successful completion. Applicants to the program should have conversational skill in ASL.

## Museology

The professional certificate in museology provides professional museum training for CU-Boulder graduate students and for museum professionals who seek to upgrade their skills and credentials. The museology certificate serves a range of disciplines in the arts and sciences, education, and engineering, as well as the Colorado museum community.

The curriculum for the professional certificate consists of the core museology sequence for the Museum and Field Studies degree program: MUSM 5011 Introduction to Museum Studies; MUSM 5031 Exhibit Development *or* MUSM 5041 Museum Administration; MUSM 5030 Museum Education; *or* MUSM 5051 Collections Management; and MUSM 6110 Seminar in Museum Issues. This 12-credit curriculum is supplemented by a 75-hour internship (which may be waived for comparable professional experience).

## Power Electronics

Power electronics is a key enabling technology in essentially all electronic systems ranging from wireless communication devices, portable and desktop computers, to telecommunication infrastructure systems and industrial systems. The necessity for power electronics technology in these rapidly expanding areas creates a rising need for design engineers equipped with knowledge and skills to follow sound engineering principles and actively participate in multidisciplinary teams. The power electronics field has evolved rapidly with the advances in technology and introduction of many new application areas. As a result, it is likely that the required knowledge and skills were not in the curricula when many of today's professionals were in college. This creates a strong ongoing demand for continuing education of the workforce in the area of power electronics. The intention of the proposed certificate program is to address the ongoing demand for skilled power electronics design engineers.

This program offers an opportunity for electrical engineers to obtain the specialized knowledge required to practice power electronics. It is intended for students and engineers having a BS degree in Electrical Engineering or equivalent.

The courses required for the professional certificate in power electronics are:

- ECEN 5797 Power Electronics 1
- ECEN 5807 Power Electronics 2
- ECEN 5007 Power Electronics 3

The certification program was initiated by the Colorado Power Electronics Center, and is operated through the Department of Electrical and Computer Engineering and through the Center for Advanced Engineering and Technology Education. For more information, go to [ece.colorado.edu/academics/certificate/index.html](http://ece.colorado.edu/academics/certificate/index.html).

## Software Engineering

Experienced software professionals work in a field that has maintained a relentlessly rapid rate of change for decades, making it impossible to stay current in all aspects of software engineering. Those with limited experience find that the challenges of work assignments exceed their preparation from most undergraduate degree programs. In a typical computer-related undergraduate curriculum, it is not possible to devote enough credit hours specifically to software engineering to address all aspects of engineering complex systems including, for example, design for maintainability, concurrency, and distributed systems.

The professional certificate in software engineering, offered by the Department of Electrical and Computer Engineering and the Division of Continuing Education, covers the body of knowledge necessary to develop products more predictably and reliably for stand-alone programs as well as for software in more complex environments. The curriculum consists of three core courses:

- ECEN 4543/5543 Software Engineering of Stand-alone Programs
- ECEN 4043/5043 Software Engineering of Multi-program Systems
- ECEN 4053/5053 Software Engineering of Distributed Systems

Applicants for the certificate program must have received or currently be enrolled in a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through class work or work experience. They need not be enrolled in a degree-granting program at CU-Boulder. For more information, visit [ece.colorado.edu/academics/certificate](http://ece.colorado.edu/academics/certificate).

## Research Support

The University of Colorado at Boulder takes an active part in research in a wide variety of fields.

More than \$250 million in sponsored research and programs was generated this past year. Research and training grants and contracts awarded by various agencies of the federal government are the principal sources of these funds. The University of Colorado's research activity is also supported by appropriations from the state of Colorado, private foundations, and private donors. For more information, visit [ece.colorado.edu/academics/certificate](http://ece.colorado.edu/academics/certificate).

## Research Institutes

**The Cooperative Institute for Research in Environmental Sciences (CIRES)** is jointly sponsored by the University of Colorado and the National Oceanic and Atmospheric Administration (NOAA). CIRES employs almost 500 faculty, students, and staff from a variety of disciplines. Academic departments represented in CIRES are astrophysical and planetary sciences; atmospheric and oceanic sciences; chemistry and biochemistry; ecology and evolutionary biology; geography; geological sciences; electrical and computer engineering; mechanical engineering; and physics. The institute serves as a center for multidisciplinary collaboration among environmental scientists from Boulder and throughout the world. A visiting fellowship program enables scientists from other institutions to spend time at CIRES.

CIRES research programs involve field investigations conducted in the mountains of Colorado, the Aleutian Islands, the Arctic and Antarctic regions, Hawaii and various Pacific atolls, and elsewhere. Results of this research bear on such practical societal problems as destruction of the Earth's ozone shield by pollutants, acid deposition in rain and snow, degradation of air and water quality, toxic waste treatment, understanding climate change, and earthquake prediction.

Current CIRES research programs, in which approximately 45 graduate students participate, can be grouped into four areas. In environmental chemistry and biology, ongoing research involves measurements of constituents and reactions in the atmosphere, kinetics of reactions in the stratosphere and troposphere, aerosol chemistry, and leaching of toxic wastes from mining. Studies of atmospheric and climate dynamics include air-sea interactions, dynamics of the atmospheric boundary layer, ocean dynamics, ice nucleation physics, cryosphere-climate interactions, ice sheet dynamics, and contemporary and paleo-climatology.

Research in solid earth geophysics includes earthquake prediction and earthquake physics, plate tectonics, seismic wave propagation, nuclear test discrimination, rock deformation and fracture, strains and tilts associated with Earth tides and secular deformation, and normal modes of vibrations of the Earth.

The Cryospheric and Polar Processes division is a national leader in the study of polar processes. Its research emphasizes studies in high latitude regions, using numerical techniques and satellite remote sensing. Research activities are supported by the World Center-A for Glaciology, the National Snow and Ice Data Center, and the Snow and Ice Distributed Active Archive Center.

**The Institute of Arctic and Alpine Research (INSTAAR)** is an interdisciplinary research institute with ongoing programs in most earth/ocean environments as well as many alpine and most polar regions of the world. It operates the Mountain Research Station and publishes the quarterly journal *Arctic, Antarctic, and Alpine Research*. Faculty from anthropology; architectural engineering; atmospheric and oceanic sciences; civil and environmental engineering; ecology and evolutionary biology; environmental studies; geography; and geological sciences are associated with the institute, as are about 60 graduate and 80 undergraduate students.

Disciplines within INSTAAR include plant and animal ecology, paleoecology, palynology, geochronology, climatology, oceanography, hydrology, remote sensing, sedimentology, geophysics, glaciology, and glacial geology. The Center for Geochronological Research is involved in amino acid, fission-track, thermoluminescence and potassium/argon dating, stable isotope geochemistry, dendrochronology, and dendroclimatology.

**The Mountain Research Station**, located at 2,900 m (9,500 feet) in the Front Range of the Rocky Mountains, is operated for the university by INSTAAR. The station, a national center for field studies in the biological and physical sciences, is especially well known for long-term ecological, climatological, and atmospheric research.

The station offers researchers easy access to a variety of terrestrial and aquatic habitats at altitudes from 1,500 m to 3,800 m. A wide variety of courses is offered in areas such as plant and animal ecology, climatology, geomorphology, and hydrology. The station maintains the mountain climate program in support of the environmental field research conducted in the area.

Weather observing stations have been operated since 1952 at four altitudes between 2,200 and 3,750 m, and additional stations are established for new projects.

**The Institute for Behavioral Genetics (IBG)** is an organized research unit whose personnel conduct research on the genetic bases of individual differences in behavior and provide research training in this interdisciplinary area. This rapidly developing field brings to bear upon behavioral research the perspectives of biochemical genetics, developmental genetics, evolutionary genetics, molecular genetics, pharmacogenetics, and quantitative genetics. Facilities are available for research on a variety of organisms, including humans, laboratory mice, and nematodes. Institute faculty currently are applying the concepts and tools of behavioral genetics to such

diverse areas as aging, alcoholism, cognitive development, drug addiction, learning disabilities, neurological diseases, personality, and psychopathology.

**The Institute of Behavioral Science (IBS)** is an interdisciplinary research organization serving faculty and graduate students in the behavioral sciences. Its principal functions are to conduct and sponsor research programs involving two or more of the behavioral sciences and related fields; to provide research facilities, equipment, and administrative services for participating faculty; to facilitate graduate and undergraduate research training; and to disseminate information about its activities and findings to scientific groups and institutions.

The institute sponsors five research programs in environment and behavior, health behavior, political and economic change, population processes, and problem behavior. IBS includes the Center for Computing and Research Services which provides assistance and training in social science methods, statistics, and computing; the Center for the Study and Prevention of Violence; the Natural Hazards Research and Information Center, and the Population Aging Center.

**The Institute of Cognitive Science (ICS)** was established to promote interdisciplinary research in the fields of psychology, computer science, linguistics, philosophy, and other cognitive sciences. Its major research programs fall into five areas: natural language processing; human-computer interaction and knowledge-based systems; connectionist modeling; human information processing and skilled performance; and judgment and decision making. These programs include the use of artificial intelligence techniques and cognitive simulations in gaining an understanding of basic cognitive processes as well as educational and industrial applications.

**JILA (formerly the Joint Institute for Laboratory Astrophysics)** has played an international role in research and education in the physical sciences and technology since its founding in 1962. The institute offers training for academic researchers and industry scientists, facilitates research in the physical sciences, and fosters the invention of applications for other research laboratories as well as commercial companies. Academic disciplines span theoretical and experimental physics, chemical physics, stellar and galactic astronomy, atomic physics, geophysics, and measurement science. Specific strengths include laser technology, optoelectronics, precision metrology, state-of-the-art electronic and optical feedback control of dynamical systems, chemistry and physics of materials and processes, ultra-high precision spectroscopy and optics, and high-performance computing and image processing.

Applied technical contributions include laser wavemeters, uniquely precise mirror mounts, laser intensity stabilization technology, high-precision gravimeters, and vibration isolation techniques, as well as software that delivers international time standards over Internet. Scientists trained at JILA have joined such firms as Boeing, DuPont, Ford, and General Electric; numerous entrepreneurial companies; the Massachusetts Institute of Technology's Lincoln Laboratory, Oak Ridge National Laboratory, and other major laboratories; and universities throughout the country, including the University of California, Georgia Institute of Technology, University of Wisconsin, and Yale University.

The senior technical staff comprises scientists from the National Institute of Standards and Technology (NIST) and the University of Colorado. The Departments of Physics, Chemistry and Biochemistry, and Astrophysical and Planetary Sciences are affiliated with JILA. The institute offers a rich mix of research and educational experience that makes graduate study at JILA a distinctly interdisciplinary endeavor. Each year, the institute attracts numerous scientific visitors and seminar speakers. In ad-



dition, graduate students attend in-house seminars to enhance their skills in laboratory electronics, instrument making, computing, and technical writing.

The JILA building centers around a 10-story tower containing offices for scientific and administrative support staff, a 128-seat auditorium, and a laboratory wing with an isolated, underground research bay. A four-story south wing contains some of JILA's computing systems, laboratories for advanced laser studies and experiments, a reading room, meeting rooms, and private offices. Research and education are supported by expert, professionally staffed electronics and instrument shops; computing, networking, and administrative services; and by a Scientific Communications Office.

A brochure describing JILA is available by writing the JILA chair, University of Colorado at Boulder, 440 UCB, Boulder, CO 80309-0440; 303-492-6787; or [jilawww.colorado.edu](http://jilawww.colorado.edu).

**The Laboratory for Atmospheric and Space Physics (LASP)** is a center for basic theoretical and experimental research in planetary, atmospheric, solar, and space physics. LASP is unique among space research labs for providing full-cycle capabilities whereby scientists analyze scientific data and develop new theories and work closely with the engineers to design and build space flight instruments. The mission operations group then operates the spacecraft and instruments and relays the data to the scientific community. As the data is analyzed, new theories are formulated and the process begins again. All areas utilize a combination of professional and student employees.

Students and faculty from the Departments of Astrophysical and Planetary Sciences, Atmospheric and Oceanic Sciences, Physics, Geological Sciences, and the College of Engineering and Applied Science pursue their research interests under the auspices of the laboratory. LASP has experiments on several NASA spacecraft including the Cassini mission to Saturn and the *SORCE* and *TIMED* instruments in Earth orbit studying the Sun's influence on the Earth's atmosphere. Missions in the development phase include the *MESSENGER* mission to Mercury, a student-designed instrument going to Pluto, the *AIM* and *SDO-EVE* missions for Earth orbit, as well as scientific data analysis from Mars.

LASP is home to the CU Center for Astrobiology, part of NASA's Astrobiology Institute. Scientists from many disciplines across campus work together to understand the origin and evolution of life on Earth, the habitability and potential for life elsewhere in our solar system, and the distribution of Earth-like planets and the potential for life beyond it.

Since the early years of LASP, the laboratory has been involved in understanding the Sun and its impact on the Earth. LASP's internationally recognized space physics program is part of a multi-billion dollar investment toward understanding the Sun-Earth system in unprecedented scope and detail. Using spacecraft linked with ground-based elements and theoretical modeling tools, the combined resources provide both a telescopic and microscopic view of the physical processes that drive our solar system and our near-Earth environment, increasing our understanding of how they impact our power systems, communications links, and the constellation of spacecraft upon which we increasingly rely.

The Engineering and Mission Operations Divisions of LASP support the Scientific Division using students, supervised by full time professionals, to design, build, test, and operate spacecraft and space flight instruments.

For additional information about LASP and its current programs, visit [lasp.colorado.edu](http://lasp.colorado.edu).

## Research Centers

**The Business Research Division** performs contract research and provides the Colorado business community with information and special studies on the state's economy and business problems. The division is also responsible for the organized research activities of the Leeds School of Business, which are conducted through four organizations. The **Center for Sustainable Tourism** is a think tank where students meet with faculty, industry leaders, and government officials to acquire technical and industry knowledge about sustainable tourism development for their eventual role as leaders in the tourism industry. The **CU Business Advancement Center** and the **Rocky Mountain Trade Adjustment Assistance Center** provide management assistance, business information, and consulting services to small and medium-sized businesses in the region. The **Mid-America Manufacturing Technology Center Colorado**, with locally based field engineers and project management staff, provides on-site assessments of the business and technical aspects of small manufacturing operations in the state and recommends priority actions to improve a company's competitive position.

The College of Engineering and Applied Science oversees 19 interdisciplinary research centers whose programs augment discipline-based research in traditional academic fields. These research centers have a wide variety of research foci such as the commercial development of space (**BioServe**); decision support for water and environmental systems (**CADSWES**); manufacturing and packaging microwave, optical, and digital electronics (**CAMPMODE**); applied parallel processing (**CAPP**); computer simulations in aerospace structures (**CAS**); astrodynamics research (**CCAR**); combustion research (**CCER**); information storage (**CCIS**); drinking water optimization (**CDWO**); photopolymerization methods (**CFAP**); biotechnology seed grants, fellowships, internships, and symposia (**CIRB**); power electronics (**CoPEC**); pharmaceutical biotechnology (**CPB**); RNA technology (**CRC**); international standardization (**ICSR**); lifelong learning and design (**L<sup>3</sup>D**); separations using thin films (**MAST**); micro-electromechanical devices in medical applications (**MEDICA**); and optoelectronics in computing systems (**OCS**).

A number of research centers are affiliated with other academic departments, schools, colleges, or programs.

**The Center for Astrophysics and Space Astronomy (CASA)** is a research center within the Department of Astrophysical and Planetary Sciences. CASA provides a focus for campuswide expertise in experimental, observational, computational, and theoretical astrophysics, including solar and stellar physics, interstellar and intergalactic medium studies, star and planetary system formation, galactic and extragalactic astrophysics, and cosmology. Staff members carry out research involving x-ray, far-UV, optical, infrared, submillimeter, and radio observations using both satellites and ground-based facilities.

CASA scientists play leading roles in data analysis for NASA astrophysics missions such as the Hubble Space Telescope. CASA instrumentalists manage an active sounding rocket program, develop millimeter instrumentation for the CalTech Observatory Submillimeter and Herschel Space Observatory, built the spectrographs for the Far Ultraviolet Spectroscopic Explorer (FUSE), and are developing the Cosmic Origins Spectrograph (COS) to be installed in the Hubble Space Telescope in 2005.

Other CASA programs include laboratory experimentation on molecules of astrophysical interest, space and ground-based observations in all wavelength bands from x-ray to radio, extensive numerical modeling of the evolution of matter in the early universe to study the formation and evolution of galaxies and intergalactic medium, and theoretical investigations in many areas of astrophysics.

**The Center for British Studies** promotes research in all aspects of British culture, history, and contemporary life. Its resources include the outstanding research collections of the University of Colorado Libraries, including a wide range of microfilmed copies of original materials from Britain. The center is the leading research facility in British studies in the Rocky Mountain/high plains area.

The center sponsors visiting lecturers, colloquium series, and conferences, and serves as a gathering point for scholars and students in the region. It welcomes outside users of the research collections and continues to develop the research base. The center also cooperates with community groups in sponsoring activities dealing with British politics, business, and the arts.

**The Center for Economic Analysis** provides opportunities for research in all fields of economics. The center seeks to identify, acquire, and distribute new and underutilized data sources. It also encourages research in topics of interest to members of the economics department and offices of state and local government. It assists in distributing such research to inform the scholarly community and the Colorado policy community.

**The Center for Labor Education and Research (CLEAR)** conducts labor education programs and research in various aspects of labor relations. Noncredit courses are offered for members of organized labor as the university's service to the labor community of Colorado. Graduate students may attend conferences with staff members and use available library facilities. CLEAR staff members also teach credit courses in other schools and colleges.

**The Center for Public Policy Research** stresses the integration of knowledge and practice to improve public policy. The research program includes policy analysis in such areas as environment, natural resources, poverty, growth management, and economic development, as well as the development of theory and methods for the policy sciences. The center also supervises the public policy curriculum for the MA in political science (public policy option).

**The McGuire Center for International Economics**, organized within the Department of Economics, is dedicated to research and graduate training in a broad range of international topics. Specialties of faculty associated with the center include international trade and finance, monetary theory and policy, monetary history and reform, and economic development and macroeconomics. Research on questions concerning international debt and trade relations in the Pacific region is given particular emphasis and support. The center offers opportunities for students and faculty interested in interdisciplinary work between international economics and areas such as international politics, conflict and peace studies, and international business.

## Laboratories and Special Equipment

Laboratories, special classrooms, and specialized equipment are essential to graduate training and research. Some of the facilities at the University of Colorado are described in the following paragraphs.

**Aerospace engineering sciences** is equipped with both high-end workstations and PCs, a low-turbulence wind tunnel, laboratories in structural dynamics and controls, a guidance and control laboratory, a Global Positioning System laboratory, and the Lockheed Martin Room, dedicated to senior design teams. Space hardware laboratories aid in developing expertise in electronics, structures, fluids, and thermal control for the development, testing, and operation of small payloads; and space biotechnology laboratories develop expertise in microgravity studies involving animal physiology, agricultural products, bioprocessing, and advanced spacecraft life support systems. Computer laboratories are equipped for use in upper-division and graduate courses and for graduate research, with special capabilities for computer-

aided control systems design, satellite image processing, satellite mission design, and parallel processing for computational structural mechanics, fluid dynamics, control, acoustics, and optimization. A NOAA satellite receiving station is available to the department for use in teaching and research.

**The Department of Astrophysical and Planetary Sciences** emphasizes studies of theoretical, instrumental, and observational astrophysics (including the sun), planetary atmospheres and surfaces, astrophysical fluid dynamics, space physics, and plasma astrophysics.

The department is a member of the ARC 3.5m telescope consortium and operates the Sommers-Bausch Observatory and laboratories for space astrophysical hardware, computational fluid dynamics, and UV/IR/X-ray astronomy. Also used are observational facilities of Cerro Tololo Inter-American Observatory in Chile; the Kitt Peak National Observatory in Tucson, Arizona; the Very Large Array (VLA) in New Mexico; and many NASA astronomical and planetary satellites, such as the Hubble Space Telescope, Galileo and Cassini Spaceprobes, and Far Ultraviolet Spectroscopic Explorer. Teaching and research are conducted in collaboration with the Laboratory for Atmospheric and Space Physics (LASP), JILA, the National Center for Atmospheric Research (including the High Altitude Observatory), and the Center for Astrophysics and Space Astronomy (CASA).

**Chemical and biological engineering research facilities** are extensive and modern. Nearly all research equipment is interfaced to microcomputer systems for automated data collection, monitoring, and control.

Studies in heterogeneous catalysis and surface science use ultrahigh vacuum systems located in the chemical engineering laboratories.

Research in chemical process control makes extensive use of an array of real-time computer systems and experimental units.

The suspension fluid dynamics laboratories include microfilters, sedimentation devices, and particle size analyzers.

Membrane studies use casting machines for fabricating flat sheet and hollow fiber membranes, and a variety of analytical equipment. A pendant drop tensiometer is used to study membrane formation via interfacial polymerization. A differential scanning calorimeter is used for determining the glass-transition and crystallization temperatures as well as other properties of polymeric membrane materials.

The biotechnology research laboratories are equipped with highly instrumented and controlled fermenters, high-performance liquid chromatographs, a flow cytometer, a tissue-culture laboratory, a DNA microarray facility, a UV-vis scanning spectrophotometer, an electron paramagnetic resonance spectrometer, a phosphorescence imager, centrifuges, and other standard bioprocess and bioanalytical equipment.

In the polymer laboratories, the latest differential scanning calorimeter is used to study photopolymerization reactions and phase transitions. Nonlinear optical polymeric materials are characterized on an optical bench equipped with a Neodymium/YAG laser and photo detection system. The laboratories are also equipped with a Hewlett Packard UV-visible spectrophotometer and facilities to perform photopolymerizations to produce membranes and polymer films.

The ceramics processing laboratory includes a high-temperature furnace, a thermal gravimetric analyzer, and several fluidized beds.

**Civil, environmental, and architectural engineering** research encompasses the infrastructure of our modern society, which depends on the technologies of structural, geotechnical, environmental, water resources, building systems, and construction engineering. Research facilities include unique laboratories for multiscale simulation of civil, environmental, and building systems. A 400 g-ton centrifuge with a sample capacity of two tons is used for simulation of the behavior of earthen and structural systems. The department has one of the 15 NSF-supported George Brown National Network for Earthquake Engineering Simulation facilities in the United States for dynamic testing of the response of large structural elements to earthquakes. The Larson Building Systems Laboratory contains a full-size room with complete HVAC controls for the study of energy efficiency, comfort, and room air quality in buildings. The Center for Drinking Water Optimization maintains laboratory facilities and a mobile pilot plant to develop water treatment technologies such as disinfection to optimize drinking water quality, minimizing costs and health risks. The environmental fluid mechanics laboratory contains a large capacity hydraulic flume equipped with a 3-D laser system for visualization of turbulence and mixing in order to study aquatic ecology and contaminant dispersion in surface waters. In addition, numerous research projects are carried out in multipurpose laboratories on the Boulder campus and at field sites from Colorado to Antarctica. The department maintains significant computing facilities for research in diverse areas such as construction project management and groundwater contaminant transport. The Center for Advanced Decision Support for Water and Environmental Systems develops software that is widely used in river basin management throughout the United States. Drawing on these facilities, faculty and students have initiated interdisciplinary research that seeks to apply emerging analytical methods such as life-cycle analysis to study the long-term interactions between built infrastructure (building, transportation, and hydraulic structures), the environment, natural resources, and the concerns of human society for safety and well-being.

**The Department of Computer Science** supports its own domain ([cs.colorado.edu](http://cs.colorado.edu)), which is a 10/100/1000 mb network connected to the campus and the world by gigabit fast ethernet. The department has been instrumental in pushing the campus to a faster networking model through research. Research and computing needs are handled by department staff. Computer science supports most architectures and operating systems, giving research students the opportunity to learn about and use the latest, greatest equipment and software.

Current hardware inventory includes Sun Microsystems workstations and servers, Digital Compaq workstations, an Alpha and DS20 parallel processing cluster, Macintoshes and Windows 2000 desktop workstations, HP workstations, NCD xterminals, and various computers. All are networked with 10/100/1000 mb networks connected with switches and hubs to a firewalled gateway.

**Electrical and computer engineering** special equipment and facilities include a class 1000 clean room facility for epitaxial growth and fabrication of microwave and optical devices, high-vacuum and vacuum deposition equipment for thin-films research, an integrated circuits laboratory, ion implantation equipment, crystal growing facilities, a systems and control laboratory, a laboratory for data storage research, a digital system design laboratory, a power electronics design laboratory, undergraduate laboratories in circuits, electronics, and energy conversion, several holography and optics laboratories, a computer laboratory for VLSI design, a microwave device research laboratory, a communications laboratory, a roof-mounted antenna range, numerous special-purpose computers, an anechoic chamber for studying propagation effects

at microwave frequencies, a special microscope for laser manipulation of microorganisms *in vivo*, and an electromagnetic fields bio-effects laboratory.

The department has a variety of computing equipment to support its research and instructional activities. Most machines are connected via Ethernet, which also provides access to a large number of shared computing resources on campus.

**Mechanical engineering** laboratories provide for experimental studies of thermal, mechanical, and electronic systems. Typical areas of study include heat transfer, fluid and solid mechanics, mechanical behavior of materials, combustion, prosthetic device performance, electronic packaging and manufacturing, and design optimization.

The combustion laboratory contains instrumentation for velocity, temperature, and composition measurements in chemically reacting flows. Included are systems for gas chromatography, laser-induced fluorescence spectroscopy, laser absorption spectroscopy, laser schlieren, laser interferometry, and laser doppler anemometry. The laboratory is also equipped for computer control of the instrumentation and automatic data reduction including graphics capabilities.

The materials laboratory is well equipped for the measurement of the physical and mechanical properties of polymers, metals, ceramics, and composites. Major facilities include a pressure dilatometer with capabilities to 200 MPa and 450°C for determination of solid and melt equations of state, a forced-oscillation dynamic mechanical analyzer as well as a large capacity torsion pendulum for measurement of modulus and damping behavior, a modern servohydraulic mechanical test system for the analysis of tensile and relaxation properties, and an acoustic microscope for morphological studies.

The fluid mechanics laboratory is equipped with several basic facilities for experimentation in fluid systems. The Stokes flow apparatus is devoted to measurement of drag in highly viscous fluid flow using laser-timer instrumentation. The Taylor-Couette apparatus incorporates thermistor sensors, laser sheet visualization, and computer data acquisition to study instabilities of fluid motion between rotating cylinders with a radial temperature gradient. A humidity-controlled room provides an environment for studying the stability of rotating capillary rivulets. A Ling vibration exciter provides the basis for g-jitter experiments on the stability of differentially heated fluid layers.

The packaging laboratory is equipped with a quick prototyping workcell for semicustom multichip modules, two fluxless solder reflow chambers, a thermosonic flip-chip bonding machine and a thermal-chip testing system. The electronic manufacturing laboratory houses a mock-up chemical vapor deposition reactor, a condensation soldering set-up, a wind-tunnel for testing various high performance heat sinks, and a Czochralski crystal growth simulator. This equipment supports work on novel packaging and process control techniques, including artificial neural networks and fuzzy logic.

**The Mechatronics Laboratory** has state-of-the-art facilities to lay out MEMS designs using Tanner Research Tools and IntelliCAD simulation software. The laboratory has probe stations equipped with computer control, video cameras, and power supply units. Personnel are able to activate, record, and evaluate MEMS to be fabricated for the proposed study.

Various optical instruments are available to verify the electromechanical behavior of fabricated MEMS in real time as a function of environmental temperature and pressure. For temporal response studies, an optical interferometer is available. For static deformation studies, a Zygo Interferometric Microscope (New View 200) is available in the **MEMS R&D Laboratory**. This imaging system uses noncontact scanning white light inter-

ferometry and provides 3-D surface analysis with Z-scan from 1 nm to 5,000  $\mu\text{m}$  with 0.1 nm height resolution. The field of view is adjustable from 1  $\mu\text{m}$  to 50 mm. With this unique system staff can visualize and study any MEMS deformation induced by internal material stresses and/or applied external forces, as well as the wear effects due to friction.

**The Nuclear Physics Laboratory**, of the Department of Physics, conducts theoretical and experimental research in nuclear physics. Theoretical work is directed primarily to the studies of the structure and interactions of strongly interacting particles. Experimental work is focused on intermediate and high energy electron and meson beam interactions with nucleons and with complex nuclei. The laboratory is well equipped with shop, laboratory, and computing facilities for the preparation of experimental equipment and for the analysis of data.

Graduate students and faculty of the laboratory carry out experiments at CEBAF, Brookhaven National Laboratory, TRIUMF (in Vancouver, Canada), DESY (in Hamburg, Germany), and elsewhere. Support for the research program comes from the U.S. Department of Energy. Research assistantships are available in both theoretical and experimental studies.

**The High Altitude Observatory (HAO)** is an internationally recognized center for the study of solar, solar-terrestrial, and related astrophysics with emphasis on the interrelationships. Established in 1940, HAO has its central laboratory and administrative offices in the National Center for Atmospheric Research (NCAR) building in south Boulder.

HAO is a part of NCAR, which is sponsored by the National Science Foundation. HAO's extensive research facilities are used by graduate students pursuing advanced studies in atmospheric sciences and physics.

# School of Journalism and Mass Communication

*Paul S. Voakes, dean*

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school web site: [www.colorado.edu/journalism](http://www.colorado.edu/journalism)

**T**HE IMPORTANCE OF THE MEDIA and their messages is growing at an unprecedented rate. However, as mass communication technology delivers new career opportunities it also presents the challenges of reaching increasingly overwhelmed audiences and understanding the implications of this information deluge.

Small classes in a big-university setting 40 minutes from downtown Denver provide students with the skills to excel in the job market and also the intellectual and conceptual background to help shape the future of both new and traditional media.

With a history of journalism instruction that dates back to 1909, the school provides a sound liberal arts foundation and solid professional preparation. Students receive education aimed at disciplined, critical thinking and analysis through the study of media history, law, ethics, writing, and social processes.

## Diversity

The school is actively committed to helping media organizations reflect the diversity of the communities they serve. It does this through focused recruitment and retention efforts aimed at preparing underrepresented students with the skills and support to excel as media professionals.

## Media Opportunities

The school takes full advantage of its proximity to Denver, a major media market. Distinguished media professionals regularly serve as adjunct faculty at both the undergraduate and graduate levels. Hundreds of Denver and Boulder area media organizations provide wide-ranging internship and career opportunities. Students consistently are offered highly competitive internships at leading Denver television and radio stations, newspapers, advertising agencies, public relations firms and government, nonprofit, and corporate public information offices. Internships are available in communities throughout the state—including Colorado's mountain resort areas—and across the country.

## Facilities and Equipment

The school is a leader in applying the latest mass communication technology. Students learn digital video and audio recording and editing, new-media design, efficient strategies for conducting online research, and how to create advertising using the latest software.

Students obtain hands-on experience in the school's labs and studios. All lab courses—reporting, editing, advertising, radio, television, new media, and photojournalism—contain no more than 20 students. Broadcast students use some of the latest electronic tools including digital video cameras and computer-based editing systems. Computer labs have the latest editing and

graphics software. The school subscribes to Associated Press, CNN Satellite News Service, and other online news sources.

## Accreditation

The School of Journalism and Mass Communication is accredited by the Accrediting Council on Education for Journalism and Mass Communications. It is a fundamental principal of the ACEJMC that education for journalism be broadly based. Undergraduate students take about two-thirds of their college course work outside of the school and approximately one-third in the school.

## Undergraduate Programs

The school enrolls 600 sophomores, juniors, and seniors in five sequences. Students begin with a broad education in the liberal arts and finish with superior professional preparation and media studies instruction. Most students take advantage of the school's extensive internship listings to obtain significant media experiences.

In addition to the required courses, the school offers all students a wide range of classes in many aspects of media practice including photojournalism, electronic and digital journalism, advertising creative development, consumer behavior, publication design, magazine article writing, public relations principles, and projects and communication law.

Media criticism and analysis are also broadly represented in the curriculum through courses such as media institutions and economics, media ethics, mass communication history, international mass communication, and special-topics offerings.

Students who intend to apply to the school complete their freshman year of undergraduate work (a minimum of 30 semester hours) typically in the College of Arts and Sciences as prejournalism and mass communication majors.

Upon completion of their studies in the school, students receive a bachelor of science degree in journalism from one of five sequences.

- Advertising
- Broadcast News
- Broadcast Production
- Media Studies
- News-Editorial

## Student Activities

Many successful alumni proudly trace their careers back to student-run media and professional organizations here. With print and electronic editions, the *Campus Press* covers the university community. "CU Sports Magazine" is a weekly televised



program that follows collegiate athletics. KVCU, the university's 24-hour radio station, broadcasts to the Denver area. *Cultural Currents* is a newsletter that focuses on issues of diversity in media coverage and personnel. "NewsTeam Boulder" is a twice-weekly cable news show produced by students in the advanced broadcast classes.

All news-editorial students complete internships at local daily newspaper as reporters, copy editors, online editors, or photographers. Students participate in chapters of the Advertising Club, Society of Professional Journalists, the Multi-ethnic Media Organization (MEMO), Association for Women in Communication, and Journalism Board, the student government organization.

## Internships

An ambitious year-round program helps students locate quality internships suited to their specific career goals. Many students leave having completed two or more internships. In addition to internships at weekly and daily newspapers, students also complete internships at magazines, advertising and public relations firms, businesses, and at government and social service agencies. Others find broadcast and cable television internships and many students have cutting-edge experiences at local online companies.

Students regularly obtain nationally competitive internships through such organizations as the Politics & Journalism Semester in Washington, D.C., the Dow Jones Newspaper Fund, American Society of Magazine Editors, and the Advertising Club of New York.

In recent years students have served as interns at: *The New York Times*, *The Wall Street Journal*, *USA Today*, *Newsday*, *Ski*, *Skiing*, *Freeze*, *Ski Trade News*, *Freeskier*, *National Geographic*, *Reader's Digest*, *Worth*, *Better Homes & Gardens*, *Sports Illustrated*, *InLine Magazine*, *Rock & Ice*, "The News Hour with Jim Lehrer," "The Today Show," "48 Hours," "Late Night with Conan O'Brien," "Entertainment Tonight," "Hollywood One-on-One," MTV, Fox Sports, NBC, ABC, CNN, National Public Radio, Encore Media, Direct TV, U S West, Sun Microsystems, Lockheed Martin, Lucent Technologies, IBM, AT&T, Ball Aerospace, the U.S. Olympic Committee; and national advertising agencies such as DDB and BBDO in New York; Goodby, Silverstein & Partners in Portland; Foote, Cone & Belding in Los Angeles; TBWA Chiat; Day, Olgivy, and Mather; and Young and Rubicam.

Internships are also available in communities throughout the state, including Colorado's mountain resort areas.

## Careers

Graduates of the School of Journalism and Mass Communication hold key positions throughout the United States in advertising, news, entertainment, government, education, business, and law. Many participate in the rapidly expanding alumni Career Network to help new graduates get started in their field by providing advice and contacts. The Student Resource Center fields local and national job opportunities through its contacts with employers and hosts on-campus interviews with a wide variety of employers. The center also assists students and graduates by offering individual counseling and a regular series of workshops on résumé preparation, interviewing, and career planning specifically for media careers. The center maintains a library of media directories and career planning resources and offers students extensive lists of web sites related to media jobs.

## Centers and Research

Through the **Center for Environmental Journalism** the school seeks to enrich and elevate the quality, range, and significance of media coverage of environmental issues. The CEJ is home to the

prestigious Ted Scripps Fellowships in Environmental Journalism, which provide working journalists with a one-year opportunity to deepen their understanding of environmental science, policy, law and journalism.

The **Resource Center for Media, Religion, and Culture** at the school's Center for Mass Media Research is a clearinghouse of information for those interested in exploring the intersection of religious and media-related practices in the everyday lives of contemporary adults and their families.

The **blurr digital innovation lab** is a state-of-the-art multimedia computer facility dedicated to teaching and experimentation in interactive design.

The school's **New Media Center** is where tomorrow's online professionals cut their teeth and where innovative teaching and media software are developed and implemented. The NMC is working with the Colorado Press Association and similar organizations to shape the next generation of mass communication technology.

## Study Abroad Programs

The School of Journalism and Mass Communication, in conjunction with the Office of International Education, encourages students to participate in the university's study abroad programs. Study abroad usually is undertaken during the junior year. Since an additional semester may be necessary to meet graduation requirements, prospective majors are urged to plan early and seek advising from the journalism and mass communication faculty. Programs are offered in more than 35 countries worldwide. Information and application forms are available at the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123.

## Academic Excellence

### Honors

Journalism and mass communication students may graduate with general honors and/or school honors. Students interested in general honors must consult the honors program office. The school may award the bachelor's degree with honors to students who have a 3.50 cumulative grade point average and a 3.50 grade point average in journalism and mass communication courses, complete an independent study in journalism and mass communication involving scholarly research effort, and demonstrate a high degree of professional skill. Application for school honors must be made to their advisor at the beginning of the student's final semester.

Students whose academic records rank in the upper 10 percent are eligible for election to Kappa Tau Alpha in recognition of outstanding scholastic achievement.

## School Awards and Scholarships

Alumni and friends of the school have made it possible to provide more than three dozen annual scholarships and awards to officially admitted students in the School of Journalism and Mass Communication. The deadline for application is February 20.

Ralph Allen Scholarship  
 Gerald C. Bean Memorial Scholarship  
 Boulder Press Club Award  
 Mary Frances Berry Scholarship in Journalism  
 Chris M. and Chris J. Burns Memorial Scholarship  
 Fred Casotti Sports Information Scholarship  
 Eugene Cervi Memorial Scholarship  
 Philip John Coffey Scholarship Fund  
 Colorado Broadcasters Association  
 Denver Women's Press Club Scholarship  
 Alvin G. Flanagan Scholarship

Curtis Michael Gimeno Memorial Scholarship  
 Greeley Tribune Scholarship  
 Barrie Hartman News Editorial Scholarship  
 Marcella G. Hertzog/Georgene Carlsen Memorial Scholarship  
 John Holden Graduate Fellowship Award  
 Brian Hostetler Memorial Scholarship  
 Raymond B. Johnson Memorial Scholarship  
 Karsh and Hagan Advertising Scholarship  
 Courtney Erin Klee Memorial Scholarship  
 Leona "Nonie" Lann Scholarship  
 Lehman Communications Corporation Scholarship  
 J. Winton Lemen Memorial Scholarship  
 Arthur B. Levis Scholarship  
 Mabee Memorial Scholarship  
 Dominic Manzanares Memorial Scholarship  
 North American Snowsport Scholarship  
 L.C. Paddock Memorial Scholarship  
 Bob and Gloria Palmer Scholarship  
 Gladys Van Vranken Parce Memorial Scholarship  
 Don Ridgway/Colorado High School Press Association Scholarship  
 Ed Sardella Broadcast Scholarship  
 J. Ember and Agnes Sterling Memorial Scholarship  
 A. Gayle Waldrop Award  
 William W. White Awards: Outstanding Graduate and Outstanding Senior

## Academic Standards

### Scholastic Suspension

Journalism students are subject to suspension if they do not maintain a cumulative university grade point average of 2.25 and a cumulative journalism and mass communication grade point average of 2.50.

Students whose grade point averages fall below either of these levels are normally placed on probation for one semester, during which they have an opportunity to raise their averages to the required levels. Students whose averages continue below the required levels are subject to suspension from the School of Journalism and Mass Communication and will be notified in writing.

Scholastic records will be reviewed as soon as possible after each semester, and students will be informed in writing if they are to be placed on probation or suspension.

The normal period of suspension is two regular semesters (one academic year, excluding summer sessions). The period of suspension will be stated in the suspension notice to the student. A student suspended a second time will be reinstated only on the basis of unusual circumstances, which the student should state in a petition to the dean of the school.

### Academic Dishonesty

The School of Journalism and Mass Communication has adopted a statement on academic dishonesty to maintain the highest standards of intellectual honesty. Copies of the statement are available from all advisers and in the school office.

## Admission and Enrollment Policies

### Requirements for Admission

Students who intend to apply to the school complete their freshman year of undergraduate work (a minimum of 30 semester hours) typically in the College of Arts Sciences as prejournalism and mass communication majors. Students may be eligible to apply to the school during the second semester of their freshman year for admission as sophomores to one of the five sequences. See Undergraduate Admission in the General Information section for admission standards for transfer students.

### Prejournalism and Mass Communication

Prejournalism and mass communication students are enrolled in the College of Arts and Sciences until they are eligible to transfer into the School of Journalism and Mass Communication, which normally occurs at the end of the freshman year. They must have completed or be working toward completing 30 semester hours with a grade point average of at least 2.25. These students must consult with advisors in the school.

Before they can apply for admission to the school, prejournalism and mass communication majors must make satisfactory progress in courses that meet the core areas of study requirements in the College of Arts and Sciences. Students must complete or have in progress two journalism classes (JOUR 1001 and 1002) with a GPA of at least 2.50 before applying.

Students wishing to apply to the School of Journalism and Mass Communication must fill out an intrauniversity transfer (IUT) form and a letter of application by October 1 for spring admission or February 20 for fall admission. Students must indicate the sequence in which they wish to enroll. Meeting these minimum requirements does not guarantee a student admission to the school.

### Transfer Students

Students applying to transfer into the School of Journalism and Mass Communication from another institution should have 30 semester hours of college credit and should have completed two introductory courses in journalism with a GPA of at least 3.00 before they apply. Students without 30 hours of credit should apply to the College of Arts and Sciences' prejournalism major. See Undergraduate Admission in the General Information section for transfer student admission standards.

### Attendance Regulations

Students are expected to attend classes regularly and to comply with the attendance regulations specified by their instructors at the beginning of each semester. A student who does not attend any of the first week's sessions of a class during a term may be dropped from the class.

### Credit Policies

#### Pass/Fail

In addition to the university's general policies, majors in the School of Journalism and Mass Communication may not take any MAPS, arts and sciences core requirements, business, or journalism and mass communication course *pass/fail*, but any other course may be taken *pass/fail*. Up to 16 hours of nonjournalism courses may be taken *pass/fail*, except for transfer students, for whom the limit is one hour in every eight attempted at the University of Colorado. Only six hours of *pass/fail* may be taken in any one semester.

#### Transfer Credits

Credit in subjects transferred from other institutions to the University of Colorado is limited to the amount of credit given for similar work at the University of Colorado. Transfer credits in journalism and mass communication are limited to 12 semester credits from four-year institutions and 6 semester credits from two-year institutions. All transfer credit is subject to approval of the dean of the school. A proficiency examination in journalistic writing and language skills may be required of those who wish to transfer credit equivalent to JOUR 1002. For additional information on transfer of credit policies, please see the Transfer of College-Level Credit section.

## Residence Requirement

A candidate for a degree from the School of Journalism and Mass Communication must earn the last 30 hours in residence at the University of Colorado. This may include courses taken on the Boulder, Denver, or Colorado Springs campus.

## Senior Requirement

Seniors should file a diploma card with the school by October 15 for May graduation and March 1 for August and December graduation. Diploma cards are available at the office of the School of Journalism and Mass Communication.

## Withdrawal

Students may withdraw at any time prior to the start of the final examination period. Students are encouraged to consider the Time Out Program when their withdrawal from the university is temporary.

## Advising

Majors are required to consult an advisor each registration period. Advising is available from faculty and staff throughout the academic year, and major advising sheets are provided for each sequence. However, students are ultimately responsible for fulfilling all degree requirements.

## Requirements for Graduation

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours is required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

## Double-Degree Programs

Students may complete requirements in two fields and receive two degrees from the university. Such double-degree programs are available combining journalism and mass communication with business, music, or disciplines in the College of Arts and Sciences, and generally require 150 hours to complete. Students must make application for a double-degree program in both the School of Journalism and Mass Communication and the Leeds School of Business, the College of Arts and Sciences, or the College of Music. Any other combined program must be arranged by consulting both schools or colleges.

## Sequences

### Advertising

The advertising major prepares students for careers with advertisers, in ad agencies, and in the media. The program was ranked among the top 10 in the country by the International Clío Awards. The curriculum includes courses in advertising principles, copy writing and layout, media, campaigns and consumer behavior. The major offers in-depth preparation for a career creating ads through a variety of electives focusing on the development of print concepts, art direction, and portfolio development. Recently students have interned at major ad agencies including DDB; BBDO; J. Walter Thompson; Saatchi and Saatchi; Goodby, Silverstein and Partners; Foote, Cone and Belding; TBWA Chiat Day; Ogilvy and Mather; and Young and Rubicam. Students in the creative track have taken home top awards three years in a

row in the National One Show Festival, the premier student creative competition sponsored by New York City's One Club.

### Course Requirements for Advertising Majors

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

#### Journalism Core Requirements (9 hours)

JOUR 1001-3 Contemporary Mass Media  
JOUR 1002-3 Critical Thinking and Writing  
JOUR 2011-3 Media and Public Culture

#### Advertising Requirements (19 hours)

JOUR 2403-3 Principles of Advertising (sophomore standing)  
JOUR 3453-3 Copy and Layout (JOUR 2403 prerequisite)  
JOUR 3463-3 Advertising Media (JOUR 2403 prerequisite) or JOUR 3503 Intermediate Creative  
JOUR 3473-3 Advertising Research (JOUR 2403 prerequisite)  
JOUR 4403-4 Campaigns (JOUR 3453, 3463, and 3473 prerequisites)  
JOUR 4931-3 Internship (JOUR 3453 or 3463 prerequisite)

#### Journalism Electives (a maximum of 12 hours)

#### Additional Requirements (10 hours)

ECON 1000-4 Introduction to Economics or ECON 2010 Principles of Microeconomics  
BCOR 2050-3 Fundamentals of Marketing  
MKTG 3250-3 Buyer Behavior

## Broadcast News

The broadcast news major prepares students for careers as news producers, reporters, photographers, editors, and writers for radio and television news organizations and cable TV systems. The curriculum covers several aspects of broadcast journalism, including broadcast news writing, video photography and editing, television reporting and producing, and mass communication law. Students produce and anchor live newscasts twice a week and have won regional Emmys for their work. Almost all students intern at local major market network affiliates. Students also regularly win nationally competitive internships, and some have recently interned at NBC, ABC, CBS, CNN, Fox Sports, National Public Radio, and the News Hour with Jim Lehrer.

### Course Requirements for Broadcast News Majors

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

#### Journalism Core Requirements (9 hours)

JOUR 1001-3 Contemporary Mass Media  
JOUR 1002-3 Critical Thinking and Writing  
JOUR 2011-3 Media and Public Culture



**Broadcast News Requirements (15 hours)**

JOUR 3604-3 Radio and Television News (JOUR 1002 prerequisite)  
 JOUR 3644-3 Principles of Production (JOUR 1002 prerequisite)  
 JOUR 4354-3 TV Reporting (JOUR 3604, JOUR 3644 prerequisites)  
 JOUR 4624-3 NewsTeam (JOUR 4354 prerequisite)  
 JOUR 4651-3 Mass Communication Law (junior standing prerequisite)

**Electives and Internships (4–16 hours)**

JOUR 4931 (1-3) Internship (JOUR 3604, JOUR 3644 prerequisites)

**Broadcast Production**

The broadcast production program prepares students for production careers in radio, television, cable, private industry, and independent firms, including positions in programming, advertising, promotion, and management. The curriculum includes broadcast news writing, broadcast production principles, mass communication law, and advanced television and radio production. Students direct and handle production duties for a live newscast twice a week. Many intern at Denver network affiliates and production facilities. Some compete successfully for internships at national news and entertainment organizations such as MTV, Radio Disney, Entertainment Tonight, and Starz-Encore Media. Students cover many collegiate sporting events on campus where they produce, direct and host programs for which they have won numerous local and regional Emmy awards.

**Course Requirements for Broadcast Production Majors**

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

**Journalism Core Requirements (9 hours)**

JOUR 1001-3 Contemporary Mass Media  
 JOUR 1002-3 Critical Thinking and Writing  
 JOUR 2011-3 Media and Public Culture

**Broadcast Production Requirements (15 hours)**

JOUR 3604-3 Radio and Television News (JOUR 1002, junior standing prerequisites)  
 JOUR 3644-3 Principles of Production (JOUR 1002, junior standing prerequisites)  
 JOUR 3674-3 TV Production 2 (JOUR 3644 prerequisite)  
 JOUR 4651-3 Mass Communication Law (junior standing)

Plus one upper-division conceptual course

**Journalism Electives and Internships (4–16 hours)**

JOUR 4931 (1-3) Internship (JOUR 3644 prerequisite)

**Media Studies**

The media studies major prepares students for careers as analysts, evaluators, and producers of media messages and policies in government and private industry and for graduate education in the social sciences, humanities, and law. The curriculum includes courses in media theory, history, law, policy, institutions, industries, and culture. Students may gain practical experience at campus media such as KVCU-AM, the “CU Sports Magazine” weekly television broadcast, and the *Campus Press* student newspaper, as well as through internships. In recent years, media studies majors have interned at “Free Speech TV,” Planned Parenthood of Colorado, “Alternative Radio,” the “David Letterman Show,” the Denver mayor’s office, Winter Park Ski Area, and the CU athletics department.

Media studies students are strongly encouraged to combine their foundation in media theory with some exposure to media practice, thus the requirement of a minimum of two media theory courses and one media practice course. However, it is possible to fulfill the requirements in the major by selecting three media theory courses from the list below in place of the media practice course. Students should consult with an adviser to determine which alternative is best suited to their goals.

**Course Requirements for Media Studies**

A total of 120 credit hours with a minimum of 30 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

**Journalism Core Requirements (9 hours)**

JOUR 1001-3 Contemporary Mass Media  
 JOUR 1002-3 Critical Thinking and Writing  
 JOUR 2011-3 Media and Public Culture

**Media Theory Requirements (6–9 hours)**

JOUR 2403-3 Principles of Advertising  
 JOUR 3771-3 Mass Media History  
 JOUR 4201-3 International Mass Communication  
 JOUR 4331-3 Women and Popular Culture  
 JOUR 4453-3 Advertising and Society  
 JOUR 4711-3 Mass Communication and Culture  
 JOUR 4874-3 The Meaning of IT (Information Technology)  
 JOUR 4871-3 Special Topics (conceptual only)

**Media Practice (0–3 hours); students are strongly encouraged to take ONE of the following:**

JOUR 3102-3 Press Photography  
 JOUR 3453-3 Advertising Copy and Layout (JOUR 2403 prerequisite and instructor permission)  
 JOUR 3473-3 Advertising Research (JOUR 2403 prerequisite and instructor permission)  
 JOUR 3614-3 Radio Programming and Production  
 JOUR 4102-3 Advanced Photography (JOUR 3102 prerequisite)  
 JOUR 4272-3 Public Relations  
 JOUR 4282-3 Public Relations Programs (JOUR 4272 prerequisite)  
 JOUR 4562-3 Electronic Journalism  
 JOUR 4802-3 Editorial and Opinion Writing (instructor permission prerequisite)  
 JOUR 4802-3 Magazine Writing (instructor permission prerequisite)  
 JOUR 4831-3 Publication Design and Production  
 JOUR 4872-3 Digital Newsroom  
 JOUR 4873-3 Motion Design (instructor permission prerequisite)  
 JOUR 4873-3 Experience Design Workshop (instructor permission prerequisite)

**Journalism Electives and Internships (3–10 hours)**

Any JOUR course, including those listed above under Media Theory and Media Practice will fulfill the elective category. Media Studies majors who wish to gain practical experience are also strongly encouraged to do an Internship (JOUR 4931, 1–3 hours) and/or to work for a semester or more for one of the campus media: *Campus Press* (JOUR 3902, 1–3 hours; (instructor permission prerequisite); KVCU radio; *Sports Mag*; or *Cultural Currents*. For internships offered through news editorial, broadcast, or advertising, students will need to take additional prerequisites (see major sheet for each sequence’s requirements).

**News-Editorial**

The news-editorial major prepares students for careers as reporters and editors for newspapers, news services, magazines, trade and technical publications, company publications, the government, and public relations firms. The curriculum includes

required courses in reporting, editing, and media law as well as electives ranging from photography and magazine writing to the digital newsroom and investigative reporting. Many students begin by working for the *Campus Press* student newspaper. CU news-editorial majors are awarded more Colorado Press Association scholarships and internships than students from any other college or university. They compete successfully for national internships including the Pulliam Fellowship, Dow Jones Newspaper Fund, the Politics & Journalism Semester in Washington, D.C., the Association for Women in Sports Media and the Chips Quinn minority internship program. Students have recently interned at *The New York Times*, *The Wall Street Journal*, *Newsday*, *National Geographic*, *Sports Illustrated*, *Reader's Digest*, and Washington, D.C., news bureaus.

### **Course Requirements for News-Editorial Majors**

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

#### **Journalism Core Requirements (9 hours)**

JOUR 1001-3 Contemporary Mass Media  
JOUR 1002-3 Critical Thinking and Writing  
JOUR 2011-3 Media and Public Culture

#### **News-Editorial Requirements (15 hours)**

JOUR 3001-3 Public Affairs Reporting (JOUR 1002 prerequisite)  
JOUR 3552-3 News Editing (JOUR 3001 prerequisite)  
JOUR 4002-3 Reporting 2 (JOUR 3001 prerequisite)  
JOUR 4502-3 Reporting 3 (JOUR 3552, JOUR 4002 prerequisites)  
JOUR 4651-3 Mass Communication Law (junior standing)

#### **Journalism Electives and Internships (4–16 hours)**

4931 Internship (1–3) (JOUR 3001, JOUR 3552 prerequisites)

## **Graduate Programs**

### **Master's Degrees**

More than 100 students are earning master of arts degrees at the School of Journalism and Mass Communication in two degree programs: newsgathering and mass communication research. The **Integrated Marketing Communications program** has been discontinued as of October 7, 2002, and the school is accepting no further applications to that track.

#### ***Newsgathering***

The newsgathering option is designed for students with limited academic or professional experience in news reporting and writing. It prepares students to work in a wide variety of professional settings including newspapers and magazines, broadcast media outlets, online publishing, and corporate communications. Students in the newsgathering program select an emphasis in print, broadcast or a combination. Print students are placed at internships on award-winning daily newspapers along Colorado's Front Range. Broadcast students participate in "NewsTeam Boulder," a student-produced news program broadcast live over the Boulder cable television system. With the addition of one to two courses, it is possible to complete both the print and broadcast sequences. The program culminates with a professional project. Students complete a minimum of 30 graduate semester hours and should be able to finish the degree in three semesters plus a summer.

#### ***Newsgathering Advanced Professional***

This track is specifically designed for practicing journalists with a minimum of three years of appropriate full-time professional journalism experience who wish to upgrade their professional skills and broaden their knowledge in a specified subject area outside the mass communication field. After being accepted to the program, students are expected to complete two required journalism courses and a culminating professional project. Also required are two to four elective courses taken outside the school's curriculum, and two to four electives in the school, at least one of which must be a reporting and writing course and another of which must be a conceptual course. Various options exist to fulfill the 30 credit-hour degree requirement. Students, with the assistance of an advisor, design their own programs within the requirements. The track is designed to be completed in one calendar year.

#### ***Mass Communication Research***

The mass communication research option offers an opportunity for critical reflection on contemporary media structures, performance, policy, and practice. It provides graduate-level study in communication theory, research methods and relevant realms of culture, law, history, politics, and ethics. The research track is designed for students interested in an in-depth study of media or for those who wish to enhance an undergraduate or professional media background. The program is especially recommended for students desiring to continue their studies toward a PhD and for professionals seeking to teach at the college level or develop an area of reporting specialization. Total required hours: 30. Prerequisites: None, unless students wish to update their knowledge in specific areas or lack background in the course of study they choose to pursue. Students should be able to finish the degree in three semesters plus a summer.

#### ***Interdisciplinary Graduate Certificate Program in Environmental Policy***

In collaboration with the university's Interdisciplinary Graduate Certificate Program in Environmental Policy, the school offers students the opportunity to earn both the master's degree in journalism, with an emphasis in environmental journalism, and the Certificate in Environmental Policy. The time to complete the degree and the certificate is estimated to be about two years.

#### ***Deadlines***

The domestic application deadline is March 1. International applications must be received in the University of Colorado Office of International Admissions by December 1 to be processed and received by the school by March 1. Applications received after March 1 will be considered on a space-available basis.

#### **Doctoral Degree in Communication**

The PhD in communication offered by the School of Journalism and Mass Communication is dedicated to interdisciplinary inquiry into the social, political, economic and cultural dimensions of media, nationally and internationally, historically and in contemporary societies.

Because of the centrality of communication and media in social and individual life, media theory and research draw from a wide range of fields and disciplines, including political science, sociology, cultural studies, philosophy, history, linguistics, economics, anthropology, business, psychology, literature, law and public policy. The interdisciplinary nature of media studies is reflected in the research interests of the graduate faculty and in the curriculum, in which students take a significant portion of their course work outside the school and receive training in both qualitative and quantitative research methods. In general, the curriculum within the school focuses on the following areas: the

range of theories, disciplines, and methodological approaches that have contributed centrally to the field of media studies; the institutional and cultural sources of meaning; the history and development of media industries and systems; and the relationship of media to other social institutions.

Doctoral students in the media studies program must take 48 hours of course work, pass the written and oral comprehensive examinations at the conclusion of course work, and prepare and defend a dissertation. The course work includes a two-semester Proseminar (6 hours), which is required of all first-year doctoral students in the program; 15 hours in one or two areas of emphasis within the school; 18 hours of electives, of which a minimum of 15 hours must be taken outside the school; and 9 hours of methods (the qualitative and quantitative methods courses offered within the school and an advanced methods course either inside or outside the school). Up to nine hours of master's degree credits may be considered for transfer into the doctoral program on a case-by-case review.

Applicants to the PhD program in media studies are expected to hold the master's degree or equivalent graduate work. In exceptional cases, applicants without a master's degree may be considered for admittance.

### Deadlines

The domestic application deadline is February 15. International applications must be received in the University of Colorado Office of International Admissions by December 1 to be processed and received by the school by February 15. Applications received by the school after February 15 will not be considered.

## Financial Support

### Master's Degree

A few graduate assistantships are available. Applicants who wish to be considered should submit a resume and letter that includes detailed professional or academic qualifications by March 1 to the director of graduate studies at the School of Journalism and Mass Communication. Applicants are chosen based on experience and the specific skills needed for available assistantships each semester.

### Doctoral Degree

Admitted PhD students are awarded graduate assistantships including a tuition waiver and stipend.

#### Contact

Graduate secretary  
303-492-5008

School of Journalism and Mass Communication  
Armory Building  
1511 University Ave.  
University of Colorado at Boulder  
478 UCB  
Boulder, CO 80309-0478  
303-492-5007

## Faculty—School of Journalism and Mass Communication

School faculty members have major-market experience in TV, radio, newspaper, magazine, and advertising. Among the faculty are leading researchers on communication policy, technology and social change, media, religion and culture, marketing and visual communication, international media development, audience behavior, and mass media law.

PAUL S. VOAKES, dean. BA, University of California, Davis; MJ, University of California, Berkeley; PhD, University of Wisconsin, Madison

LEN ACKLAND, associate professor. BA, University of Colorado; MA, Johns Hopkins School of Advanced International Studies.

SAMUEL J. ARCHIBALD, professor emeritus.

JOANNE EASLEY ARNOLD, professor emerita.

SHU-LING C. BERGGREEN, associate professor. BA, Fu-Zen University; MS, Southern Illinois University; PhD, University of Tennessee.

P. DELBERT BRINKMAN, emeritus dean and professor

ANDREW CALABRESE, associate professor. BA, Denison University; MA, PhD, Ohio State University.

MALCOLM A. DEANS, senior instructor emeritus.

THOMAS R. DUNCAN, associate professor. BS, MA, Northwestern University; PhD, University of Iowa.

KENDRA L. GALE, assistant professor. BA, St. Olaf College; MA, PhD, University of Minnesota School of Journalism and Mass Communication.

BRUCE HENDERSON, associate professor. BA, University of Wisconsin, Milwaukee; MA, University of Wisconsin, Madison.

LEONA HOOD, assistant professor. BJ, University of Missouri; MA, PhD, University of Colorado.

STEWART HOOVER, professor. BA, McPherson College; MA, PhD, Annenberg School of Communications, University of Pennsylvania.

STEPHEN B. JONES, assistant dean; instructor. BA, MA, West Virginia University; PhD, University of Utah.

FRANK L. KAPLAN, professor emeritus.

SAM KUCZUN, professor emeritus.

MICHAEL J. McDEVITT, assistant professor. AB, University of California, Berkeley, MA, San Jose State University; PhD, Stanford University.

POLLY E. McLEAN, associate professor. BA, Richmond College, City University of New York; MS, Columbia University; PhD, University of Texas.

SANDRA E. MORIARTY, professor. BJ, University of Missouri; MS, PhD, Kansas State University.

MARGUERITE J. MORITZ, associate dean; professor. BS, MS, PhD, Northwestern University.

KIRBY MOSS, assistant professor. BA, University of Nebraska, Omaha; MA, University of Nebraska, Lincoln; PhD, University of Texas, Austin.

JANICE A. PECK, associate professor. BA, University of Utah; MA, University of Washington; PhD, Simon Fraser University.

PATRICIA RAYBON, associate professor. BA, Ohio State University; MA, University of Colorado.

ROBERT B. RHODE, professor emeritus.

BRETT ROBBS, associate professor. BA, Rhodes College; MA, PhD, Vanderbilt University.

WILLARD D. ROWLAND, JR., dean emeritus and professor emeritus.

ELIZABETH A. SKEWES, assistant professor. BA, University of California, Los Angeles; MA, Ohio State University; PhD, Syracuse University.

DAVID SLAYDEN, associate professor. BA, Southern Illinois University; MA, University of Chicago; PhD, Indiana University.

DON S. SOMERVILLE, professor emeritus.

MICHAEL TRACEY, professor. BA, University of Exeter; PhD, University of Leicester.

ROBERT TRAGER, professor. BA, San Francisco State College; MA, PhD, University of Minnesota; JD, Stanford University.

JAN WHITT, associate professor. BA, MA, Baylor University; PhD, University of Denver.

THOMAS YULSMAN, associate professor. BA, Harpur College, State University of New York at Binghamton; MS, Columbia University Graduate School of Journalism.

# School of Law

*David H. Getches, dean*

401 UCB • phone: 303-492-8047 • fax: 303-492-1757

school web site: [www.colorado.edu/law](http://www.colorado.edu/law)



**T**HE SCHOOL OF LAW was established in 1892. It is a charter member of the Association of American Law Schools, organized in 1901, and has been on the list of approved law schools of the American Bar Association since the first publication of such a list in 1923. Such approval is based upon high scholastic standards, a three-year program of full-time resident study, a well-qualified faculty, good library facilities, and high admission qualifications. At the University of Colorado School of Law, a relatively small student body of 500 and a favorable faculty-student ratio produce classes of a size that encourages discussion. Classes are rarely larger than 83 students, and many are much smaller. In addition, faculty are readily available for informal conferences with individual students.

Courses are offered in a wide range of law-related subjects. Students are free to take almost all second- and third-year courses as electives after a required first-year curriculum. Areas of curricular strength at the School of Law include natural resources, the environment, criminal law, business, constitutional law, taxation, public law, American Indian law, litigation, intellectual property, international law, and jurisprudence. Graduates are academically qualified to take the bar examination in all 50 states provided that, in choosing their curricula, students comply with any individual requirements of states in which they intend to practice.

## Law Building and Law Library

The School of Law is housed in the Fleming Law building, located on the southern edge of the campus. Teaching facilities include an excellent library, classrooms, seminar rooms, a complete trial and appellate courtroom, and videotape equipment. The building also contains suites for the Legal Aid and Defender Program, Natural Resources Law Center, Indian Law Clinic, Entrepreneurial Law Center, Silicon Flatirons Telecommunications Center, the Byron R. White Center for the Study of American Constitutional Law, offices for various student organizations, the *University of Colorado Law Review*, the *Colorado Journal of International Environmental Law and Policy*, *Journal on Telecommunications and High Technology Law*, the faculty and administrative offices, and a student lounge. The new Wolf Law building, which will house the University of Colorado School of Law, is scheduled in the near future.

The law library contains one of the premier legal reference collections in the western United States. The collection consists of over 490,000 volumes and microform equivalents. Students and faculty have access to a comprehensive collection of American case law from all jurisdictions, statutes of all states (in annotated form when available), and the major digests, encyclopedias, periodicals, and texts dealing with American law. English, Canadian, and other Commonwealth materials are almost as complete. A collection of books in German, French, and other foreign

languages as well as international law holdings provide a basis for comparative law studies.

The Law Library offers a full range of electronic resources to law students and faculty, including access to online databases, the Internet and World Wide Web sites, and CD-ROM products. Computer labs and workstations are provided for student use, and instruction is provided for both book and electronic materials.

## Career Services

The Office of Career Services provides students and alumni with personal and group career counseling to assist and prepare them with decisions about career direction, legal employers, and alternatives to traditional legal careers. The office annually offers workshops, symposia, and clinics focusing on resume preparation, interviewing skills, judicial clerkship applications, and self-directed job search strategies.

Extended daily office hours are maintained during the academic year and summer to allow for additional access to professional personnel and resources. The office maintains its own Career Resource Library which offers students access to a growing collection of career development and job search aid materials. Students can visit the Office of Career Services' web site at [www.colorado.edu/law/careerservices](http://www.colorado.edu/law/careerservices).

The Office of Career Services sponsors an on-campus interview program, providing students with the opportunity to interview with numerous legal employers from throughout the country. Most second- and third-year students participate in the fall semester interviews while first-year students begin their self-directed job search and limited on-campus interviews during the spring semester.

In addition to hosting the traditional on-campus and off-campus interview programs, the Office of Career Services provides expanded and varied programming throughout the academic year. For example, the Annual Legal Career Options Day, held in mid-November, provides law students the chance to network with a multitude of practitioners from the corporate, private, government, and public sectors.

Regionally, CU initiated and participates with eight other law schools in the Annual Rocky Mountain Government/Public Interest Career Fair. The Office of Career Services was also instrumental in developing the Colorado Pledge to Diversity Law Firms Minority Summer Clerkship Program implemented in summer 2001.

The CU-Boulder alumni jobs bulletin, *The Buffalaw*, gives alumni another opportunity to find job openings in the Denver metropolitan area, the state, and the nation. All new graduates receive a one-year complimentary subscription.

## Lectureships

In 1955, a trust fund was established in memory of John R. Coen to bring to the School of Law a prominent jurist, scholar, or other public figure to deliver a lecture to the law school community and the general public. Recent lecturers in the series have included: John C. Coffee, Jr., Adolph A. Berle professor at Columbia University School of Law; Supreme Court Justice Antonin Scalia and the Honorable Alex Kozinski, judge, U.S. Court of Appeals, 9th Circuit; Peter L. Strauss, Betts professor, Columbia University School of Law; and most recently, Robert Mnookin, Samuel Williston Professor of Law, Harvard Law School.

The Austin W. Scott, Jr. Lecture Series was established in 1973. Lectures in this series are given by members of the faculty of the School of Law, generally on research in progress. Although the topics vary with the interests of the lecturer, lectures are always topical and stimulating. Recent lectures have included: Professor Mark Loewenstein on corporate law; Associate Professor Rebecca French on time and identity; Professor Hiroshi Motomura on immigration law; Professor Paul Campos on the obesity myth and the Lewinsky scandal; and most recently, Professor Kevin Reitz on the new model penal code

## Clinical and Extern Programs

Under the supervision of full-time clinical faculty who are experienced trial attorneys, the **Legal Aid and Defender Program** allows students to represent low-income clients in civil and criminal cases in Colorado courts and before administrative agencies.

The **Appellate Advocacy Clinic** is taught at the School of Law by a member of the Appellate Division of the Colorado State Public Defender's Office or the Office of the Attorney General. Each student, under direct supervision of the instructor, is responsible for completing an appellate brief for a criminal case pending in the Colorado Supreme Court or the Colorado Court of Appeals. In addition, students meet to discuss appellate procedure, issue identification, appellate writing, and oral advocacy.

**Indian Law Clinic** is a hands-on course in which up to six second- and third-year students can participate in the representation and advocacy of Indian causes. The clinic's clients are Native American people in the Denver metropolitan area, tribal courts and/or Indian litigants on the Southern Ute and Ute Mountain reservations, and other Indian groups or tribal agencies that would otherwise be unable to afford legal assistance.

The clinic gives priority to cases with a uniquely Indian law dimension—land or water claims, Indian religious freedom, job or other discrimination based on race, and issues implicating tribal sovereignty.

Students meet individually on a weekly basis with the supervising attorney, and collectively in a weekly two-hour seminar. For further information, contact the Indian Law Clinic, University of Colorado at Boulder, 404 UCB, Boulder, CO 80309-0404, 303-492-0966, [www.colorado.edu/law/clinics/ilc](http://www.colorado.edu/law/clinics/ilc).

**Natural Resources Litigation Clinic's** docket consists exclusively of environmental litigation that concentrates on water resources development and public lands protection. Clinic cases often require expert testimony and witness preparation; analysis and presentation of detailed scientific and environmental data; and submission of complex and precedential legal briefs. Students work as "associates" in a small environmental law practice representing public interest clients before administrative agencies, state and federal courts, Congress, and state legislatures. In this practice students forge and clarify the law in controversial environmental arenas, and in the process, learn not only from the clinic's staff, but also from matching the best and brightest attorneys and experts the opposition can muster.

The **Entrepreneurial Law Clinic** advises clients who need legal services in the founding of their business or not-for-profit associations.

Under the School of Law's **Extern Program**, up to 4 hours of credit may be earned for uncompensated legal work done for an outside employer. Students interested in such a program must submit a timely application describing the proposed project and certain other information. To gain approval, the project must contain a substantial writing component and be under the supervision of an approved attorney. Credit is awarded on the basis of 1 hour of credit for each fifty hours of working time.

## Activities

The School of Law offers many activities in addition to those available for students in the university as a whole. The Rothgerber Moot Court Competition, Carrigan Cup Competition, Jessup International Law Moot Court Competition, and the Saul Lefkowitz National Moot Court Competition offer students an opportunity to refine their research skills, as well as develop skills in advocacy at the trial and appellate levels. In addition, CU law students have recently participated in the Native American Law Students Association (NALSA) Moot Court Competition, the Pace University School of Law National Environmental Law Moot Court, Hispanic National Bar Association (HNBA) Moot Court, and the Giles S. Rich Moot Court Competition. In these competitions, students thoroughly prepare and brief hypothetical cases and then argue before panels of distinguished judges and lawyers.

The *University of Colorado Law Review*, a professional journal edited entirely by students, publishes scholarly articles and comments on matters of concern to the legal profession at both the national and state levels. The *Colorado Journal of International Environmental Law and Policy*, a scholarly journal dedicated to examining the legal and policy implications of international environmental issues, was formed by students in the spring of 1989.

The *Journal on Telecommunications and High Technology Law* is sponsored by the Silicon Flatirons Telecommunications Program and is committed to providing a meaningful experience to students who have an interest in telecommunications, technological convergence, intellectual property, and regulatory law. *JTHTL* capitalizes on these facts: the University of Colorado at Boulder was the first university to offer an Integrated Telecommunications Program, and a strong base of technology companies is located in the Denver-Boulder corridor. *JTHTL* recognizes the inherently interdisciplinary nature of telecommunications and looks to engineering, business, and other disciplines for potential solutions to current issues.

The Student Bar Association represents the interests of law students generally. Other student organizations include: Ageless Student Society, American Bar Association/Law Student Division, American Civil Liberties Union, Asian Pacific American Law Students Association, Black Law Students Association, Business Law Association, Christian Legal Society, Doman International Law Society, Environmental Law Society, Federalist Society for Law and Public Policy Studies, Intellectual Property Law Society, Latino Law Students' Association, National Lawyer's Guild, Native American Law Students Association, Outlaw, Public Interest Student Association, Sports and Entertainment Law Students Association, Student Bar Association, Student Trial Lawyers Association (or the CU chapter of the American Trial Lawyers Association), Telecom/High Tech Association, and Women's Law Caucus.

## Academic Excellence

### Order of the Coif

The Order of the Coif is a national law school honor society founded to encourage legal scholarship and to advance the ethical standards of the profession. The University of Colorado is one of only 76 law schools entitled to award the Order of the Coif. Members are selected for demonstrated scholarship from among seniors ranking scholastically in the top 10 percent of their class.

### Academic Standards

#### Honor System

On the premise that academic dishonesty is incompatible with the dignity and responsibility of the legal profession, the School of Law operates under an honor code that is subscribed to by all entering students. The honor code is a system of rules administered by student officers and demands high ethical conduct. For example, use of unauthorized sources in examinations is prohibited. The same code also permits students considerable individual freedom and responsibility. The honor code, accessible at [www.colorado.edu/law/about/honorcode](http://www.colorado.edu/law/about/honorcode), allows tests to be taken in several unproctored locations of a student's own choice throughout the School of Law.

#### Grading and Point System

The School of Law grades on the following numerical basis:

A	=	93–100
A-	=	90–92
B+	=	86–89
B	=	83–85
B-	=	80–82
C+	=	76–79
C	=	73–75
C-	=	70–72
D+	=	66–69
D	=	63–65
D-	=	60–62
F	=	59 or below

One semester hour of credit represents one 50-minute class period per week through a semester.

In courses designated as *pass/fail* or *pass/graded*, the grade of *pass* is given when in the judgment of the instructor the quality and quantity of work is such that on a graded basis the work would be the equivalent of at least a 72. If the instructor judges the work not the equivalent of a 72, the work is assigned that letter and numerical grade between 50 (*F*) and 71 (*C-*) which the instructor determines to be appropriate.

### Admission and Enrollment Policies

#### Prelegal Preparation

The School of Law at the University of Colorado prescribes no specific prelaw curriculum. Students should pursue their interests, the offerings of their particular colleges, and their personal objectives for studying law. In general, the prelaw student should place primary emphasis on acquiring excellent methods of study, thought, and communication, especially writing. Obviously, these skills can be acquired in a number of different areas, and successful law students and lawyers have college majors in almost every field. College courses should be chosen with care to produce a balanced pattern of skills and insights. An undergraduate major field should be one that requires rigorous application of one's abilities.

### Admission Requirements and Standards

The School of Law grants admission to qualified applicants who have received a baccalaureate degree from a properly accredited institution.

The applicant also must show substantial intellectual promise and give evidence of high moral and ethical standards. The entering class in 2003 had a median GPA of 3.62 and a median Law School Admission Test (LSAT) score of 162.

Admission decisions are based heavily on undergraduate grade point averages and LSAT scores. Other indicators of ability and motivation are also considered in the admissions process. Because the School of Law believes student body diversity will contribute to everyone's educational experience, a class of students with a mixture of backgrounds, experiences, interests, goals, and talents is the goal of the Admissions Committee. Thus, as important as the results of the Law School Admissions Test and the applicant's undergraduate record are, they are not the only factors considered. The School of Law seeks ethnic, cultural, and other diversity in the student body. Colorado residency is also given special consideration, since the university is a state-supported school.

Due to the large number of applicants seeking admission, formal interviews cannot be scheduled. Applicants are required to submit a personal statement and one or two letters of recommendation in support of their application.

Beginning students are admitted for the fall semester and only on a full-time basis. The School of Law does not have an evening division of study.

Tutorial assistance will be available for first-year students who desire it and whose qualifications suggest that this type of support might be beneficial.

#### How and When to Apply

1. Information about the law school and an application are available at [www.colorado.edu/law](http://www.colorado.edu/law). Alternatively, a catalog and application can be requested at [www.colorado.edu/law/admissions/request.htm](http://www.colorado.edu/law/admissions/request.htm), or by calling 303-492-7203.

2. Students must return a completed application for admission and a nonrefundable application fee of \$65 by February 17. Applicants are responsible for arranging for submission of all supporting documents, including materials from the Law School Data Assembly Service, and for ensuring that materials are received by the School of Law in a timely fashion. Late applications will be considered, but those that are timely will be reviewed first. Only the strongest late applicants have any chance of admission.

Some forms of financial aid will be jeopardized by late application. All applicants who seek financial aid should ensure compliance with the Free Application for Federal Student Aid instructions, available at any high school, college, or university, on the Web at [www.fafsa.ed.gov](http://www.fafsa.ed.gov), or in the Office of Financial Aid.

#### Admission Process

Beginning in January, completed applications are considered by the Admissions Committee. Applicants are notified in writing of their decision from mid-January until the class is filled, usually late in May. Files are reviewed at the discretion of the Admissions Committee, and in general, those with the strongest credentials are reviewed first. If the committee is unable to reach a decision to admit or deny a particular candidate, the application may be placed in a "hold" category to be reviewed again after the application deadline has passed and other applications have received initial consideration. In these cases, an applicant is *not* notified until further action has been taken.

When all places in the class have been filled—usually in May—a waitlist is established and those who are included on the waitlist are notified of this decision and asked to confirm their acceptance of a place on the waitlist.

Upon acceptance for admission, an applicant is required to send a confirmation form and a \$200 enrollment deposit to the School of Law by a date specified in the letter notifying the applicant of admission. Each admitted student is asked to respond within two weeks of receipt of the letter (but not earlier than April 1).

### ***Transfer and Visiting Students***

Transfer students must have completed at least one full year of study at a law school accredited by the American Bar Association and must meet all standards and requirements set forth above for students who have not previously attended law school.

Applicants must arrange to have sent, in addition to the above items: 1) an official transcript showing all law school work undertaken; 2) upon completion of all law school work undertaken, a letter from the law school dean stating that the applicant is in good standing and eligible to continue without condition; and 3) class rank or normal grade distribution for the law school attended.

A limited number of second-year transfer students are accepted each year. Decisions are based heavily on law school performance.

Admitted students, having previously attended other fully accredited law schools, may receive advanced standing credit for work done in such law schools in an amount and on such conditions as determined by the Office of the Dean.

The School of Law may admit one or more visiting students who may study at the school for a semester or a year, but who will receive their law degree from their school of origin. Admission as a visiting student is available only to applicants who have completed one or two years of high-quality work at another law school and who have demonstrated a compelling need to attend the University of Colorado School of Law.

Application procedures are the same as for transfer applicants. In addition, however, the dean of the school of origin must send a letter agreeing to accept work satisfactorily completed at the University of Colorado School of Law for credit toward the student's law degree. Admission as a visiting student allows enrollment in courses on a space-available basis. As a rule, financial aid for a visiting student is handled by a consortium agreement between the School of Law and the degree-granting institution.

### ***International Student Information***

The University of Colorado School of Law offers only the juris doctor (JD) degree. The School of Law does not offer the master of law (LLM). International students are considered within the following parameters: applicants must submit a completed application including a personal essay, transcripts showing completion of the equivalent of a bachelor's degree from a United States institution, a letter of recommendation, current LSAT scores, and the application fee in United States currency. All documents must be in English. The TOEFL is not required. However, a good command of English is crucial to success in law school and can be demonstrated by the LSAT, the personal essay, and other written communication required by the application process.

Applicants possessing a law degree from an international law school may apply for admission as transfer students by submitting a letter of good standing from the dean (or equivalent) of their previous law school, LSAT scores, official law school transcripts, and all documents mentioned in the previous paragraph.

The School of Law accepts a maximum of one year of credit from an international law school; normally, transfer students must complete the first-year curriculum at the School of Law.

The school has no scholarship or loan assistance available for international students. All international students must submit a financial affidavit after admission to the School of Law stating that they possess the financial resources to support themselves while attending school in the United States.

### ***Transcripts—Withdrawal of Admission***

Prior to enrolling in the School of Law, all students who have been admitted and have confirmed their admission must submit two official transcripts from each college and law school attended, showing all college and postgraduate work completed. Such transcripts must show the student has received a baccalaureate degree from a properly accredited institution. These transcripts must also show any subsequent work undertaken, whether or not the work was included in the LSDAS evaluation. If such subsequent work is not of substantially similar quality to that included in the LSDAS evaluation, or if the transcripts fail to show the student has received the required baccalaureate degree, the student's prior admission may be withdrawn.

### ***Attendance***

A student who has been absent from more than 20 percent of the total number of classes in a course may be excluded from the final examination and will receive a failing grade in the course.

### ***Classification of Students***

At the end of each academic semester, students in each class are ranked according to their numerical averages. To be ranked in the second-year class, a student must have passed 30 semester hours of work; to be ranked in the third-year class, 59 hours of work.

### ***Normal Course Load***

The normal course load is 14 or 15 hours per semester. Students may not register for more than 16 hours or fewer than 10 hours without special permission, and first-year students must obtain permission in order to register for less than a full schedule. A student who discontinues a course at any time without notifying the Office of the Dean and processing the necessary papers will receive an *F*.

### ***Dropping Courses***

Any first-year student who desires to drop a course must first obtain the permission of the dean. Clinical courses and wait-listed courses may be dropped until the sixth day of classes, and other upper-division courses may be dropped until the end of the sixth week of classes. After the applicable deadline, a course may be dropped for good cause and with the consent of the instructor and the dean's office. If a student drops a course after the applicable deadline without such consent, he or she will receive a failing grade in the course.

### ***Summer Session***

A limited summer curriculum is offered at the School of Law. Any student who has completed at least one year at an ABA-accredited law school may register for courses offered during the summer session upon submission of a summer application form with a letter of good standing from his or her law school. A student may enroll in courses totaling no more than 8 semester hours without special permission from the dean's office.

A schedule of summer courses together with an application form may be obtained after March 1 by writing to the Office of Admissions, School of Law, University of Colorado at Boulder, 403 UCB, Boulder, CO 80309-0403.

## Transcripts

Official transcripts of credit should be ordered from the Office of the Registrar transcript section, Regent Administrative Center 105, either in person or in writing. Official transcripts are prepared only at the student's request. Unofficial law school transcripts indicating class standing, numerical averages, and attendance dates may be made in person or by writing to the School of Law Registrar, Room 141.

## Withdrawals

Students may withdraw from the School of Law at any time up to two days before the beginning of final examinations by obtaining permission of the Office of the Dean. Readmission will be at the discretion of the faculty. Tuition and fee refunds are based on withdrawal date. Consult the School of Law registrar and/or the Bursar's Office for refund deadlines.

## Expenses and Financial Aid

Colorado residents enrolled in the School of Law paid \$7,645 in tuition and fees for the 2003–04 academic year; nonresidents paid \$22,781. The School of Law's Office of Admissions tentatively classifies applicants as resident or nonresident students, but the final decision is made by the tuition classification officer. For more information concerning resident and nonresident classification, consult Academic Records in the General Information section.

Living expenses, books, and incidental costs in the amount of approximately \$11,378 per year should be added to tuition figures in estimating yearly expenditures.

The Free Application for Federal Student Aid (FAFSA) is the only financial aid application that will be accepted for 2004–05. FAFSA forms will be available from local high schools, colleges, and universities after January 1, 2004. The University of Colorado participates in the Federal Direct Stafford/Ford Loan program. Students receive a maximum of \$18,500 through this program. If a student's cost of attendance is greater than \$18,500, alternative private loans through Access Group, Citiassist, or other private lenders also may be available.

Grants are available on a limited basis to eligible resident students and are awarded on the basis of need and timeliness of filing the financial aid application. Nonresident students may not be awarded grants from state funds under present state policy but may be considered for loans and work-study. (*Note:* Work-study is available only to second- and third-year students).

Scholarships are given each year on a competitive basis, including both academic and financial considerations. Scholarships are awarded by the financial aid committee for the School of Law.

The status of financial aid applications submitted to CU-Boulder cannot be confirmed until students have been officially admitted to the School of Law. Students missing the admission deadline are considered late, even if they meet the financial aid application filing deadline.

The priority date for financial aid is March 1. This means all financial aid applicants should have a complete file, consisting of student tax information and the FAFSA, by March 1. A completed file is essential for the Office of Financial Aid to process an award offer.

All students who receive financial aid are required to understand and comply with minimum standards of reasonable academic progress. The Reasonable Academic Progress policy is

available to students upon request at the university's Office of Financial Aid.

For more information regarding financial assistance, contact either the assistant dean for admissions and financial aid, School of Law, University of Colorado at Boulder, 403 UCB, Boulder, CO 80309-0403, **303-492-7203**, or the Office of Financial Aid, University of Colorado at Boulder, 556 UCB, Boulder, CO 80309-0106, **303-492-5091**.

## Part-Time Employment

The study of law is essentially a full-time task. Most students devote from 50 to 70 hours a week to classroom attendance, preparation for class, and other activities directly related to their legal education. These include participation in appellate briefing and argument competitions and work in the school's clinical program. As a consequence, the opportunity for self-support through employment while attending law school is limited. Students may not accept outside employment during the critical first year. Law-related employment for a limited number of hours may actually enhance the educational experience of second- and third-year students, but students may not commit themselves to employment of more than 20 hours per week, or schedule employment that will interfere with class attendance.

The School of Law's Office of Career Services assists students in obtaining part-time hourly and summer employment as well as permanent employment for graduates. The university's Office of Career Services aids those who wish to find conventional employment or work-study placement.

## Degree Requirements

### Methods of Instruction

Law school classes are conducted primarily as discussions rather than as lectures. Judicial opinions and statutes are critically analyzed and the principles extracted are used in arguments about hypothetical situations. Other methods of instruction include research and writing, seminars, and practical experience both in clinical programs and by simulation.

Transmission of knowledge of established law is only one element of legal education. The School of Law seeks to train students to use the law, to research and analyze relevant materials, to speak and write effectively, and to evaluate arguments. Significant changes in the law occur frequently, and knowledge of specific laws may become obsolete, but the ability to analyze, argue, and evaluate endures.

### Graduation Requirements

The juris doctor (JD) degree is conferred on students who have satisfactorily completed the six-semester curriculum in accordance with School of Law rules. All law school work must be taken in residence; that is to say, in the classroom or under direct personal supervision of the instructor and not by correspondence or extension. No credit toward graduation from the School of Law is given for any prelaw courses.

The requirements for the JD degree are:

1. Completion of 89 semester hours of credit with a numerical average of 72 or better.
2. Completion of all required courses listed under the School of Law curriculum.
3. Completion of one seminar.
4. Study for at least six semesters or equivalent in residence at this or some other accredited law school, with at least 45 hours in residence at the School of Law. If a student is not in



residence at the School of Law during the last two semesters, at least 60 hours in residence is required at the school.

Half a semester's time and residence credit may be earned in a summer term, if at least 5 credit hours are earned. By enrolling in two summer terms and earning a minimum of 5 credit hours in each, the student can obtain a full semester of residence credit and earn a degree one semester earlier than normal.

5. Satisfaction of any conditions imposed at the time of admission.

## Law Curriculum

Law is not fixed or static, but evolves as society and its institutions change. Thus, the curriculum of the School of Law is also not fixed or static. The courses taught at the School of Law are subject to constant evaluation by the dean and the faculty, as is the organization of the curriculum itself. Courses offered by the School of Law in recent years are described below and are subject to change at any time. A number of upper-class courses are offered only in alternate years.

### First-Year Curriculum

The following first-year courses are required of all JD candidates. In the absence of special authorization from the dean, all first-year students must take the full schedule of courses—15 hours in the fall semester and 15 hours in the spring semester. Each first-year student will be assigned to one small section course, normally numbering not more than 30 students.

<i>Required Courses</i>	<i>Semester Hours</i>
LAWS 5101/5111 Contracts I and II	6
LAWS 5223 Appellate Court Advocacy	2
LAWS 5226 Legal Writing	2
LAWS 5303/5313 Civil Procedure I and II	6
LAWS 5503 Criminal Law	4
LAWS 5425 Torts	4
LAWS 5624/5634 Property I and II	6
LAWS 6005 Constitutional Law	4

### Second- and Third-Year Curriculum

The program in the second and third years is elective, with the exception of Evidence and Professional Responsibility.

In addition, each student is required, as a condition of graduation, to elect and complete at least one seminar and to fulfill a practice requirement (including service on a jury in legal aid or trial advocacy courses). Seminar topics vary widely from year to year and are subject to frequent change. In the absence of special authorization from the dean, no student will be permitted to register for more than 16 nor less than 10 semester hours. Courses in the 6000 series generally are second-year courses and those in the 7000 series are third-year courses.

Although the upper-division curriculum is almost entirely elective, students should bear in mind in planning their programs that certain basic courses may be prerequisites for advanced courses. For this reason—as well as to avoid possible schedule conflicts—it is generally advisable to take these more basic courses in the second year.

### Second- and Third-Year Courses by Category

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Alternative Dispute Resolution</b>	
LAWS 7409 Legal Negotiation	3
LAWS 7429 Alternative Dispute Resolution	2
LAWS 7419 Legal Negotiation and Dispute Resolution	2-3
LAWS 7751 Commercial Arbitration	3
<i>See also Litigation and Business</i>	

## Business

LAWS	Commercial Drafting	3
LAWS 6011	Payment Systems	3
LAWS 6021	Secured Transactions	3
LAWS 6201	Agency, Partnership, and the LLC	3-4
LAWS 6211	Corporations	3
LAWS 6251	Corporations	4
LAWS 6281	Accounting Issues for Lawyers	3
LAWS7021	Bankruptcy	3
LAWS 7011	Creditors' Remedies and Debtors' Protection	3
LAWS 7201	Antitrust	3
LAWS 7411	Mergers, Acquisitions, and Reorganizations	3
LAWS 7451	Law and Finance for Entrepreneurs	3
LAWS 7401	Securities Regulation	3
LAWS 7331	Sports Law	2
LAWS 7601	Business Transactions	3
<i>See also International; Property; Intellectual Property, Technology and Telecommunications; Taxation; and Seminars</i>		

## Criminal

LAWS	Wrongful Conviction	3
LAWS 6045	Criminal Procedure	3
LAWS 7045	Criminal Procedure: Adjudicative Process	3
LAWS 7345	Comparative Criminal Procedure	2
<i>See also Jurisprudence and Perspective; Litigation; Practice-Clinical; Practice-Simulation; and Seminars</i>		

## Family, Gender, and Health

LAWS 7095	Women in Law	2
LAWS 7105	Domestic Relations	3
LAWS 7115	Legal Rights of Children	2
LAWS 7425	Health Law	2-3
<i>See also Practice-Clinical and Seminars</i>		

## Government

LAWS 6128	Legislation	3
LAWS 6138	Federal Tax Politics	3
LAWS 7003	Federal Courts	3
LAWS 7013	Supreme Court Decision Making	2
LAWS 7025	Civil Rights Legislation	3
LAWS 7205	Administrative Law	3
LAWS 7255	Local Government	3
LAWS 7475	Advanced Torts	2
<i>See also Public Interest and Seminars</i>		

## Intellectual Property, Technology, and Telecommunication

LAWS 6301	Introduction to Intellectual Property Law for the Information Age	3
LAWS 7301	Copyright	3
LAWS 7241	Telecommunications Law and Policy	3
LAWS 7311	Patent Law	2-3
LAWS 7341	Trademark and Unfair Competition	3
<i>See also Business and Seminars</i>		

## International

LAWS 6210	Comparative Law	3
LAWS 6400	International Law	2-3
LAWS 6510	International Environmental Law	2-3
LAWS 7065	Immigration and Citizenship Law	3
LAWS 7310	International Dispute Settlement	2
LAWS 7440	International Human Rights	3
LAWS 7611	International Business Transactions	2-3
<i>See also Business; Jurisprudence and Perspective; Practice-Simulation; Research and Writing; and Seminars</i>		

## Jurisprudence and Perspective

LAWS 6318	Law and Economics	3
LAWS 7128	Jurisprudence	3
LAWS 7248	History of Anglo-American Criminal Justice	3
LAWS 7458	Law and Literature	2
LAWS 7708	Law and Social Science	3
<i>See also International and Seminars</i>		

**Litigation**

LAWS 6103 Professional Responsibility (required course)	2
LAWS 6353 Evidence	3
LAWS 7303 Complex Civil Litigation	3
<i>See also Criminal; Government; Alternative Dispute Resolution; International; Practice-Clinical; Practice-Simulation; and Seminars</i>	

**Natural Resources and the Environment**

LAWS 6002 Public Land Law	3
LAWS 6112 Foundations of Natural Resources Law and Policy	3
LAWS 6302 Water Resources	3
LAWS 7122 Mining and Energy Law	3
LAWS 7202 Environmental Law	3
LAWS 7725 American Indian Law	3
<i>See also International; Practice-Clinical; Public Interest; and Seminars</i>	

**Practice—Clinical**

LAWS 6009/6019 Legal Aid Civil Practice I and II	4/3
LAWS 6029/6039 Legal Aid Criminal Practice I and II	4/3
LAWS 6069 Legal Aid Civil Practice	4
LAWS 6079 Legal Aid Criminal Practice	4
LAWS 7029 Appellate Advocacy Clinic	3
LAWS 7209 Natural Resources Litigation Clinic	3
LAWS 7309 American Indian Law Clinic	3
LAWS 7609 Law Practice Management	1
LAWS 7619 Entrepreneurial Law Clinic	2
LAWS 7939 Extern Program	2-4

**Practice—Simulation**

LAWS 6109 Trial Advocacy	2
LAWS 6179 Trial Practice	2
LAWS 7106 Rothgerber Moot Court Competition	1
LAWS 7159 Advanced Trial Advocacy	2
LAWS 7169 Motions Advocacy	2
LAWS 7406 International Moot Court Competition	1
LAWS 7439 Mediation	2
LAWS 7509 Trial Competition	1
LAWS 7529 Appellate Advocacy Competition	1
<i>See also Practice-Clinical</i>	

**Property**

LAWS 6024 Real Property Security	3
LAWS 6104 Wills and Trusts	3
LAWS 7024 Real Estate Planning	3
LAWS 7154 Land Use Planning	3
<i>See also Natural Resources and the Environment; Intellectual Property, Technology, and Telecommunications; and Business</i>	

**Public Interest**

LAWS 6511 Labor Law	3
LAWS 7005 Media Law	3
LAWS 7015 First Amendment	3
LAWS 7055 Education Law	3
LAWS 7375 U.S. Races and Justice Systems	2-3
LAWS 7541 Employment Discrimination	3
<i>See also Family; Gender and Health; International; Jurisprudence and Perspective; Natural Resources and the Environment; and Seminars</i>	

**Research and Writing**

LAWS 6856 Advanced Legal Research	2
LAWS 7846 Independent Legal Research	1
LAWS 7906 Independent Legal Research: <i>Law Review</i>	2
LAWS 7916 Independent Legal Research: <i>Journal of International Environmental Law and Policy</i>	1
LAWS 7946 Independent Legal Research: <i>Journal on Telecommunications and High Technology Law</i>	2
<i>See also International; Practice-Simulation; and Seminars</i>	

**Taxation**

LAWS 6007 Income Taxation	4
LAWS 6157 Corporate Taxation	3

LAWS 6167 Taxation of Conduit Entities	3
LAWS 7207 Federal Estate and Gift Tax	3
LAWS 7217 Estate Planning	2
LAWS 7617 International Taxation	3
<i>See also Property; International; and Seminars</i>	

**Seminars**

LAWS Race, Racism, and American Law	2
LAWS 7128 Jurisprudence	32
LAWS 8015 Constitutional Theory	3
LAWS 8022 Protected Public Lands	2
LAWS 8075 Reforming Criminal Trials	2
LAWS 8103 ADR Ethics	2
LAWS 8112 Advanced Natural Resources Law	2-3
LAWS 8122 Mineral Development	2
LAWS 8135 Gender, Work, and Family	2
LAWS 8154 Land Use planning	2
LAWS 8251 Advanced Corporate Law	2
LAWS 8222 Environmental Philosophy and Law	2
LAWS 8302 Advanced Problems in Water Resources Law	2
LAWS 8310 International Crimes Punishment	2
LAWS 8315 Advanced Criminal Justice	2
LAWS 8335 Advanced Criminal Procedure—Juries	2
LAWS 8341 Law and Economics of the Information Age	3-2
LAWS 8355 Sentencing Law and Policy	2
LAWS 8375 Advanced Immigration and Citizenship Law	2
LAWS 8407 Tax Policy	2
LAWS 8458 Law and Literature	2
LAWS 8521 Comparative Labor Law	2
LAWS 8531 Labor and Employment in Transportation	2
LAWS 8532 Class and Law	2
LAWS 8548 Theory of Punishment	2
LAWS 8608 Power, Ethics, and Professionalism	2
LAWS 8613 Civil Liberties Litigation	2
LAWS 8718 Modern Theorists and Law	2
LAWS 8725 Advanced American Indian Law	2
LAWS 8765 Gender Law	2

**Dual-Degree Programs**

The School of Law offers five dual-degree programs: juris doctor/master of business administration (JD/MBA) with the Leeds School of Business; juris doctor/master of international affairs (JD/MIA) with the College of Arts and Sciences, Department of Political Science; juris doctor/master of public affairs (JD/MPA) with the Graduate School of Public Affairs on the Denver campus; juris doctor/master of science, telecommunication (JD/MST); and the juris doctor/master in environmental science (JD/ENVS). Through these programs, each school accepts a specified number of hours of course work taken at the other school as part of the requirements for completion of its degree. School of Law credit for work in the Leeds School of Business or the Graduate School of Public Affairs is conditioned upon completion of the MBA or MPA program. School of Law credit for work in the Leeds School of Business or the Graduate School of Public Affairs is treated on a *pass/fail* basis and is not computed in class rank or used in the computation of the cumulative 72 grade point average requirement for graduation from the School of Law.

To become eligible for any dual-degree program, a student must apply separately to and be admitted by each of the two schools under its respective admissions procedures and standards. Students may elect the dual-degree program at the time of initial application to both schools.

A student enrolled in a dual-degree program may commence studies under the program in either school. However, a student in any dual-degree program is required by the School of Law to take the first year of the juris doctor curriculum as a unit exclusively in the School of Law. The Leeds School of Business requires that the first year of the MBA program also be taken as a unit.

To request further information on and an application for the MBA program, write to the Graduate School of Business Administration, University of Colorado at Boulder, 419 UCB, Boulder, Colorado, 80309-0419, **303-492-1831**. For more information about the MIA program, write to the Department of Political Science, University of Colorado at Boulder, 333 UCB, Boulder, CO 80309-0333, **303-492-7871**. For more information on the MPA program, write to the Graduate School of Public Affairs, 142 UCB, P.O. Box 173364, Denver, CO 80217-3364, **303-556-5970**.

For more information on the MST program, visit [itd.colorado.edu](http://itd.colorado.edu); write to Department of Interdisciplinary Telecommunications, ECOT 317, University of Colorado at Boulder, 530 UCB, Boulder, CO 80309-0530; phone **303-492-8916**; fax **303-492-0112**; or e-mail [itd@colorado.edu](mailto:itd@colorado.edu).

For more information on the ENVS program visit [envs.colorado.edu/graduate/prospective/degrees/envs\\_law\\_dual.html](http://envs.colorado.edu/graduate/prospective/degrees/envs_law_dual.html), or contact the Environmental Studies Graduate Program, 397 UCB, Boulder, CO 80309-0397, **303-492-5420**.

## Certificate Programs

### *Tax Emphasis Program*

The School of Law offers a program of law study that leads to a juris doctor degree with a certificate evidencing an emphasis in the area of taxation.

This program is designed to provide a student with a credential that the School of Law believes will be attractive to many potential legal employers, as well as employers in the accounting profession. The certificate signifies taxation law experience beyond what is normally obtained by law graduates. The school believes that a number of employers desire law graduates with additional experience in the taxation area, but are unwilling to incur the additional expense required, or are unable to provide the full-time work in the tax area necessary, to hire a person with a graduate tax degree.

The program requires a participating student to earn at least 95 semester hours of course credit for graduation (as contrasted with the usual 89 semester hours), and to earn at least 18 of these credits in the area of taxation. These 18 hours must include Income Taxation, Taxation of Conduit Entities, and Federal Estate and Gift Tax; at least one tax planning course (Business Planning, Estate Planning, or Real Estate Planning); and Tax Policy (if available at the School of Law or, if not offered, either the Tax Policy course at the Leeds School of Business or Public Finance in the Department of Economics).

A sufficient additional number of elective credits to make up the minimum 18 hours may be chosen from among the tax courses in the School of Law or from among the graduate tax offerings in the business school approved for law credit.

Business school and economics courses taken for law school credit under the tax emphasis program are limited to 6 semester hours of credit and must have received prior approval from the faculty.

A student must receive at least a *B* in the business school course or in the public finance course in order for the course to count for law school credit under the program. The business school or public finance courses will be treated as *pass/fail* courses for the School of Law transcript; that is, these courses will count toward the 95 hours required for the degree but will not be taken into account in computing the law student's grade point average.

A student may take more than the required 18 semester hours of tax courses under the tax emphasis program. However, in order to ensure that the student's law program is sufficiently broad, the faculty requires that at least 73 semester hours of credit be earned in courses outside of the taxation area.

A student should be able to complete this program within the normal three-year law degree period by planning the program of law study effectively and taking either a summer session of law study or a somewhat heavier than average load in each semester after the first year of law study. Law students who wish to participate in the program should contact the registrar of the School of Law for enrollment forms. Students interested in this program are encouraged to complete the forms during the spring semester of their first year.

### *Graduate Certificate in Environmental Policy*

Students at the University of Colorado School of Law may enroll in an interdisciplinary program in the Graduate School providing the certificate in environmental policy. Environmental issues—such as water policy, wilderness preservation, air quality, energy development, and global climate change—transcend ordinary academic boundaries. Policy analyses dealing with these problems must integrate insights and information from many disciplines. The program draws on courses in several departments in the College of Architecture and Planning, the College of Arts and Sciences, the College of Engineering, and the School of Law.

Two team-taught capstone seminars are offered each year: Environmental and Natural Resource Policy and Policy Responses to Global Change. Each focuses on a policy research problem, emphasizing the contribution of different disciplines to the understanding of that problem and the integration of disciplinary perspectives in the analysis of alternative policy recommendations.

Admission to the certificate program is open to law students and students in any regular graduate degree program. To qualify for the certificate, students must complete at least 18 hours from a list of eligible courses, including the two capstone seminars. At least 12 of the 18 hours must be in courses outside the law school. Up to 6 of these 12 hours may be applied toward the JD degree under certain circumstances.

The award of the certificate recognizes the additional course work beyond that required for the student's regular degree program.

Questions about the certificate program in environmental policy should be directed to Professor Sam Fitch, interim director, Graduate Interdisciplinary Program in Environmental Policy, University of Colorado at Boulder, 333 UCB, Boulder, CO 80309-0333, **303-492-2954**, or to Professor James B. Martin, School of Law, University of Colorado at Boulder, 401 UCB, Boulder, CO 80309-0401, **303-492-1287**.

## Faculty—School of Law

DAVID H. GETCHES, dean; Raphael J. Moses Professor of Natural Resources Law. AB, Occidental College; JD, University of Southern California School of Law.

NORMAN F. AARONSON, clinical professor of law, legal aid and defender program. BA, Brandeis University; JD, Boston University Law School.

BARBARA BINTLIFF, Nicholas Rosenbaum Professor of Law; library director; Charles Inglis Thomson Fellow. BA, Central Washington State College; JD, MLL, University of Washington.

HAROLD H. BRUFF, Charles J. Thomson Professor of Law. BA, Williams College; JD, Harvard Law School.

CLIFFORD J. CALHOUN, professor emeritus.

EMILY M. CALHOUN, professor. BA, MA, Texas Tech University; JD, University of Texas School of Law.

PAUL F. CAMPOS, professor. AB, MA, University of Michigan; JD, University of Michigan Law School.

HOMER H. CLARK JR., Moses Lasky Professor emeritus.

RICHARD B. COLLINS, professor; director of the Byron R. White Center for the Study of American Constitutional Law. BA, Yale College; LLB, Harvard Law School.

JAMES N. CORBRIDGE JR., professor emeritus.

RICHARD DELGADO, Jean N. Lindsley Professor. AB, University of Washington; JD, University of California, Berkeley.

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ALLISON HARTWELL EID, associate professor. AB, Stanford University; JD, University of Chicago Law School.

TED J. FILIS, professor. BS, Northwestern University; LLB, Harvard Law School.

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LAKSHMAN GURUSWAMY, professor of law. LLB, Sri Lanka; PhD (law), University of Durham, United Kingdom.

MELISSA HART, associate professor. BA, Harvard-Radcliffe College; JD, Harvard University.

DAVID S. HILL, professor. BS, University of Nebraska; JD, University of Nebraska School of Law.

J. DENNIS HYNES, Nicholas Rosenbaum Professor emeritus. BA, University of Colorado; LLB, University of Colorado School of Law.

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HOWARD C. KLEMME, professor emeritus.

SARAH A. KRAKOFF, associate professor. BA, Yale University; JD, University of California, Berkeley.

MARK J. LOEWENSTEIN, associate dean for research; professor. AB, University of Illinois; JD, University of Illinois College of Law.

THOMAS LUSTIG, associate professor adjoint. AB, Washington University; MS, University of Michigan; JD, University of Colorado School of Law; PhD, Massachusetts Institute of Technology.

DAYNA MATTHEW, associate professor. BA, Harvard-Radcliffe College; JD, University of Virginia.

OSCAR J. MILLER, professor emeritus.

HIROSHI MOTOMURA, Nicholas Doman Professor of International Law. BA, Yale College; JD, University of California, Berkeley.

CHRISTOPHER B. MUELLER, Henry S. Lindsley Professor of Procedure and Advocacy. AB, Haverford College; JD, University of California, Berkeley.

KATHRYN MUTZ, research associate, Natural Resource Law Center. BA, University of Chicago; MS, Utah State University; JD, University of Colorado School of Law.

ROBERT F. NAGEL, chair; Ira C. Rothgerber Jr. Professor of Constitutional Law; director, Byron R. White Center for American Constitutional Study. BA, Swarthmore College; JD, Yale Law School.

DALE A. OESTERLE, Monfort Professor of Commercial Law. BA, MPP, JD, University of Michigan.

SCOTT PEPPET, associate professor. BA, Cornell University; JD, Harvard Law School.

COURTLAND H. PETERSON, Nicholas Doman Professor of Law emeritus.

WILLIAM T. PIZZI, professor; Byron R. White Center fellow. AB, Holy Cross College; MA, University of Massachusetts; JD, Harvard Law School.

CAROLYN RAMSEY, associate professor. BA, University of California, Irvine; AM, Stanford University; JD, Stanford Law School.

KEVIN R. REITZ, professor; Byron R. White Center fellow. BA, Dartmouth College; JD, University of Pennsylvania Law School.

WILLIAM E. RENTFRO, professor emeritus.

PIERRE J. SCHLAG, Byron R. White Professor of Constitutional Law. BA, Yale College; JD, University of California, Los Angeles.

DON W. SEARS, professor emeritus.

PETER N. SIMON, associate professor emeritus. BS, MD, University of Wisconsin; JD, University of California, Berkeley.

AMY SCHMITZ, associate professor. BA, Drake University; JD, University of Minnesota Law School.

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MICHAEL J. WAGGONER, associate dean for academic affairs; associate professor. AB, Stanford University; LLB, Harvard Law School.

PHILIP J. WEISER, associate professor; executive director of the Silicon Flatirons Telecommunications Program. BA, Swarthmore College; JD, New York University School of Law.

MARIANNE C. WESSON, professor and Wolf Nichol fellow. BA, Vassar College; JD, University of Texas School of Law.

AHMED WHITE, associate professor. BA, Southern University; JD, Yale Law School.

CHARLES F. WILKINSON, distinguished university professor; Moses Lasky Professor. BA, Denison University; LLB, Stanford Law School.

SIENHO YEE, associate professor. Educated at Peking University, Brandeis University, University of Oxford; JD, Columbia Law School.

### *Legal Writing Faculty*

JOANNE DUGAN, professor in legal writing. BA, Bates College; MLS, University of Washington; JD, University of Maine.

LOUISE HEINY, professor in legal writing. BA, JD, University of Colorado.

GABRIELLE MARKS STAFFORD, professor in legal writing. BA, University of Pennsylvania; JD, Boston University School of Law.

TODD STAFFORD, professor in legal writing. BA, Southern Methodist University; JD, Duke University.

### *Library Faculty*

GEORGIA BRISCOE, associate director and head of technical services. BS, Washington State University; MA, University of San Diego; AMLS, University of Michigan.

DONALD L. FORD, reference librarian. BA/BA, American University; JD, University of Virginia.

DRUET CAMERON KLUGH, reference librarian. BA, JD, University of Iowa.

KAREN SELDEN, catalog librarian. BS, Pennsylvania State University; MLS, Simmons College.

JANE THOMPSON, head of faculty services. BA, University of Missouri, Columbia; JD, MA, University of Denver.

### *Professional Staff*

ANTHONY L. BASTONE II, assistant dean for career services. BS, University of Texas, Arlington and Northeastern State University; MA, Sam Houston State University.

CINDY GIBBONS, registrar. BFA, University of Colorado.

DAVID GOSSER, assistant dean for alumni relations. BA, University of Colorado at Boulder; JD, University of Colorado School of Law.

JEAN E. KLINE, assistant to the dean. BS, University of Colorado; Certified Public Accountant.

JAMES B. MARTIN, professor; director of Natural Resources Law Center. BA, Knox College; JD, Northwestern School of Law.

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JEAN PATTON, assistant to the dean. BA, MA, University of Northern Colorado.

CONNIE A. ZUBLER, director of career services. BS, Drake University; JD, Southern Methodist University School of Law.

# College of Music

*Daniel P. Sher, dean*

301 UCB • phone: 303-492-6352 • fax: 303-492-5619

college web site: [www.colorado.edu/music](http://www.colorado.edu/music)



**T**HE COLLEGE OF MUSIC PROVIDES specialized training designed to prepare students for a variety of careers in music. The college offers three undergraduate degrees, three certificate programs, and four graduate degrees; numerous performance opportunities are also available.

Established by the Regents of the University of Colorado in 1920, the College of Music is a fully accredited member of the National Association of Schools of Music.

## Mission

The mission of the College of Music at CU-Boulder is to promote excellence in music through distinguished instruction in performance, composition, musicology, theory and teacher preparation, and to provide opportunities for performance, creative activities, research and scholarship, and teaching.

The college is dedicated to:

- providing music majors the opportunity to develop their knowledge, understanding, and ability in the various aspects of music;
- preparing students for careers as performers, composers, scholars, teachers, administrators, and other professionals in the field of music;
- broadening and deepening the knowledge and understanding of music through research, teaching, creative activities, and publication; and
- enriching the lives of students and faculty as well as the community, state, nation, and the world with a variety of performances and publications.

The College of Music is an academic community committed to maintaining a climate of mutual respect and collegiality showing appreciation for a diversity of musical cultures and individual backgrounds.

The widely varied functions of music in the world today present many challenging and interesting opportunities for teachers, performers, creative artists, technicians, and commercial personnel. While these different pursuits require specialized emphases, the faculty of the College of Music recognize the musical and educational experiences that are common to all. Therefore, each curriculum of the College of Music is designed to present music as an integrated whole. Solo performance and technique, ensemble performance, historical and theoretical studies, concert and recital opportunities, and elective courses both inside and outside the college are intended to give students a balanced approach to musical understanding and musicianship.

The college maintains a ratio of approximately one faculty member for every 10 students. This enables students to benefit from dynamic, personal interaction with their professors. The

college also offers students regular academic advising to ensure that they complete their degrees without unnecessary delay.

In addition to training in the various professions of music, the college provides general music studies and activities for the non-major; broad cultural programs (concerts, recitals, lectures) for the university and Boulder communities; favorable conditions for research in music; and service activities to the state and nation.

## Major Fields and Degrees

Undergraduate degrees include the bachelor of music (BM), the bachelor of arts in music (BA), and the bachelor of music education (BME). Students may also elect to earn a certificate in jazz studies or music technology in conjunction with their degree. In addition to a substantial core of studies in music, the BA in music program allows a wide choice of study in areas outside of music. BM areas of concentration include: composition, history and literature of music, performance, and voice theatre. The major emphasis areas in the BME program are: choral, choral-general, instrumental, and instrumental-general.

Incoming freshmen and transfer students in the College of Music are normally declared as music majors before or at the beginning of their first semester. There is no minor in music.

Qualified students may receive both the bachelor of music and bachelor of music education degrees by taking the required extra work (approximately 30 additional semester credit hours). Intent to be admitted to candidacy for both degrees should be indicated as soon as possible, preferably in the sophomore year. Students may also pursue double degrees in music and an outside field such as engineering, business, etc. Questions may be directed to the associate dean for undergraduate studies, College of Music, 303-492-6354, or [ugradmus@colorado.edu](mailto:ugradmus@colorado.edu).

Graduate degrees include the master of music (MM), the master of music education (MME), doctor of musical arts (DMA), and doctor of philosophy (PhD). Major fields in the master of music and doctor of musical arts degrees are conducting, composition, pedagogy, and performance. The master of music in musicology provides training in musicology and music theory. The master of music education degree is designed to provide advanced instruction for teachers in the elementary and secondary schools. The master of music in jazz performance and pedagogy provides training for teaching and performing jazz in a range of styles. The PhD is a research degree for all fields of music and music education.

Graduate degrees are offered through the Graduate School and additional information can be found in the Graduate School section as well as in the curricula listed for the college. Correspondence regarding details not included in this publication should be directed to the associate dean for graduate studies, College of Music.

## Facilities

The College of Music has several beautiful performance halls, including the 2,000-seat Macky Auditorium, the 500-seat Grusin Music Hall, the 250-seat Music Theatre, and the 120-seat Chamber Hall. The college is located primarily in the Warner Imig Music Building, a large complex of practice rooms, faculty studios, offices, ensemble rehearsal areas, seminar facilities, and classrooms. An addition to the east side of the building features a 4,300 square foot rehearsal space with a 35-foot ceiling and acoustical draping. Additional rehearsal and classroom facilities are located in Macky.

The college's outstanding Music Library is considered to be among the nation's most comprehensive. The library contains over 150,000 volumes, scores, recordings, and periodicals. Computerized facilities are provided for listening to recordings and practicing ear training. Computer terminals are available for computer-based reference searching. The Music Library also includes the American Music Research Center, a unique facility dedicated to the discovery of new information about American music. The center sponsors concerts and scholarly activities and serves as an archive for several extensive collections of American music.

The college also features extensive facilities for music technology and electronic music study. The Computer-Assisted Music Laboratories (I and II) are multi-purpose labs designed primarily for classroom instruction. They feature numerous workstations, each with a Musical Instrument Digital Interface, sampling keyboard, and a computer. The CRUNCH lab is a fully-featured electronic music project studio. This lab is optimized for computer music research (including live interactive performance systems), as well as sound recording and editing projects and audio/video production. The Class Piano laboratory is equipped with thirteen digital pianos.

## Performances

Each year the College of Music presents over 400 concerts by students, faculty, and guests. In addition to individual musical pursuits, students at all levels have the opportunity to perform in a variety of outstanding ensembles including orchestras, choirs, bands, chamber and early music groups, jazz ensembles and combos, opera productions, and musicals. Many of these groups have been invited to perform at prestigious national and international events. Recitals by students and faculty are supplemented by visits from world-class guest artists, all of which provide the Boulder community with the chance to hear some of the finest music being performed today. The vast majority of these excellent performances are free and open to the public. Other programs presented by CU Concerts include: the Artist Series, CU Opera, Takács Encore Series, and the Holiday Festival. For a schedule of all College of Music performances, call 303-492-8008 or visit [www.cuconcerts.org](http://www.cuconcerts.org).

## International Study

The college encourages the educational breadth that comes with study abroad. Two programs, one at the Hochschule für Musik in Berlin and one in Regensburg, Germany, offer study in performance and music history. These programs are coordinated in conjunction with the Office of International Education, which may be contacted for further information.

## Student Organizations

The student body of the College of Music has its own government, represented by the Associated Students of the College of Music and the Graduate Music Student Council. Honorary music fraternities are Phi Mu Alpha, Sigma Alpha Iota, Kappa Kappa Psi, and Tau Beta Sigma. Pi Kappa Lambda, the national scholastic honorary music fraternity, is also an active organization on campus. Music education majors are eligible for membership in student chapters of the National Association for Music Education (MENC), the American Choral Directors Association, the American String Teachers Association, and the International Association of Jazz Educators.

## Entrepreneurship Center

The Entrepreneurship Center for Music helps students think creatively about using their talents and interests in the music industry. The traditional job choices for music students—teaching and performing—are only two of the hundreds of employment options in the \$40 billion global music industry. The center helps students develop an entrepreneurial spirit through specialized courses, guest speakers, workshops, and individual appointments to discuss career options. The internship program provides valuable experience outside of the classroom in arts organizations around the country. More information about the center is available at [www.colorado.edu/music/entrepreneurs](http://www.colorado.edu/music/entrepreneurs).

## Academic Excellence

### Dean's Honor Roll

A full-time undergraduate student in the College of Music who completes at least 24 credit hours of course work at the end of the fall semester on the Boulder campus (excluding continuing education), and who earned a semester grade point average of at least 3.70, will be included in the college dean's honor roll for that semester. Notation of the "Dean's Honor Roll" is also listed in the Honors Convocation Program.

### Honors at Graduation

Students achieving a cumulative grade point average of 3.70–3.80 (honors), 3.80–3.90 (high honors), and 3.90–4.00 (highest honors) are recognized at commencement.

### Scholarships and Awards

Several scholarships and awards are designed specifically for students in the College of Music. Undergraduate music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory progress in their major as determined by the faculty in jury exams and auditions, and maintain a minimum cumulative grade point average of 2.75. (Voice majors must also maintain a minimum 3.00 GPA in music courses.)

Graduate students must enroll as full-time students, maintaining a 3.00 GPA, and make adequate progress toward their degrees. The college offers approximately 70 graduate assistantships as well as graduate fellowships, and a variety of endowed scholarships for graduate students (included below.)

Nancy and Ted Anderson Music Awards  
 Beckie Reeder Arnold Piano Scholarship  
 Joyce Mata Ashley Scholarship Fund  
 The Bagley Prize  
 John W. (Jack) Bartram Memorial Scholarship  
 Virginia Blake Becker Flute Scholarship  
 Darrell and Lauren Boyle Music Theatre Scholarship  
 Charles Byers Choral Music Education Scholarship

Rebecca Beardmore Chavez Scholarship Fund  
 William Clendenin Music History Scholarship  
 Berton Coffin Scholarships in Voice  
 Arline P. Cohen Scholarship  
 Walter and Jenny Kate Collins Memorial Graduate Fellowship in Choral Studies  
 Sue Conrad and C. Dickson Titus Memorial Fund  
 Viola Vestal Coulter Foundation Voice Scholarship in Honor of Harold A. Norblom  
 Wilma and Perry Louis Cunningham Scholarship in Voice  
 Frank and Gina Day Graduate Performance Fellowship  
 Denver Lyric Opera Guild Scholarship  
 Barbara M. Doscher Memorial Voice Scholarship  
 Cecil Effinger Fellowship in Composition  
 Ewing Memorial Music Scholarship  
 Robert R. Fink Undergraduate Scholarship in Music Theory  
 Wallace F. Fiske Performance Awards  
 Gordon Getty Foundation Scholarship  
 Robert and Diane Greenlee Scholarship in Honor of Doris Lehnert  
 Robert and Diane Greenlee Scholarship in Honor of Oswald Lehnert  
 James M. Grossi Composition Scholarship  
 Dave Grusin Graduate Fellowship  
 Charles Haertling Piano Scholarship  
 Jessie and Albert Henry Memorial Scholarships  
 Eugene Hillgoss Memorial Scholarship  
 Everett J. Hilty Carillon Fellowship  
 Everett J. Hilty, Sr. Fund  
 Honors String Quartet Awards  
 Warner and Norma Imig Choral Conducting Scholarship  
 Dennis Jackson Opera Scholarship  
 Freelyn Jeffers Award in Choral Conducting  
 Dale R. Johnson Opera Scholarship  
 Keyboard Honors Awards  
 Denés Koromzay String Chamber Music Award  
 Scott Robert McBurney Memorial Scholarship  
 Robert K. McIntosh Fund for Music Instruction for Disadvantaged Children  
 Vera McWharther Memorial Voice Scholarship  
 Claudia Boettcher Merthan Vocal Scholarship  
 Trudi Mielziner Graduate Opera Scholarship  
 Mile High Band Music Education Scholarship  
 Musicology Academic Achievement Award  
 Noris Graduate Piano Award  
 Gabor Ormai String Scholarship  
 Phyliss and Paul Parmelee Memorial Piano Scholarship  
 John N. Parsons Musicology Fund  
 Peercy-Roth Memorial Scholarship  
 Theodore Presser Academic/Performance Award  
 Gregory Philip Ranno Excellence in Music Scholarship  
 Charlotte Orr Reid Memorial Voice Scholarship  
 Anthony and Dorothy Riddle Lyric Theatre Performance Prize  
 Walter Orr Roberts Music Scholarship  
 William Earl Rose, Sr. Scholarship Fund  
 Robin Sawhill Award for Excellence in Piano Performance  
 Charles Sawtelle Memorial Music Scholarship in Jazz Studies  
 Virginia Schwatel Fund for Music Education  
 Fay Shwayder String Quartet Awards  
 Eric Sutton Skinner Memorial Scholarship in Percussion  
 Pete Smythe AMRC Scholarship Fund  
 Galen and Ada Belle Files Spencer Fellowship in Voice  
 Meg Stanavage Memorial Music Scholarship  
 Peter and Julianne Steinhauer AMRC Scholarship in honor of Wayne Scott  
 Crick Streamer Memorial Scholarship  
 Beth Suitts CU Opera Endowment  
 Louise Touhy Music Scholarship  
 Howard B. Waltz Composition Scholarship  
 Howard B. Waltz Music Scholarship  
 Howard B. Waltz Piano Scholarship  
 Judith Richardson Waterman Choral Music Education Scholarships  
 Betty M. Weir Memorial Voice Scholarship  
 Katherine Anne Suber Whiton Memorial Scholarship in String Bass

Lynn Whitten Fellowship in Graduate Choral Conducting  
 Brownlow V. Wilson Music Education Scholarship  
 Paula Marie and H. Rolan Zick Endowment

## Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery, or falsification of official records, and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university.

In particular, students are advised that plagiarism consists of any act involving the offering of the work of someone else as their own. It is recommended that students consult with their instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Students are expected to be acquainted with and abide by provisions of the University of Colorado at Boulder Honor Code.

### Scholastic Requirements

Any undergraduate student who has a cumulative or semester grade point average below 2.00 is automatically placed on probation for the following three semesters. (Cumulative grade point average is calculated on grades earned at this university.) If, at the end of each semester and cumulative probationary period, the semester grade point average is not 2.00 or above, automatic suspension results.

Undergraduate students who have a cumulative or semester grade point average of 1.00 or below are automatically suspended. Suspended students must attend a summer term or continuing education classes at CU-Boulder to raise their grade point averages. Those attempting to do this must successfully complete 12 credits in one semester with no withdrawals and no incomplete grades.

Undergraduate students under scholastic suspension may petition for readmission and may receive a personal hearing before the associate dean for undergraduate studies.

Students who have been dismissed must reapply for admission to the university after being reinstated by the college, unless they are dismissed in May and raise their cumulative GPA to 2.00 during the following summer.

Graduate students should see Quality of Graduate Work in the Graduate School section for scholastic requirements.

### Appeals

Students have the right to appeal decisions of academic dishonesty and to petition for exceptions to the academic policies stated in this catalog. Appeals should be directed to the Office of the Dean. College of Music policies stated below are in addition to the campus policies.

## Undergraduate Admission and Enrollment Policies

### Admission Requirements

In addition to the entrance requirements of the university outlined in Undergraduate Admission in the General Information section, freshman and transfer students must meet College of Music entrance requirements. A knowledge of the rudiments of music theory and good sight-reading ability in the major instrument or voice is expected. Prospective music majors are also advised to develop fluent reading ability in treble and bass clefs and at least elementary piano skill. Students with appropriate

skill in piano sight reading and keyboard harmony may be able to test out of all or part of the secondary (class) piano requirement if it is included in their degree plan.

History and literature majors should have a performance skill. Instrumental majors and singers should possess a well-grounded technique sufficient to play and sing music of moderate difficulty.

### Auditions

An audition is required for all entering undergraduate music majors. Undergraduate auditions are held in Boulder on Saturdays in February. Alternate audition dates may also be scheduled if necessary. If travel distance is prohibitive, prospective students may substitute a high-quality recording. It is helpful for performers to identify themselves by name and to list selections and titles at the beginning of the recording. The college ordinarily expects to receive recordings by February 15 in order for students to be considered for financial assistance. Everyone who auditions is evaluated for a merit-based music scholarship. There is no special music scholarship application. Students should prepare a 10–20 minute audition program in accordance with the audition requirements that are listed on the College of Music web site: [www.colorado.edu/music](http://www.colorado.edu/music) (click on Prospective Students, then on Undergraduate Studies, then on Audition Requirements, and then on the instrument/voice desired).

Contact the Undergraduate Office at **303-492-6354** or [ugradmus@colorado.edu](mailto:ugradmus@colorado.edu) for a paper copy of audition requirements or for more information.

Admissions decisions for music education applicants are based on academic qualifications, audition results, and an interview conducted by two or more music education faculty members. Interviews address written and verbal communication skills, motivation and goals related to music teaching, prior music teaching experiences, and affective characteristics associated with effective music teachers. For information about music education interviews, contact James Austin, music education chair, at **303-492-1782** or [James.Austin@colorado.edu](mailto:James.Austin@colorado.edu).

### Provisional Admission

Applicants who meet all admission requirements except the minimum academic preparation standards (MAPS) may petition the associate dean for undergraduate studies for admission as a provisional student. Such applicants must offer at least three units of English and six additional units in academic fields.

### Transfer Students

Transfer students from within the university and from other universities must meet the general requirements of the university and the specific requirements of the College of Music, including the audition. See Undergraduate Admission in the General Information section for specific requirements.

### Nondegree Students

With the written permission of the instructor, nondegree students may take any class offered by the College of Music except private applied instruction. However, those students intending to become degree students the following semester may petition the dean for permission to register for private applied instruction.

### Attendance Requirements

Students are expected to attend classes regularly and to comply with the attendance requirements specified by their instructors. For performance groups, these requirements include attendance at concerts and trips as well as rehearsals. Unexplained absences

from three class periods are reported to the student's associate dean by the instructor.

### Convocations and Recitals

All degree students are required to pass Music Convocation (CONV 1990) for a minimum of six semesters. Transfer students normally do four semesters. Graduation is not permitted until this requirement is met. Deficiencies can be removed only during the academic year. If necessary, students may register for two convocations in one semester (CONV 1990 and 2990.) Discrepancies concerning convocation credit should be resolved within one year of the semester in question.

Each semester, students are given a list of convocations and recitals from which a minimum of seven must be attended to receive a passing grade. Events in which the student participates do not count toward this requirement. Monitors are present at each event to distribute and collect attendance slips. Students are encouraged to keep their copies of attendance slips for verification.

### Ensembles

All undergraduate students enrolled in applied music must participate in a university ensemble appropriate to and required by their degree program. (Students enrolled in Conducting courses must concurrently be enrolled in a conducted ensemble.) Voice performance majors are not required to be in ensembles during the semester of their senior recital. Any student who studies applied music beyond degree requirements must participate concurrently in a university ensemble. Double majors need be in only one ensemble at a time.

### Course Load

The normal academic load for an undergraduate student in the College of Music is 15–17 semester hours. Schedules of fewer than 12 or more than 19 hours must have approval of the associate dean for undergraduate studies of the College of Music.

See limitations on registration under the Graduate School section for graduate student course load stipulations.

### Dropping a Course

Students should adhere to the deadlines for dropping a course in the registration handbook distributed each semester. After a certain date each semester, a special action form signed by the instructor and associate dean for undergraduate studies is required to drop a course.

### Pass/Fail Option

The *pass/fail* option for 12 credits is open only to undergraduate students. Music education students may only use the *pass/fail* option for student teaching. *Pass/fail* hours are to be selected from nonmusic courses and are in addition to those that may be taken in honors. Courses so elected are taken according to the *pass/fail* policies of the college or school concerned.

*Pass/fail* hours that transfer students can apply toward degree requirements from departments within the university are limited to 1 in every 8 semester hours earned in the College of Music.

### Residence Requirement

Of the hours required for an undergraduate degree, the last 56 credits must be completed in residence in the College of Music. This may be reduced by the faculty for excellent work done in this university and for high scholarship exhibited at previous institutions attended. In no case shall the minimum be fewer than 40 hours distributed over three semesters. At least 9 hours in



applied music (private instruction) must be earned in this college for the degrees bachelor of music and bachelor of music education, and 6 hours for the bachelor of arts in music.

## Student Work

A copy of all scholarly student papers that generate credit (dissertations, theses, projects, lecture recitals, and other document-producing activities), whether undergraduate or graduate, is placed in the Music Library. More than one copy may be required in individual degree programs. To ensure that degree requirements have been met and the document is appropriate for placement in the Music Library, all faculty-approved documents must be presented to the appropriate associate dean's office at least two weeks before the graduation date.

Students who cannot meet the proficiency requirements after two semesters of private study receive a grade of incomplete fail (*IF*) or incomplete withdrawal (*IW*) and cannot progress to the next level until the proficiency is achieved. Advisors provide students with proficiency and repertoire requirements.

Any recital required for graduation is recorded. Arrangements are to be made through the College of Music Concerts Office, and a recording fee is charged. The original recording is placed in the Music Library.

## Withdrawal

*The Registration Handbook and Schedule of Courses* indicates the deadlines for withdrawal from the university and the financial penalties incurred with each. Students wishing to withdraw should follow appropriate university guidelines (contact the office of the registrar or the associate dean of music). Those who stop attending class without officially withdrawing will receive F's in each of their courses. Such a transcript is usually problematic for students who resume study at any institution at some future date.

## Undergraduate Degree Programs

The degrees bachelor of arts in music, bachelor of music, and bachelor of music education are granted by the university, upon recommendation of the faculty of the College of Music, to those who have successfully completed prescribed requirements.

Students must file an appropriate request-to-graduate form by May 1 in the Office of the Associate Dean for Undergraduate Studies if they anticipate completing requirements in December, May, or August of the following academic year.

## General Education in Music

The undergraduate degrees in music emphasize knowledge and awareness of:

- solo performance and technique, including the various musical styles used in compositions for students' musical instruments or voice;
- each composition performed, notation and editorial signs used in the compositions performed, and repertoire for the students' performance medium;
- ensemble performance, including familiarity with major composers in the student's performance medium and the techniques necessary to blend a number of individual musicians into an ensemble;
- concert and recital opportunities, including literature composed for different performance forces;
- theoretical studies, including tonal harmony, counterpoint, voice-leading, and notation; formal principles and analytical techniques for tonal music; and instruments in score, including

the concert pitch of transposing instruments and nomenclature used in scores; and

- historical studies, including representative works in the canon of musical literature from chant to the present, the general outlines of the history of music from the Middle Ages to the present, music in the United States, and musical cultures other than those of Europe.

In addition, students completing any of the degrees in music are expected to acquire the ability to:

- perform solo and ensemble repertoire demonstrating musical artistry, technical proficiency, and stylistic understanding;
- demonstrate an understanding of theoretical studies, including sight-reading and ear training; and
- demonstrate an understanding of historical studies including the analysis of stylistic periods and music of non-Western cultures.

## Double-Degree Programs

Students may complete requirements in two fields and receive two degrees from the university. Such double-degree programs are available combining music with business, engineering, journalism and mass communication, or disciplines in the College of Arts and Sciences. Students must make application for a double-degree program in both the College of Music and the Leeds School of Business, the College of Engineering and Applied Science, the School of Journalism and Mass Communication, or the College of Arts and Sciences. Any other combined program must be arranged by consulting both schools or colleges.

## Bachelor of Arts in Music

The bachelor of arts in music degree has as its goal a broad education in music within a liberal arts context. Although students may elect within their programs courses that permit them to pursue special interests, the primary emphasis is on the development of basic musicianship, an ability to perform music, and a broad knowledge of the foundations and principles of music as an art.

Students may elect to pursue a degree in a nonmusic field in addition to a music degree. This is most often done with a BA in music; double degrees may or may not require more than four years to complete.

A minimum of 120 semester hours with an overall grade point average of 2.00 must be earned for the BA in music degree. Of these hours, at least 68 must be in nonmusic courses. Thirty must be at the 3000 or 4000 level. A minimum of 40 hours is required in music courses.

The normal pattern for private applied instruction in this degree is one half-hour lesson per week for 2 semester hours of credit or one one-hour lesson for 3 semester hours credit. The minimum proficiency is equal to the bachelor of music education sophomore level. Not more than 16 semester hours of credit in private instruction may be used toward the degree.

Students registered for applied music must participate in an ensemble as recommended by their applied faculty. A maximum of 4 credit hours in ensemble can apply to the BA in music degree.

A recital may be given with permission of the chair of the faculty concerned and the student's advisor.

## Minimum Requirements

In addition to the general requirements listed above, the following specific requirements must be met:

1. Three credits of English composition.

2. Basic proficiency in one foreign language equal to three semesters at the university level. This requirement also may be fulfilled by three years of study in high school in one language or by passing a university proficiency examination.

3. Nonmusic electives to fulfill the minimum requirement of 68 semester hours of credit. Of the non-music electives, 34 semester hours of credit must be fulfilled through the College of Arts and Sciences' core curriculum.

### Courses and Curricula

For the BA in music degree, students must complete the courses listed below. More detail is given on the degree sheet available from the associate dean of undergraduate studies.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters).....	0
Applied instruction (lessons and literature class).....	4
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Foreign language .....	3
Nonmusic electives .....	10
<b>Sophomore Year</b>	
CONV 1990 Convocation (two semesters).....	0
Applied instruction (lessons and literature class).....	4
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2988 Intro. to Music Research.....	1
Nonmusic electives .....	18
<b>Junior Year</b>	
CONV 1990 Convocation (two semesters).....	0
MUSC 3802, 3812 History of Music 1 and 2 .....	6
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101).....	2
Nonmusic electives .....	23
<b>Senior Year</b>	
Non-Western music, 2000/4000 level .....	3
Elective in music history, 4000 level.....	3
Nonmusic electives .....	21

## Bachelor of Music

The four-year professional curriculum leading to the bachelor of music degree emphasizes creative skill, academic achievement, and artistic performance in music. Concentration areas are offered in performance, voice theatre, composition, history and literature of music, and church music. Performance areas include voice, piano, jazz piano, organ, string instruments, classical guitar, woodwinds, brass, and percussion.

A half recital in the junior year and a full public recital in the senior year are required of students in the performance concentration areas, except church music and voice theatre. Students should check with their advisor about preview policies.

A thesis is required of students in the composition area and in the history and literature area. For composition students, the thesis should be an original composition; for history and literature students, a major paper. Students should check with their advisor for details.

A thesis is required of church music students and may consist of several minor research projects, choral arrangements, composition projects, or the preparation and production of a short cantata. A senior project is required of students in the voice

theatre area. This project may be a senior recital, major role, or direction or design of a major show.

Specific performance group requirements are controlled by the degree plan in each concentration area and are subject to the advisor's judgment in the best interest of the student.

The bachelor of music degrees include requirements in theory, history, and literature of music. Elective study in most degrees requires 30 nonmusic credits, including 3 in English composition, and 12 free electives that may be music or non-music courses. A suggested course sequence is shown below. (More detail is given on the degree sheets available from the associate dean for undergraduate studies.)

### English Composition

Students pursuing the bachelor of music degree will be required to take one 3-hour course in English composition through the Program for Writing and Rhetoric or the English department. Courses such as First-Year Writing and Rhetoric, Freshman Writing Seminar, or Introduction to Creative Writing fulfill the requirement. The credit hours are applied in the liberal arts electives category. Students are strongly encouraged to complete this requirement by the end of their sophomore year.

### Courses and Curricula

Most concentration areas require at least 123 credit hours.

#### Composition Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters).....	0
PMUS 1636-807 Piano for Composers .....	4
Ensemble .....	2
PMUS 1526 Composition (and Composition Seminar).....	6
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	6
<b>Sophomore Year</b>	
CONV 1990 Convocation (two semesters).....	0
PMUS 2636-807 Piano for Composers .....	4
Ensemble .....	2
PMUS 2526 Composition (and Composition Seminar).....	6
MUSC 2071 Instrumentation (spring).....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
Electives 13 .....	13
<b>Junior Year</b>	
CONV 1990 Convocation (two semesters).....	0
PMUS 3636-807 Piano for Composers .....	4
Ensemble .....	2
PMUS 3526 Composition (and Composition Seminar).....	6
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 4001 New Music Styles and Practices (spring).....	2
MUSC 3176 Conducting 1 (fall).....	2
MUSC 4041 Orchestration (fall).....	2
Electives .....	9
<b>Senior Year</b>	
PMUS 4636-807 Piano for Composers .....	4
Ensemble .....	2
PMUS 4526 Composition (and Composition Seminar).....	6
MUSC 4011, 4021 16th/18th Century Counterpoint.....	4
MUSC 4061, 4071 Tonal Analysis and Post-tonal Theory and Analysis.....	4
Non-Western music, 2000/4000 level.....	3

MUSC 4957 Senior Thesis.....	0
Electives .....	11

### Classical Guitar Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
PMUS 1566 Applied guitar instruction (lessons and literature classes).....	8
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1326 Guitar Sight Reading .....	1
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
MUSC 2366 Introduction to Accompanying.....	2
English composition.....	3
Electives .....	7

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2566 Applied guitar instruction (lessons and literature classes).....	8
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
Electives .....	16

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
PMUS 3566 Applied guitar instruction (lessons and literature classes).....	7
MUSC 4061 Tonal Analysis (fall).....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3176 Conducting.....	12
MUSC 3997 Junior Recital .....	1
Ensemble .....	2
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101).....	2
Electives .....	11

#### Senior Year

PMUS 4566 Applied guitar instruction (lessons and literature classes).....	7
Non-Western music, 2000/4000 level .....	3
MUSC 4106 Guitar Literature .....	2
MUSC 4997 Senior Recital .....	1
Ensemble .....	2
Electives .....	11

### Organ Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1616 Applied organ instruction (lessons and literature classes).....	8
Performance minor .....	2
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	3

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2616 Applied organ instruction (lessons and literature classes).....	8
Performance minor .....	2
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2265 Service Playing Techniques.....	2
MUSC 3176 Conducting 1.....	2
Electives .....	15

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
PMUS 3616 Applied organ instruction (lessons and literature classes .....	7
Ensemble .....	2
MUSC 3802, 3812 History of Music 1 and 2\.....	6
MUSC 3997 Junior Recital .....	1
MUSC 4011, 4021 16th/18th Century Counterpoint.....	4
MUSC 4265, 4275 Improvisation.....	4
MUSC 4285, 4295 Organ Survey.....	6

#### Senior Year

PMUS 4616 Applied organ instruction (lessons and literature classes).....	7
MUSC 4997 Senior Recital .....	1
Ensemble .....	2
Non-Western music, 2000/4000 level.....	3
Electives .....	18

### Piano Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1636 Applied piano instruction (lessons and literature classes) .....	8
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1325 Sight Reading for Piano .....	1
MUSC 2365 Introduction to Accompanying.....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	9

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2636 Applied piano instruction (lessons and literature classes) .....	8
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2325 Applied Harmony for the Keyboard .....	2
PMUS 4105 Independent Accompanying .....	2
Electives .....	15

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
PMUS 3636 Applied piano instruction (lessons and literature classes) .....	7
Band, orchestra, or choir.....	2
MUSC 3176 Conducting 1 (fall).....	2
MUSC 3345/3355 Piano Pedagogy 1 and 2 .....	4
MUSC 3802/3812 History of Music 1 and 2.....	6
Performance minor.....	4
MUSC 3997 Junior Recital .....	1
MUSC 4061 Tonal Analysis or MUSC 4071 Post-tonal Theory and Analysis.....	2
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101).....	2
Electives .....	3

#### Senior Year

PMUS 4636 Applied piano instruction (lessons and literature classes) .....	7
PMUS 4105 Independent Accompanying.....	2
MUSC 4325, 4335 Piano Literature 1 and 2.....	4
MUSC 4997 Senior Recital .....	1
Electives .....	12
Non-Western music, 2000/4000 level.....	3

### Jazz Piano Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1636 Applied Piano Instruction (lessons and literature classes).....	4
PMUS 1806 Applied Jazz Piano Instruction (lessons and literature classes).....	6
MUSC 1101, 1111 Theory 1 and 2 .....	4

MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1325 Sight Reading for Piano .....	1
MUSC 2365 Introduction to Accompanying .....	2
MUSC 1802 Introduction to Musical Styles and Ideas .....	3
EMUS 1427 Jazz Ensemble .....	2
English Composition .....	3
Electives .....	3

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2636 Applied Piano Instruction (lessons and literature classes).....	4
PMUS 2806 Applied Jazz Piano Instruction (lessons and literature classes).....	5
MUSC 3997 Classical Recital.....	1
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 3081 Jazz Theory and Aural Foundations (spring).....	3
EMUS 1427 Jazz Ensemble .....	2
EMUS 1437 Jazz Combo .....	1
Electives .....	9

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3806 Applied Jazz Piano Instruction (lessons and literature classes).....	6
MUSC 3176 Conducting 1 .....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3061, 3071 Jazz Improvisation 1 and 2 .....	4
EMUS 3427 Jazz Ensemble .....	1
EMUS 3437 Jazz Combo .....	2
Electives .....	9

**Senior Year**

PMUS 4806 Applied Jazz Piano Instruction (lessons and literature classes).....	6
MUSC 4997 Jazz Senior Recital .....	1
MUSC 4031 Jazz Scoring and Arranging .....	2
EMUS 3642 History of Jazz .....	3
EMUS 3437 Jazz Combo .....	2
Four credits selected from MUSC 3345, 3355 (Piano Pedagogy 1 & 2), MUSC 4325, 4335 (Piano Lit 1 & 2), or one seminar of piano pedagogy or literature and MUSC 3253 Jazz Techniques for the Music Educator .....	4
Electives .....	15

**Saxophone Performance with Secondary Emphasis in Jazz Concentration Area***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1646 Applied saxophone instruction (lessons and literature classes).....	6
PMUS 1105, 1205 Keyboard Musicianship.....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Band (Wind Sym., Symphonic, Concert) .....	2
Electives .....	6

**Sophomore Year**

CONV 1990 Convocation (two semesters) .....	0
PMUS 2646 Applied saxophone instruction (lessons and literature classes).....	6
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
EMUS 1407 Chamber Music (Woodwind) .....	2
Performance minor .....	2
PMUS 1515 Jazz Piano Class .....	2
Band (Wind Sym., Symphonic, Concert) .....	2
Electives .....	12

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3646 Applied saxophone instruction (lessons and literature classes).....	6
MUSC 3997 Junior Recital .....	1
MUSC 3176 Conducting 1 .....	2
MUSC 3081 Jazz Theory and Aural Foundations (spring).....	3
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3061 or 3071 Jazz Improvisation 1 or 2.....	2
Band (Wind Sym., Symphonic, Concert) .....	1
EMUS 3427 Jazz Ensemble .....	1
EMUS 3407 Chamber Music (Woodwind) .....	1
EMUS 3437 Jazz Combo .....	1
Electives .....	9

**Senior Year**

PMUS 4646 Applied saxophone instruction (lessons and literature classes).....	6
MUSC 4997 Senior Recital .....	1
Performance minor .....	2
MUSC 4031 Jazz Scoring and Arranging (spring).....	2
EMUS 3642 History of Jazz or a Non-western music course.....	3
MUSC 3253 Jazz Techniques for the Music Educator (spring).....	2
EMUS 3427 Jazz Ensemble .....	2
EMUS 3437 Jazz Combo .....	2
Electives .....	12

**String Performance Concentration Area: Harp, String Bass, Viola, Violin, and Violoncello***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
EMUS 1327 Orchestra.....	2
PMUS 1XXX Applied string instruction (lessons and literature classes) .....	8
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	8

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
EMUS 1327 Orchestra.....	2
PMUS 2XXX Applied string instruction (lessons and literature classes) .....	8
PMUS 2105, 2205 Keyboard Musicianship 3 and 4 .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 3273 String Pedagogy.....	2
Electives .....	12

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied string instruction (lessons and literature classes) .....	7
Chamber music.....	1
MUSC 2071 Instrumentation (spring) .....	2
MUSC 3176 Conducting 1 (fall).....	2
EMUS 3327 Orchestra.....	2
PMUS 4517 Orchestral Repertoire .....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3997 Junior Recital .....	1
Electives .....	9

**Senior Year**

PMUS 4XXX Applied string instruction (lessons and literature classes) .....	7
Chamber music.....	2
EMUS 3327 Orchestra.....	2
MUSC 4997 Senior Recital .....	1
Upper-division theory or musicology elective (not MUSC 4101).....	2-3
Electives .....	10
Non-Western music, 2000/4000 level.....	3

**Voice Performance Concentration Area**

One year of study at the university level of each of two foreign languages is required of vocal performance majors.

*Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
PMUS 1726 Applied voice instruction (lessons and literature classes) .....	8
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1544, 1554 Italian/English Diction .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	8

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2105, 2205 Keyboard Musicianship 3 and 4 .....	2
PMUS 2726 Applied voice instruction (lessons and literature classes) .....	8
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
Electives (including foreign language).....	16

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3726 Applied voice instruction (lessons and literature classes) .....	7
Ensemble .....	2
MUSC 3176 Conducting 1 (fall).....	2
MUSC 3193 Pedagogy for Young Voices (spring).....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3997 Junior Recital .....	1
MUSC 3464, 3444 German/French Diction.....	2
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101) .....	2
Electives .....	9

**Senior Year**

PMUS 4726 Applied voice instruction (lessons and literature classes) .....	7
Ensemble .....	1
PMUS 4137, 4147 Opera Theatre 1 and 2.....	3
MUSC 4997 Senior Recital .....	1
Non-Western music, 2000/4000 level.....	3
Electives .....	9

**Voice Performance with Elective Studies in Music Theatre***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
PMUS 1726 Applied voice instruction (lessons and literature classes) .....	6
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1544, 1554 Italian/English Diction .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition .....	3
Theatre/dance elective.....	1
Electives .....	6

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2105, 2205 Keyboard Musicianship 3 and 4 .....	2
PMUS 2726 Applied voice instruction (lessons and literature classes) .....	6
Ensemble .....	1
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
THTR 1019 & 1029 Foundations of Theatre 1 & 2.....	6
Beginning ballet .....	1
Electives .....	11

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3167 Opera Theatre Stagecraft .....	3
PMUS 3726 Applied Voice Instruction (lessons and literature classes) .....	6
Ensemble .....	1
PMUS 4137 Opera Theatre 1 .....	1
PMUS 4147 Opera Theatre 2 .....	2
PMUS 4167 Opera Theatre Lab.....	1
MUSC 3176 Conducting 1 (fall).....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3193 Pedagogy for Young Voices (spring).....	2
THTR 2003 Acting 1 .....	3
THTR 3053 Acting 2 .....	3
Electives .....	3

**Senior Year**

PMUS 4726 Applied voice instruction (lessons and literature classes) .....	6
PMUS 4157 Opera Practicum.....	2
PMUS 4167 Opera Theatre Lab.....	2
Senior Project (or major role, or design or direction of a major production).....	0
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101) .....	2
Theatre and dance elective.....	1
Electives .....	15
Non-Western music, 2000/4000-level .....	3

**Woodwind, Brass, and Percussion Instruments Performance Concentration Area***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1XXX Applied wind/brass/percussion instruction (lessons and literature classes) .....	8
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
Ensemble .....	2
English composition.....	3
Electives .....	6

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2XXX Applied wind/brass/percussion instruction (lessons and literature classes) .....	8
Music electives .....	4
Chamber music.....	2
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
Electives .....	12

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied wind/brass/percussion instruction (lessons and literature classes) .....	7
Chamber music.....	2
Ensemble .....	2
MUSC 3176 Conducting 1 (fall).....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3997 Junior Recital .....	1
MUSC 2071 Instrumentation (spring).....	2
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101) .....	2
Electives .....	9

**Senior Year**

PMUS 4XXX Applied wind/brass/percussion instruction (lessons and literature classes) .....	7
Non-Western music, 2000/4000 level.....	3
MUSC 4997 Senior Recital .....	1

Chamber music.....	2
Ensemble .....	2
Electives .....	12

### Musicology Concentration Area

In addition to the requirements applying to all bachelor of music curricula, a second year proficiency is required in one foreign language.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
Applied instruction (lessons and literature classes).....	4
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	6
Foreign language .....	8
Electives .....	3

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
Applied instruction (lessons and literature classes).....	4
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 .....	2
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
HIST 1010 & 1020 History of Western Civilization 1 and 2.....	6
Foreign language .....	8
Non-Western music, 2000/4000 level.....	3

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
Applied instruction (lessons and literature classes).....	4
Ensemble .....	2
Musicology courses, 4000 level.....	8
TMUS 4403 Special Studies.....	2
MUSC 4011, 4021 16th/18th Century Counterpoint.....	4
MUSC 4061, 4071 Tonal Analysis and Post-tonal Theory and Analysis .....	4
Electives .....	6

#### Senior Year

Applied instruction (lessons and literature classes).....	4
Ensemble .....	2
Musicology courses, 4000 level.....	8
MUSC 3176 Conducting 1.....	2
MUSC 4957 Senior Thesis.....	4
Electives .....	8

### Church Music Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1616 Applied Organ Instruction (lessons and literature classes).....	8
Performance minor .....	2
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas.....	3
English composition.....	3
Electives .....	6

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2616 Applied Organ Instruction (lessons and literature classes).....	8
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2265 Service Playing Techniques.....	2
MUSC 3176, 3186 Conducting 1 and 2 .....	4
Electives .....	15

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
PMUS 3616 Applied Organ Instruction (lessons and literature classes).....	8
Ensemble .....	2
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 4011 16th Century Counterpoint.....	2
MUSC 4265, 4275 Improvisation.....	4
Electives .....	9

#### Senior Year

PMUS 4616 Applied Organ Instruction (lessons and literature classes).....	7
Ensemble .....	2
MUSC 4245, 4255 Church Music .....	6
MUSC 4957 Senior Thesis.....	2
MUSC 4997 Senior Recital .....	1
Electives .....	12

## Bachelor of Music Education

The four-year professional program leading to the bachelor of music education degree prepares students to teach music in primary and secondary schools. Students completing this degree program also qualify for a Colorado K-12 music teaching license. Music education curricula strike a balance between specialization and generalization. BME students must demonstrate a sufficiently broad knowledge of the entire music program, but also possess the specialized skills necessary to be a successful general music, choir, orchestra, or band instructor.

### Courses and Curricula

Four basic curricula options are provided for students pursuing the bachelor of music education degree. The choral-general and instrumental-general tracks include a larger concentration of course work and field experiences related to elementary general music teaching, while the choral and instrumental tracks involve more specialized course work and field experiences related to the teaching of choir, orchestra, or band classes at the secondary level. Within each degree track, students have a limited number of elective credits that may be used to further customize degree work according to their needs and interests. All degree tracks satisfy minimum requirements for the Colorado K-12 music teaching license.

A minimum of 126 semester hours with an overall grade point average of 2.75 must be earned for the BME degree, with no pass/fail credit and no grade below C- in a course. Twenty-four semester hours in the liberal arts are required.

### Liberal Arts Requirements

All students entering the music education program, whether freshmen, transfers, or those holding a degree, shall take the general education core curriculum courses designated by the College of Music curriculum committee for the bachelor of music education degree. Students should check with their advisor each semester before final selection of courses.

## Admission to the Teacher Education Program

Teacher education is a campuswide function at the University of Colorado. Admission to the music education program in the College of Music does not constitute admission to the teacher education program. Students must apply to the School of Education through the music education chair no later than the second semester of the junior year or by the time 65 credits have been completed toward the BME degree (including approved transfer credits). Students may not register for upper-division music education courses, teacher education courses or student teaching until they are admitted to the teacher education program.

Requirements for recommended admission to the teacher education program are:

1. Minimum grade point average of 3.00 in music and music education, and a minimum overall grade point average of 2.75.
2. Minimum grade of C- in MUSC 2103.
3. Twenty-five hours of documented, supervised field experience.
4. Satisfactory functional piano ability as demonstrated by passing the proficiency examination or completing prescribed course work.
5. Satisfactory performance ability as demonstrated by meeting the sophomore proficiency requirements in an applied area of study.
6. Recommendation by the music education faculty. An interview with each student is held by the members of the music education faculty during the first semester of the sophomore year to review the student's progress and qualifications for admission to the teacher education program.

For further information, please refer to the *Handbook for Undergraduate Studies in Music Education* which can be obtained in the music office.

### Student Teaching

Students wishing to receive a student teaching assignment must complete an application and submit it to the School of Education through the chair of the music education faculty early in the semester preceding the student teaching semester. Prerequisites for student teaching are:

1. Admission to the teacher education program.
2. A minimum grade point average of 3.00 in music and music education, and a minimum overall grade point average of 2.75.
3. Completion of all required music education and education courses in the music education curriculum.
4. Satisfactory performance ability as demonstrated by meeting the junior proficiency requirements in a private applied area of study, or by passing the junior recital (brass only).
5. Recommendation by the music education faculty.

### Choral Music Emphasis

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. Five of the seven semesters of required ensemble registration must be in a conducted choral ensemble (University Singers, University Choir, Collegiate Chorale, or Women's Chorus). Students must be enrolled in a conducted choral ensemble when concurrently enrolled for Conducting.

Required Courses	Semester Hours
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105/EMUS 1184 Piano/voice class .....	2
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas (fall).....	3
Written communication.....	3
Electives in nonmusic core requirements.....	12

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105/EMUS 1184 Piano/voice class .....	2

Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2103 Introduction to Music Education (fall).....	3
MUSC 4143 Devel Children's Choirs or MUSC 4163 Choral Lit (spring) .....	2
MUSC 3193 Vocal Pedagogy and Literature for Young Voices (spring) .....	2
EDUC 3013 School and Society (spring) .....	3
Electives in nonmusic core requirements.....	9

#### Junior Year

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied instruction (lessons and literature classes).....	5
Conducted Choral Ensemble .....	2
MUSC 3013 String Class (fall).....	1
MUSC 4313 Teaching Choral Music (fall) .....	3
MUSC 3133 Teaching General Music 1 (fall).....	2
MUSC 3023 Woodwind Class or MUSC 3033 Brass Class (spring) .....	1
MUSC 4143 Devel Children's Choirs or MUSC 4163 Choral Lit (spring) .....	2
MUSC 1544 Italian Diction (fall) & MUSC 1554 English Diction (spring).....	2
MUSC 3176, 3186 Conducting 1 and 2 .....	4
MUSC 3802, 3812 History of Music 1 and 2 .....	6
MUSC 3997 Junior Recital (spring).....	1
MUSC 4203 Music Methods Practicum (with methods course) fall .....	1
EDUC 3023 Teaching in American Schools (spring) .....	3

#### Senior Year

PMUS 4XXX Applied instruction (lessons and literature classes) fall .....	3
Ensemble (fall) .....	1
Non-Western music, 2000/4000 level (fall) .....	3
MUSC 4103 Introduction to Student Teaching (fall) .....	1
MUSC 4153 Percussion Class (fall) .....	1
MUSC 4193 Student Teaching Seminar (spring) .....	1
MUSC 3444 French Diction (fall) .....	1
EDUC 4112 Educational Psychology (fall).....	3
EDUC 4732 Student Teaching (spring) .....	8
Upper-division Theory Elective (3000 or 4000 level theory classes except MUSC 4101) fall.....	2

### Choral-General Music Emphasis

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted choral ensemble (University Singers, University Choir, Collegiate Chorale, or Women's Chorus). A minimum of one credit hour must be in a world music ensemble. Students must be enrolled in a conducted choral ensemble when concurrently enrolled for Conducting.

Required Courses	Semester Hours
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#### Freshman Year

CONV 1990 Convocation (two semesters).....	0
PMUS 1XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105/EMUS 1184 Piano/voice class .....	2
Ensemble .....	2
MUSC 1101, 1111 Theory 1 and 2 .....	4
MUSC 1121, 1131 Aural Skills 1 and 2 .....	2
MUSC 1802 Introduction to Musical Styles and Ideas (fall).....	3
Written communication.....	3
Electives in non-music core requirements .....	12

#### Sophomore Year

CONV 1990 Convocation (two semesters).....	0
PMUS 2XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105/EMUS 1184 Piano/voice class .....	2
Ensemble .....	2
MUSC 2101, 2111 Theory 3 and 4 .....	4
MUSC 2121, 2131 Aural Skills 3 and 4 .....	2
MUSC 2103 Introduction to Music Education (fall).....	3
MUSC 3193 Vocal Pedagogy for Young Voices (spring).....	2
EDUC 3013 School and Society (spring).....	3
Electives in non-music core requirements .....	9

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied instruction (lessons and literature classes).....	5
Conducted Choral Ensemble.....	2
MUSC 3013 String Class (fall).....	1
MUSC 3023 Woodwind Class or MUSC 3033 Brass Class (spring).....	1
MUSC 4143 Devel Children's Choirs or MUSC 4163 Choral Lit (spring).....	2
MUSC 3133 Teaching General Music 1 (fall).....	2
MUSC 3176, 3186 Conducting 1 and 2.....	4
MUSC 3802, 3812 History of Music 1 and 2.....	6
MUSC 3997 Junior Recital (spring).....	1
MUSC 4113 Teaching General Music 2 (spring).....	3
MUSC 4313 Teaching Choral Music (fall).....	3
MUSC 4203 Music Methods Practicum (with methods course) spring.....	1
EDUC 3023 Teaching in American Schools (fall).....	3

**Senior Year**

PMUS 4XXX Applied instruction (lessons and literature classes) (fall).....	3
Ensemble (fall).....	1
Non-Western music, 2000/4000 level (fall).....	3
Upper-Division Theory elective (3000 or 4000 level theory classes except MUSC 4101).....	2
MUSC 4103 Introduction to Student Teaching (fall).....	1
MUSC 4153 Percussion Class (fall).....	1
MUSC 4583 Inclusive Music Classroom (fall of even-numbered years).....	2
MUSC 4193 Student Teaching Seminar (spring).....	1
EDUC 4112 Educational Psychology (fall).....	3
EDUC 4732 Student Teaching (spring).....	8

**Instrumental Music Emphasis**

Students must take keyboard or wind/brass/percussion as the primary applied area, or petition the music education faculty for an exception. For piano players, two semesters of Independent Accompanying may be applied to the ensemble requirement. The remaining five semesters must be in a conducted instrumental ensemble (Symphony Orchestra, Chamber Orchestra, Wind Symphony, Symphonic Band, Concert Band, or Campus Band). For string players, five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble. For woodwind, brass, and percussion players, five semesters must be in a conducted instrumental ensemble, and one semester must be in marching band. Students must be enrolled in a conducted instrumental ensemble when concurrently enrolled for Conducting.

*Required Courses**Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105, 1205 Keyboard musicianship.....	2
Ensemble.....	2
MUSC 1101, 1111 Theory 1 and 2.....	4
MUSC 1121, 1131 Aural Skills 1 and 2.....	2
MUSC 1802 Introduction to Musical Styles and Ideas (fall).....	3
Written communication.....	3
Electives in nonmusic core requirements.....	12

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2XXX Applied instruction (lessons and literature classes).....	6
Ensemble.....	2
MUSC 2101, 2111 Theory 3 and 4.....	4
MUSC 2121, 2131 Aural Skills 3 and 4.....	2
MUSC 2103 Introduction to Music Education (fall).....	3
EMUS 1184 Voice Class (spring).....	1
MUSC 3133 Teaching General Music 1 (fall).....	2
MUSC 3153 Teaching Woodwind Instruments (spring).....	2
MUSC 3253 Jazz Techniques for the Music Educator (spring).....	2
EDUC 3013 School and Society (spring).....	3
Electives in nonmusic core requirements.....	9

**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied instruction (lessons and literature classes).....	5
Conducted Instrumental Ensemble.....	2
MUSC 3163 Teaching String Instruments (fall).....	2
MUSC 3176, 3186 Conducting 1 and 2.....	4
MUSC 3193 Vocal Pedagogy and Literature for Young Voices (fall).....	2
MUSC 3223 Teaching Brass Instruments (spring).....	2
Instrumental Music Electives—choose 2 credits from: MUSC 3273 String Pedagogy and Literature (spring) or MUSC 3363 Marching Band Tech (fall).....	2
MUSC 3802, 3812 History of Music 1 and 2.....	6
MUSC 3997 Junior Recital (spring).....	1
MUSC 4203 Music Methods Practicum (with methods course) spring.....	1
MUSC 4443 Teaching Instrumental Music (spring).....	3
EDUC 3023 Teaching in American Schools (fall).....	3

**Senior Year**

PMUS 4XXX Applied instruction (lessons and literature classes) fall.....	3
Ensemble (fall).....	1
Upper-Division Theory elective (3000 or 4000 level theory classes except MUSC 4101).....	2
Non-Western music, 2000/4000 level (fall).....	3
MUSC 4103 Introduction to Student Teaching (fall).....	1
MUSC 4153 Percussion Class (fall).....	1
MUSC 4193 Student Teaching Seminar (spring).....	1
EDUC 4112 Educational Psychology (fall).....	3
EDUC 4732 Student Teaching (spring).....	8

**Instrumental-General Music Emphasis**

Students must take keyboard or wind/brass/percussion as the primary applied area, or petition the music education faculty for an exception. For piano players, two semesters of Independent Accompanying may be applied to the ensemble requirement. The remaining five semesters must be in a conducted instrumental ensemble (Symphony Orchestra, Chamber Orchestra, Wind Symphony, Symphonic Band, Concert Band, or Campus Band). For string players, five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble. For woodwind, brass, and percussion players, a minimum of four semesters must be in a conducted instrumental ensemble, one semester must be in marching band, one semester in choir, and one semester in a world music ensemble. Students must be enrolled in a conducted instrumental ensemble when concurrently enrolled for Conducting.

*Required Courses**Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 1XXX Applied instruction (lessons and literature classes).....	6
PMUS 1105, 1205 Keyboard musicianship.....	2
Ensemble.....	2
MUSC 1101, 1111 Theory 1 and 2.....	4
MUSC 1121, 1131 Aural Skills 1 and 2.....	2
MUSC 1802 Introduction to Musical Styles and Ideas (fall).....	3
Written communication.....	3
Electives in nonmusic core requirements.....	12

**Sophomore Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 2XXX Applied instruction (lessons and literature classes).....	6
Ensemble.....	2
MUSC 2101, 2111 Theory 3 and 4.....	4
MUSC 2121, 2131 Aural Skills 3 and 4.....	2
MUSC 2103 Introduction to Music Education (fall).....	3
EMUS 1184 Voice Class (spring).....	1
MUSC 3133 Teaching General Music 1 (fall).....	2
MUSC 4113 Teaching General Music 2 (spring).....	3
EDUC 3013 School and Society (spring).....	3
Electives in nonmusic core requirements.....	9



**Junior Year**

CONV 1990 Convocation (two semesters).....	0
PMUS 3XXX Applied instruction (lessons and literature classes).....	5
EMUS 1184 Voice Class (spring).....	1
Conducted Instrumental Ensemble.....	2
MUSC 3163 Teaching String Instruments (fall).....	2
MUSC 3176, 3186 Conducting 1 and 2.....	4
MUSC 3193 Vocal Pedagogy and Literature for Young Voices (fall).....	2
Instrumental Music Electives—choose 2 credits from: MUSC 3253 Jazz Techniques for the Music Educator (spring) or MUSC 4583 Inclusive Music Classroom (fall of even-numbered years).....	2
MUSC 3802, 3812 History of Music1 and 2.....	6
MUSC 3997 Junior Recital (spring).....	1
MUSC 3153 Teaching Woodwind or MUSC 3223 Teaching Brass (spring).....	2
MUSC 4203 Music Methods Practicum (with methods course) spring.....	1
MUSC 4443 Teaching Instrumental Music (spring).....	3
EDUC 3023 Teaching in American Schools (fall).....	3

**Senior Year**

PMUS 4XXX Applied instruction (lessons and literature classes) fall.....	3
Ensemble (fall).....	1
Upper-Division Theory elective (3000 or 4000 level theory classes except MUSC 4101).....	2
Non-Western music, 2000/4000 level (fall).....	3
MUSC 4103 Introduction to Student Teaching (fall).....	1
MUSC 4153 Percussion Class (fall).....	1
MUSC 4193 Student Teaching Seminar (spring).....	1
EDUC 4112 Educational Psychology (fall).....	3
EDUC 4732 Student Teaching (spring).....	8

**Undergraduate Certificate Programs****Certificate in Jazz Studies**

The Jazz Program offers a Certificate in Jazz Studies for undergraduate music majors. The certificate program consists of an intense 18-hour curriculum in both academic and performance areas, concluding with a jazz recital. Courses include jazz theory and aural foundations, improvisation, history of jazz, scoring and arranging, jazz piano, jazz techniques for the music educator, jazz combo, and jazz ensemble.

**Certificate in Music Technology**

The certificate in music technology provides students with an opportunity to study music technology in greater depth than music degrees currently allow. Each participating student must elect the certificate's curriculum in addition to the normal requirements of their degree program. The certificate is available to students in the College of Music only.

At present, the curriculum consists of 14 credit hours, including: MUSC 4081 Introduction to Music Technology, MUSC 4111 Computer Programming for Musicians, MUSC 4121 Intermediate Music Technology, MUSC 4131 Advanced Sound Synthesis, MUSC 4181 Music for Visual Media, MUSC 2081 Prepared for the Soundcheck, and MUSC 2091 Recording Techniques. Students who wish to earn this certificate must complete all five Music Technology courses offered by the department, and must also complete an independent project (a composition, performance, or research project) under the supervision of a member of the Music Technology faculty. For more information, contact Andrew May at [a.may@colorado.edu](mailto:a.may@colorado.edu).

**Graduate Degree Programs**

All graduate degrees in music are granted by the Graduate School of the University of Colorado upon the recommendation of the faculty of the College of Music and approval by the administrative officers of the Graduate School. The information supplied here is supplemental to and must be read in conjunction with the information contained in the Graduate School section. Information applicable to master of music and master of music education degrees is discussed under Master of Arts and Master of Science in the Graduate School section; information pertaining to doctor of philosophy in music and doctor of musical arts degrees is discussed under Doctor of Philosophy. Other information regarding rules applying to graduate degree students in music may be found in supplements to the catalog and in the *Graduate Studies in Music Handbook*, both available in the office of the College of Music's associate dean for graduate studies.

**Admission Requirements**

Admission requirements for specific degree programs that supplement the Graduate School requirements are discussed in the degree program descriptions that follow. Students are urged to take the general (verbal, quantitative, analytical) portions of the Graduate Record Examination (GRE). GRE scores are required as part of the application to the PhD programs and the MM in musicology program, and are recommended for the DMA and Master of Music Education degrees.

**Preliminary Examinations**

Just before the beginning of their first semester of work toward a master's or doctoral degree, students are given placement exams covering the major field, several areas of music theory, and music history. Specific requirements vary with the student's degree and program. Students pursuing the master's and doctoral degrees in voice also must pass preliminary requirements in piano and diction (English, French, German, and Italian).

Any deficiencies demonstrated by the placement examination scores must be removed early in the degree program. Application for candidacy and required examinations cannot be approved until deficiencies are removed. Thesis and dissertation projects may not be completed while preliminary examination deficiencies remain.

Results from the major-field examination serve as one basis for recommending specific course work in the program. The major-field examination in composition covers music literature and compositional methods; in musicology, essay questions cover score analysis and identification of terms. The music-education examination, administered in the form of an interview, covers general knowledge of philosophy and history of music education, organization and supervision of music teaching, and methods and materials for the individual areas of vocal, string, and instrumental music. Conducting majors should be knowledgeable in areas of repertoire, score analysis, and conducting techniques; and performance majors are examined in the areas of technique, repertoire, stylistically informed performance, and pedagogy. Students enrolled in the master's degree in Jazz Performance and Pedagogy must demonstrate knowledge of jazz theory and history, and jazz keyboard proficiency.

**College Teaching Area**

For graduate students in music who intend to teach at the college level and who have had no prior college teaching experience, a teaching module of at least 6 hours of courses is recommended. This module can consist of professional education courses, music education courses, teaching-skills courses, or teaching practica.

The teaching-area module is not normally used toward the minimum 30-hour course requirement for master's or DMA programs. Workshops, videotaping of students' teaching, observation, and consultation services are available through the Graduate Teacher Program. Students who participate in this program are eligible to receive a graduate teacher certificate.

### Financial Aid

In addition to the opportunities for financial aid described in the Graduate School section, the College of Music grants graduate assistantships and part-time instructorships to approximately 70 students each year. The assistantships and instructorships, which are considered one-quarter time, include both a stipend and the waiver of 6 credit hours of tuition each semester. Applications for these positions must be filed with the Office of the Associate Dean for Graduate Studies by March 1 of the preceding academic year. There are also scholarships offered by the individual faculties, grants-in-aid given for various college-related responsibilities, and fellowships awarded through the Graduate School.

### Academic Standards

A student who is noticeably deficient in the use and spelling of the English language may not obtain an advanced degree from the University of Colorado. Satisfaction of this requirement depends not so much upon ability to pass formal tests, although these may be required, as upon the habitual use of good English in all oral and written work.

### Graduate Auditions

Auditions are required for all performance and performance/pedagogy programs. Generally a personal audition is preferred, but students may be accepted into most programs by submitting a recorded audition. For specific information and audition dates, contact the office of the associate dean for graduate studies at 303-492-2207 or [gradmusc@colorado.edu](mailto:gradmusc@colorado.edu).

### Master of Music

The major fields for this degree are composition, conducting, musicology, performance, and the combined major of performance/pedagogy. Conducting students may concentrate in choral, orchestral, or wind symphony/band areas. Performance and performance/pedagogy majors may concentrate in brass, early keyboard, jazz, piano, percussion, organ, harpsichord, string instruments (including guitar and harp), voice, or woodwind instruments.

Major work in the conducting degrees includes advanced conducting, analytical studies, score reading, orchestration, arranging, performance-related writing, and conducting practica. In musicology, courses in musicology and two thesis projects are required. In pedagogy, courses in the psychology of music, the pedagogy and literature of a specific performing area and a written thesis are required. In performance, students complete applied study, recitals, and courses that investigate the repertoire of their performance areas. All master's degree students are required to take a course in bibliographic research and a block of 6 credits outside their major area.

Brass, conducting, percussion, string, voice, and woodwind majors are required to participate in a music ensemble. Committee chairs advise students concerning the appropriate choice of ensemble.

#### Prerequisites

As noted in the Graduate School section, students are expected to present undergraduate preparation equivalent to that expected for the bachelor's degree at this university. Normally this is a bachelor of music degree in the proposed area of concentration.

Before admission, composition majors should submit both scores and tapes of their original work and a list of completed compositions; musicology majors must submit GRE scores (the general test) and examples of their research papers; performance majors must submit a repertoire list and arrange for an audition or submit a nonreturnable recording of their performance. Conducting majors must submit a videotape of their performance.

#### Program of Study

The master of music (MM) degree, which the Graduate School considers a Plan II program, requires a minimum of 30–32 semester hours of graduate course work, including thesis projects. Most students find it necessary to exceed this minimum in order to meet the musical and academic standards demanded by the qualifying and comprehensive-final examinations. Outlines of specific programs may be secured from the office of the associate dean for graduate studies in the College of Music.

Each student's program is directed by a three-member advisory committee headed by the major advisor (generally the student's major professor) or a designated substitute. A second member is chosen from the major area, and a third from outside the major area. (The four major areas are music education, musicology, music theory, and performance.) During the second month of the second semester of residence, the student should formulate an advisory committee, complete a tentative degree plan, and obtain the approval of the advisory committee and the associate dean for graduate studies. Students must complete the master's degree within four years of matriculation into the program.

#### Examinations

In addition to the preliminary examinations, master's degree students in music must take qualifying (written) and comprehensive-final (oral) examinations. The procedures, guidelines for registration, and deadlines for taking these examinations, which must be observed, are published and posted, and are available in the Graduate Music Office. The qualifying (written) examination must be taken no later than the semester preceding that of the comprehensive-final (oral) examination.

#### Recital/Thesis Requirements

The recital/thesis requirement for the major in composition is: composition during the period of graduate study of several works of major proportion, at least one of which must receive public performance. For the major in conducting, the requirement is a public practicum and a performance-related or other scholarly document. For the major in musicology, it is two written projects that provide focus to the candidate's work. For the major in performance, preparation and performance of two public recitals constitute the requirement. For the major in performance and pedagogy, a full-length recital and documentation of research in pedagogy are required.

### Master of Music Education

The master of music education (MME) program addresses the professional development needs of music teachers in the field. Master of music education students are challenged to develop a greater understanding and mastery of music teaching-learning processes, to improve personal musicianship, and to become committed leaders within the music education profession.

#### Prerequisites

Applicants are expected to provide evidence of undergraduate preparation equivalent to that required for the bachelor of music education degree at this university. Applicants also must

possess a music teaching certificate/license or agree to work toward a Colorado music teaching license. GRE scores are not required for admission, but can be helpful in determining qualifications for graduate awards. Individuals who wish to pursue music performance or conducting as their minor field must demonstrate at least senior-level standards of their particular medium, through an audition.

### *Program of Study*

Students earning the MME degree must complete a minimum of 30 hours of course work, including 12 hours in music education, 12 hours in music, and 6 hours of electives in a specialization area or other areas of interest. Of the 12 hours in music, a two-hour course in bibliography and research is required. Students also must complete six hours of study in a minor area, which includes music history and literature, music theory, or performance (including conducting) and jazz studies.

The music education component of the degree includes three required courses: MUSC 6113 Foundations of Music Education, MUSC 6203 Psychology of Music Learning, and MUSC 5183 Research in Music Teaching. Elective courses include MUSC 6133 Comprehensive Musicianship through Performance, MUSC 6213 Measurement and Evaluation of Music Learning, MUSC 6173 Directions of Contemporary Aesthetic Education, and MUSC 6223 Sociology of Music Education. Two credits of music education electives may be fulfilled through summer intensives.

The music component of the degree should assist students in developing their musical knowledge and skills to a more highly refined level. One member of the student's graduate advisory committee should be from the minor area, and it is assumed that at least some part of the student's study is with that faculty member. All music studies must be at the 5000-level or above. Under special circumstances, up to 6 credit hours at the 4000-level may be applied to the open electives portion of the degree.

Open electives are selected and structured by the student and his or her advisor based on the student's interests and abilities. Students may choose to specialize in the traditional fields of general, choral, and instrumental music education, in other music areas, or in areas outside of music (e.g., related arts, education, psychology, sociology, technology). Any nonmusic courses applied to the MME degree must be taken at the 4000 level or above (and must fall within the 6-credit-hour limit).

As a master of music education degree candidate, each student must produce a culminating paper that focuses on a topic of vital interest or importance. This paper may be developed as part of the requirements for a music education course or may take the form of a master's thesis. Culminating papers or theses are defended during final oral examinations.

Students typically complete the degree in two academic years, or one academic year plus two summers. Degree work must be completed within four years of the semester in which the student is accepted into a degree program and begins studies. Because most master's-level music education courses are offered in late afternoons, students who live within commuting distance can earn a significant portion of credit toward the degree while continuing to work full time.

### Dual Master's Degree Program

Students may apply for a dual master's degree that incorporates any two master's programs in the College of Music. They must be accepted into both programs through the normal application process and take the full complement of courses in the major area of each degree program. Courses common to both pro-

grams may be counted for each. A minimum of 45 credit hours must be earned.

### Professional Certificate in String Quartet Performance

The Professional Certificate in String Quartet Performance is designed to provide instruction and experiences for young artists who have already completed a master's degree in performance. Students are generally accepted into the certificate program as part of a pre-formed string quartet, which will apply for admission into the College of Music graduate program as a unit.

### Doctor of Musical Arts

The doctor of musical arts (DMA) is a professional degree for creative and performing students who possess the talent as well as the breadth of knowledge, background, outlook, and scholarly capacity requisite to a doctoral program. Fields of study are composition, instrumental conducting and literature, literature and performance of choral music, performance, and performance/pedagogy. Performance and/or performance/pedagogy concentration areas are brass, guitar, harpsichord, organ, percussion, piano, string instruments, voice, and woodwinds. Outlines of specific programs may be obtained from the office of the associate dean for graduate studies.

### *Prerequisites*

Entrance requirements include a master's degree in music or demonstrated equivalency comparable to that of the master of music degree at this university; submission of performance tapes or, for composers, original scores and tapes of compositions; a personal audition and interview, when possible; and evidence of writing proficiency (in English) and scholarly research, such as term papers or theses.

### *Program Requirements*

The following program description supplements the requirements applying to all graduate students found in the Graduate School section and in the introductory section of Graduate Degree Programs in this College of Music section. Information on quality of work, credit by transfer, application for admission to candidacy, comprehensive examination, and final examination found under the PhD description is applicable to the DMA degree. DMA degree work must be completed within six years of first registration.

**Advisory Committee.** Each DMA program is directed by a five-member advisory committee headed by the major advisor, who is generally the student's major professor. At least one member must hold the PhD degree.

**Residence Requirements.** The minimum residence requirement shall be six semesters of scholarly work beyond the attainment of an acceptable bachelor's degree. Two semesters of residence credit may be allowed for a master's degree from another institution of approved standing, but at least four semesters of residence credit, two of which must be consecutive in one academic year, must be earned for course work and/or dissertation work taken at this university.

Not more than one-half semester of residence credit may be earned in a summer session. Students must be registered full-time to earn residence credit. For employed students, only those with one-fourth time or less in work that does not contribute directly to their degree program may earn full residence credit.

**Continuous Registration.** After the residence requirements for the doctor of musical arts program have been satisfied, a student must enroll for fall and spring semesters of each year until attaining the degree. If a student has enrolled in all required

dissertation courses but has still to complete the work, he or she should enroll in TMUS 8019 Precandidate for Doctor of Musical Arts Degree, or TMUS 8029 Candidate for Doctor of Musical Arts Degree, until the degree is completed.

**Degree Plan.** A degree plan approved by the advisory committee will be presented to the associate dean for graduate studies no later than the third month of residence. The student's major professor is responsible for helping the student formulate this plan. The plan should include designated members of the student's doctoral committee, projected remedial and supporting course work, suggested dissertation projects, and tentative dates for the comprehensive and final examinations.

**Language Requirement.** Each DMA student must satisfy a foreign language requirement, and the one foreign language used to satisfy that requirement must be approved by the student's advisory committee. Additional language work is required for voice students. Acquisition of knowledge and skill in music technology may be approved as an alternative to the foreign language requirement. Appropriate courses and projects are prescribed by the college's music technology faculty. International students whose native language is not English are exempt from the requirement.

**Course Requirements.** Students must take a minimum of 30 hours of course work, of which at least 18 hours are dissertation projects. Two doctoral seminars, one each in musicology and music theory, are required; prerequisites include 2 hours of bibliography and 6 hours each of graduate-level musicology and music theory. Some areas require specific course work prior to or in conjunction with work on dissertation projects. In other instances students may be advised to take course work in preparation for the comprehensive examination. Applied music instruction may be elected for the duration of the residency requirement.

**Dissertation.** The DMA dissertation consists of a specified number of performances, projects, and documents. The student's permanent advisory committee must approve all dissertation projects. While dissertation requirements for the various majors differ somewhat, individual instances may require the permanent advisory committee to exercise discretionary flexibility in tailoring dissertation requirements to the student's artistic and educational advantage.

Normally, if preliminary examinations and GRE scores show satisfactory preparation for doctoral studies, the student is advised to begin work on the dissertation concurrently with preparation for the comprehensive examination.

## Doctor of Philosophy

The doctor of philosophy (PhD) in music degree is offered through the Graduate School for students who seek a terminal degree with an emphasis on research. The two principal areas of study are music education and musicology.

### *Prerequisites*

Students applying to the PhD program should have a master's degree or equivalent in a music field related to their intended area of study. Letters of recommendation, completed major papers, and satisfactory scores on the GRE (the general test) are required elements of the student's application for the degree. Upon acceptance to the degree program, students must pass the preliminary examinations and begin working toward basic requirements.

### *Residence Requirement*

The minimum residence requirement for the PhD is 6 semesters of full-time study beyond the attainment of an acceptable bachelor's degree. Two semesters of residence credit may be allowed for a master's degree from another institution of approved standing; however, at least 4 semesters of residence credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder.

## Doctor of Philosophy–Musicology

For the musicology student, the doctor of philosophy in music degree is intended to emphasize research in music history, music literature, or some other aspect of music in culture. A minimum of 30 semester hours in courses numbered at 5000 or above is required (although the minimum number is almost always exceeded). Courses taken below the 5000 level to remedy deficiencies may not count towards degree requirements. At least 4 doctoral seminars (7000 level) in musicology and music theory (3 plus 1, 1 plus 3, or 2 plus 2) must be taken at the University of Colorado at Boulder as part of this course work. Unless otherwise specified by departmental requirements, all courses at the 5000 level or above taken for the master's degree at the University of Colorado may be applied toward the doctoral degree. Graduate work of high quality taken at another institution will only be accepted for transfer once a student has established a satisfactory record of residence at CU and then only up to 21 semester hours where a grade of B- or higher was received. All requests for credit transfer, however, must be approved by the chair of the Musicology Department and other college and university officers as specified on a form for that purpose. Transfer credit will not affect the residency requirement, the four-seminar rule, or dissertation credit hours. The College of Music requires two foreign language proficiencies, usually in German and French, although another appropriate language may be substituted for the latter, if it is important to the student's program of study. Normally the language requirement is met by a translation exercise individually scheduled with the chair of the musicology faculty.

### *Dissertation Requirements*

A student must complete a total of at least 30 credit hours of dissertation credit (beyond course work), with not more than 10 of these hours in any one semester. Furthermore, not more than 10 hours of dissertation credit earned prior to a student's advancement to candidacy may be applied toward the required 30 credit hours. The dissertation itself should be an original and worthwhile contribution to knowledge in the field of musicology. It is expected that the student work closely with a major professor who will serve as the first reader and critic before it is submitted to the other dissertation examination committee members.

## Doctor of Philosophy–Music Education

The doctor of philosophy degree in music, with music education as a field of specialization, is offered through the Graduate School for students who demonstrate both superior commitment to the music education profession as well as scholarly potential. This degree program requires that individuals think abstractly, generalize knowledge, apply research results to areas of specialization, and communicate effectively in both oral and written forms. Course work emphasizes the study of historical, philosophical, psychological, and sociological foundations of music education; the theoretical and pedagogical principles of music teaching and learning; curriculum development; testing and assessment; and research techniques. Graduates typically

pursue careers in music education at the college level or supervisory positions in elementary and secondary schools.

### Course Work

A minimum of 45 semester hours of courses numbered 5000-level or above (15 of which may be transferred from the master's degree upon approval of the music education faculty) and a minimum of 30 hours of doctoral dissertation credit are required for the PhD degree.

### Dissertation Requirements

A dissertation based on original investigation, demonstrating mature scholarship, must be completed by each candidate. Following the successful completion of the comprehensive examination, the student designates a dissertation committee, develops a dissertation prospectus, and presents it to the committee for approval. After the dissertation has been accepted, a final oral examination on the dissertation and related topics is conducted by the student's dissertation committee.

## Faculty—College of Music

DANIEL SHER, dean; professor (piano). BM, Oberlin College Conservatory of Music; MS, Juilliard School of Music; EdD, Columbia University.

PHILIP AAHOLM, professor emeritus.

LYNEE ABBEY-LEE, instructor (harp). BM, University of Michigan.

MICHAEL ALLEN, assistant professor (tuba). BM, University of Denver.

KWASI AMPENE, assistant professor (ethnomusicology). Diploma, University of Ghana; MM, West Virginia University; PhD, University of Pittsburgh.

JAMES R. AUSTIN, associate professor. BME, University of North Dakota; MAEd, PhD, University of Iowa.

FRANK BAIRD, professor emeritus.

GRETCHEN HIERONYMUS BEALL, professor emerita.

MARGARET BERG, assistant professor (music education). BS, Case Western Reserve University; BM, Cleveland Institute of Music; MME, University of Cincinnati; PhD, Northwestern University.

GIORA BERNSTEIN, professor emeritus.

JAMES BRODY, associate professor (oboe). BM, Ohio State University; MM, Indiana University.

STEVEN M. BRUNS, associate professor (theory/composition). BME, Northern State College, Aberdeen, SD; MM, PhD, University of Wisconsin—Madison.

STORM BULL, professor emeritus.

CHARLES BYERS, professor emeritus.

CARLO CABALLERO, assistant professor (musicology). BA, Pomona College; PhD, University of Pennsylvania.

JOAN CATONI CONLON, professor (choral). BA, MA, and DMA, University of Washington.

ANDREW COOPERSTOCK, associate professor (piano). BM, University of Cincinnati; MM, The Juilliard School; DMA, Peabody Conservatory of Music.

JOHN DAVIS, assistant professor (jazz studies). BA, Metropolitan State College; MM, University of Denver; DArts, University of Northern Colorado.

JOHN DRUMHELLER, instructor (theory/composition). BME, Montana State University; MM, DMA, University of Colorado at Boulder.

GUY DUCKWORTH, professor emeritus.

CHARLES EAKIN, professor emeritus.

ERIKA ECKERT, associate professor (viola). BM, Eastman School of Music.

OLIVER ELLSWORTH, professor emeritus.

AKIRA ENDO, director of orchestras; professor. BM, MM, University of Southern California.

PAUL ERHARD, associate professor (double bass). BM, Eastman School of Music; MM, DMA, The Juilliard School.

ELIZABETH FARR, associate professor (organ, harpsichord). BM, Stetson University; MM, The Juilliard School; DMA, University of Michigan.

ROBERT FINK, dean emeritus and professor emeritus.

JOHN GALM, professor emeritus.

JUDITH GLYDE, professor (cello). BM, Hartt College of Music; MM, Manhattan School of Music.

LUIS GONZALEZ, professor emeritus.

LARRY GRAHAM, professor emeritus.

WILLIAM GUSTAFSON, director of opera studies, associate professor (voice). BM, University of Connecticut; MM, DMA, University of Michigan.

ROBERT HARRISON, professor (voice). BA, Milton College; MM, University of Wisconsin; DMA, University of Arizona.

KUNIAKI HATA, professor emeritus.

DEBORAH HAYES, professor emerita.

EVERETT HILTY, professor emeritus.

WARNER IMIG, dean emeritus and professor emeritus.

YOSHIYUKI ISHIKAWA, professor (bassoon). BME, MM, Northwestern University; DMA, University of Michigan.

DENNIS JACKSON, professor emeritus.

JENNIFER JOHN, associate professor (violin). BA, Cincinnati College Conservatory; MM, University of Michigan.

LAWRENCE KAPTEIN, associate professor (choral). BME, Willamette University; MA, Portland State University; DMA, University of Southern California.

WILLIAM KEARNS, professor emeritus.

JAY KEISTER, assistant professor (ethnomusicology). BA, California State University, Fullerton; MA, PhD, University of California, Los Angeles.

DAVID KOREVAAR, assistant professor (piano). BM, MM, DMA, The Juilliard School.

DORIS PRIDONOFF LEHNERT, professor (piano). Attended University of Southern California, The Juilliard School, and University of Connecticut.

OSWALD LEHNERT, professor (violin, viola). Special Studies, Chicago Musical College; The Juilliard School; University of Connecticut.

DAPHNE LEONG, assistant professor (theory). BM, University of Saskatchewan, MA, MM, PhD, Eastman School of Music.

ALAN LUHRING, professor emeritus.

REBECCA MALOY, assistant professor (musicology). BM, University of Illinois Champaign-Urbana; MM, PhD, Cincinnati College Conservatory of Music.

PATRICK MASON, associate professor (voice). BM, Peabody Conservatory of Music; MM, University of Nebraska, Lincoln.

ANDREW MAY, director of music technology; assistant professor (theory/composition). BA, Yale University; MFA, California Institute of the Arts; PhD, University of California, San Diego.

KEVIN McCARTHY, associate professor (music education, musicology). BME, University of Notre Dame; MM, Michigan State University; PhD, Case Western Reserve University.

ALLAN McMURRAY, director of bands; Robert and Judith Charles Professor (trumpet). BA, California State University, Long Beach; MM, University of Wisconsin. Additional study, University of Michigan.

JANET MONTGOMERY, associate professor (music education). BME, MME, Wichita State University; PhD, University of Wisconsin—Madison.

MUTSUMI MOTEKI, associate professor (vocal coach/accompanist). BA, Kunitachi College of Music; MM, Westminster Choir College; DM., University of Michigan.

TOM MYER, associate professor (saxophone). BS, University of Wisconsin—LaCrosse; MM, North Texas State University.

MICHAEL PAGÁN, assistant professor (jazz studies). BME, MA, Kent State University; DMA, Northwestern University.

CURT PETERSON, assistant professor (voice). BM, Arizona State University; MM, University of Colorado at Boulder.

PATTI PETERSON, associate professor (voice). BM, Salem College; MM, DMA, University of Colorado at Boulder.

DAVID PINKOW, associate dean for graduate studies; associate professor (horn and theory). BM, Performer's Certificate, Eastman School of Music; MFA, Carnegie—Mellon University; DMA, University of Maryland.

THOMAS RIIS, director, American Music Center; professor (musicology). BA, Oberlin College; MA, PhD, University of Michigan.

MATTHEW ROEDER, instructor; associate director of bands. BM in Music Education Miami University; MM, Music Education/Conducting, Peabody Conservatory of the Johns Hopkins University.

BRENDA ROMERO, associate professor (musicology, ethnomusicology). BM, MM, University of New Mexico; PhD, University of California—Los Angeles.

BARBARA KINSEY SABLE, professor emerita.

GORDON SANDFORD, professor emeritus.

TERRY SAWCHUK, associate professor (trumpet). BM, MM, University of Michigan.

F. WAYNE SCOTT, professor emeritus.

DANIEL SILVER, assistant professor (clarinet). BM, Northwestern University; MM, University of Michigan.

JULIE SIMSON, associate professor (voice). BM, Western Michigan University; MM, University of Illinois.

JEREMY SMITH, assistant professor (musicology). BA, Washington College; MFA, University of California, Irvine; PhD, University of California, Santa Barbara.

ROBERT SPILLMAN, professor (piano). BM, MM, Eastman School of Music.

WILLIAM STANLEY, associate professor (trombone). BME, University of Kansas; MM, DMA, University of Illinois.

JOHN "CHIP" STEPHENS, assistant professor (jazz studies). BM, University of Akron, MM, Cleveland State University.

ALEXA STILL, associate professor (flute). BM, University of Auckland; MM, DMA, SUNY—Stony Brook.

MICHAEL THEODORE, assistant professor (theory/composition). BA, Amherst College; MM, Yale School of Music; PhD, University of California—San Diego.

MICHAEL THORNTON, instructor (horn). BM, Temple University; additional studies at Manhattan School of Music and The Juilliard School.

RICHARD TOENSING, professor (theory/composition). BM, St. Olaf College; MM, DMA, University of Michigan.

DON VOLLSTEDT, professor emeritus.

KEITH WALLINGFORD, professor emeritus.

DOUGLAS WALTER, professor (percussion). BM, University of North Texas; MM, University of Michigan; DMA, Temple University.

KEITH WATERS, assistant professor (theory/composition). BM, University of North Carolina—Greensboro; MM, New England Conservatory of Music; PhD, Eastman School of Music.

LYNN WHITTEN, professor emeritus.

SUSAN WILLIAMSON, instructor (music education). BME, Ball State University; MME, University of Colorado at Boulder.

KEVIN WOELFEL, instructor, director of music entrepreneurship. BM, Washington State University; MM, University of Wisconsin, Madison.

CHARLES WOLZIEN, associate dean for undergraduate studies; associate professor (guitar). BM, San Francisco Conservatory; MM, DMA, University of Colorado at Boulder.

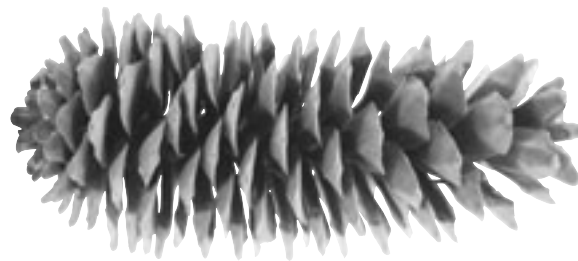
### Takács Quartet

EDWARD DUSINBERRE, associate professor (violin). Graduate, London Royal College of Music.

ANDRAS FEJER, associate professor (cello). Graduate, Franz Liszt Academy of Music, Budapest.

KAROLY SCHRANZ, associate professor (violin). Graduate, Franz Liszt Academy of Music, Budapest.

ROGER TAPPING, associate professor (viola). BA, Queen Mary's 6th Form College; MA, Cambridge University; honorary doctorate, Nottingham University.



## Other Academic Programs

### Chancellor's Leadership Residential Academic Program

The Chancellor's Leadership Residential Academic Program (CLR) at Williams Village provides a living and learning community for students with a shared interest in leadership. The CLR is a regular academic program of the University of Colorado at Boulder. Students from all schools and colleges on the Boulder campus are eligible to participate. Students not residing in Williams Village may enroll with the permission of the director. CLR offers two academic tracks: the Service Learning Initiative (SLI) and the Ethnic Living and Learning Community (ELLC). When a student enrolls in the CLR, they will select one of the tracks. Leadership courses offered each semester meet core requirements in the College of Arts and Sciences and may be applied toward graduation as well as a Leadership Certificate. The program also offers small class sizes and courses in writing and rhetoric, history, math, political science, and integrative physiology. Supplemental activities include mountain retreats and the chance to dialogue with representatives from government, private industry, non-profit organizations, and community organizations. In addition, students enjoy dining with faculty members and engaging in informal discussions. Living together on the same residence floor allows students to create a home away from home where many lifelong friendships are developed.

### The Ethnic Living and Learning Community

The Ethnic Living and Learning Community (ELLC) provides students with an intentional multicultural living and learning experience and the opportunity to study leadership from a multicultural and global perspective. The ELLC students, faculty, and staff devote themselves to building community both in and out of the classroom. Throughout the year, two mountain retreats and a variety of social and educational events are planned to encourage critical thinking about important social issues, academic excellence, and social networks. The small class sizes offered through the ELLC are just one of the many benefits students will experience as a result of participating in the program. The ELLC boasts an exceptional lineup of faculty. Our instructors take the time to establish a caring but academically challenging environment for students. They take pride in knowing the students on a personal level and engaging them in the learning process.

### The Service Learning Initiative

The Service Learning Initiative (SLI) offers leadership development with an emphasis on civic responsibility and community service. The courses that constitute the core of this yearlong leadership program are Leadership for the 21st Century, Understanding Privilege and Oppression in Contemporary Society, and two service learning practica. In these courses, students explore their roles and responsibilities in society including the moral and ethical dimensions of leadership. The service practicum enhances

classroom content by offering appropriate hands-on community experiences for students. In addition to the required leadership class and practica, students can choose from offerings in math, writing and rhetoric, political science, and history. In early October and again in March, SLI students and staff attend a weekend retreat in the mountains close to Boulder. SLI participants focus on getting to know each other better by engaging in discussions related to topics being developed in the leadership classes and by taking part in activities that develop leadership skills in a beautiful outdoor environment.

### Admission and Enrollment

Students generally join the Chancellor's Leadership RAP for their freshman year, but sophomores may also apply. Participants are in residence in Williams Village—however, exceptions do occur. Only students admitted to the CLR are eligible to take the leadership and other core courses that the program offers at Darley Commons.

Interested students should indicate Williams Village as their first choice on the housing application form and return it to the Housing Reservation Center as early as possible. Students should also indicate their choice of the ELLC or SLI on their housing application. In addition, students are asked to complete a CLR application form, which includes questions regarding their leadership experiences in high school and in their community. The form can be obtained from the CLR office. As with all residential academic programs there is an annual \$725 program participation fee; some scholarships to cover the fee are available for those in need. Information is available from the Academic Director, Chancellor's Leadership RAP, University of Colorado at Boulder, 452 UCB, Boulder, CO 80309-0452 or **303-735-1987**. Students may also contact our program assistant at [CLR@colorado.edu](mailto:CLR@colorado.edu) or online at [www.colorado.edu/chancellor/chancellorstrap](http://www.colorado.edu/chancellor/chancellorstrap).

### Staff

GABRIELLA CHAPMAN, ELLC coordinator. BA, University of Colorado at Boulder.

SUSAN HARAN, program assistant. BS, University of California, Davis.

CAROL MIYAGISHIMA, interim director. BA, Metropolitan State College; MA, University of Colorado.

### Continuing Education

The mission of Continuing Education is to provide quality, innovative, lifelong learning opportunities to a diverse student population by extending the resources of the University of Colorado at Boulder. A variety of credit courses, noncredit courses, workshops, and seminars is offered through Continuing Education, which also administers CU-Boulder's summer session. Only university-approved faculty teach Continuing Education courses, workshops, and seminars.

The office is located at 1505 University Avenue in Boulder, 303-492-5148 (or 1-800-331-2801). The fax number is 303-492-3962, and the web site is [www.colorado.edu/conted](http://www.colorado.edu/conted).

### Boulder Evening Credit Classes

Offered in conjunction with CU-Boulder's academic departments, the Boulder Evening Program provides credit courses in the evening on the Boulder campus. These affordable, smaller-sized classes are provided through various departments including anthropology, communication, economics, English, film studies, fine arts, geography, mathematics, philosophy, psychology, sociology, Spanish, and theatre.

### Independent Learning Program

Programs include independent learning via correspondence and the Web, individualized instruction, and applied music featuring a tutorial relationship between student and instructor. Courses are self-paced, allowing learning to occur at times convenient to the student.

### Center for Advanced Engineering and Technology Education (CAETE)

CAETE is a partnership between the College of Engineering and Applied Science, and the Division of Continuing Education. CAETE provides graduate education and professional development at a distance for practicing engineers and managers of technology. Course sequences may lead to a master's degree in aerospace engineering, computer science, electrical and computer engineering, engineering management, or telecommunications. Individual courses are also offered in civil/environmental and mechanical engineering. Graduate certificates and short courses are available in some fields. CAETE also provides ongoing access to over 100 courses taught in previous semesters through the tape library.

### ACCESS and High School Concurrent Programs

In conjunction with CU-Boulder academic departments, ACCESS (Available Credit Courses for Eligible Special Students), enables nondegree students to enroll in Boulder main campus undergraduate and graduate credit courses after most degree-seeking students have registered. Colorado high school juniors and seniors interested in the challenge of university course work may take CU courses concurrent with their high school schedules. In addition to earning college credit, students may also earn credit toward high school graduation requirements.

### Extraordinary and Contract Credit Programs

Through Continuing Education, academic departments can offer courses to special audiences on or off campus. Many of these unique offerings are designed for various external constituencies. This includes courses offered off campus to educators across the state as well as courses offered on site to business and industry.

### Personal Enrichment Program

These noncredit classes are designed to meet students' personal enrichment and educational interests. This program provides courses in fine arts, foreign languages, writing, theatre, and more.

### Center for Business Education

The Center for Business Education (CBE) is a partnership between the Leeds School of Business and Continuing Education, offering certificate and custom programs as well as the most respected real estate appraisal program in the state. Certificate programs include the Colorado Executive Development in Residence (CEDIR) program and the 50 for Colorado program for business professionals, and the CU Business Intensive Certificate (CUBIC) for nonbusiness graduates.

### Computer Applications Program

More than 100 computer courses are offered each semester. Courses are hands on and/or lecture based and are taught by experts in the field. Courses include: networking, the Internet, operating systems, programming, office applications, computer graphics, and multimedia. Certificates are available in network administration, programming, web site design, and web graphics. Customized training for individual groups and computer lab rental are also available.

### International English Center

The International English Center (IEC) offers language learning, cultural adjustment, and academic preparation programs for international students planning to matriculate and for members of the campus and local community with limited English proficiency. The IEC also contracts with corporate groups to provide language training and professional development courses.

### Outreach

The Division of Continuing Education encourages CU-Boulder faculty, staff, and students to extend their expertise, talent, and programs to diverse constituencies throughout Colorado. The division partners with the provost, chancellor, and the outreach committee to fund these activities in departments and units across campus. Sample programs include the Rural Immigrant Project, Exploring Nanoworld, Conserving Biodiversity, African Music Ensemble, and the Community Literacy Outreach.

### Summer Session and Maymester at CU-Boulder

Summer session offers over 500 campus courses and enrolls more than 7,000 students in a relaxed, comfortable learning environment. Courses are available to CU-Boulder students who wish to accelerate their academic progress. Courses are also available to students visiting from other colleges, teachers, high school students, or others interested in pursuing their professional development or enrichment.

Maymester is a special three-week summer session term immediately following the end of spring semester. It provides intense, accelerated courses for those who need academic credits in an abbreviated time period.

### Dean

ANNE HEINZ, dean of the Division of Continuing Education and associate vice chancellor for summer session. BS, Southern Illinois University; EdM, PhD, University of Illinois at Urbana-Champaign.



## Norlin Scholars Program

The Norlin Scholars Program, begun in fall 1999, offers a range of educational benefits and financial incentives for outstanding students. The Norlin Program, named after a distinguished former president of the University of Colorado, includes a total of approximately 100 students.

Norlin scholars accepted as first-year students receive a four-year award, contingent upon fine academic progress. University juniors (either continuing students at CU-Boulder or transfer students) receive a two-year award.

Norlin scholars are encouraged to shape an enriched educational experience tailored to fit their interests and goals in any of CU-Boulder's undergraduate colleges and schools.

The program offers academic challenge, breadth of experience, and close work with advising faculty. Benefits include:

- two required courses, developed for the Norlin Scholars Program, that provide a shared intellectual experience among the students and develop strength and thoughtfulness in perceptive reading as well as in critical and incisive writing;
- opportunities to participate in honors courses and other small-group experiences emphasizing critical thinking and communication, both written and oral;
- experience in original research or independent work under faculty supervision, leading to graduation with honors;
- priority registration times throughout the program;
- opportunities for service learning, internships, and overseas experience; and
- for those who wish, admission to and full participation in the first-year Farrand Residential Academic Program, a high-demand program for 350 students located in the center of campus (standard program fee required).

## Financial Information

Each Norlin Scholar receives a merit-based award of \$2,000 per year. Students who need additional financial assistance should complete the FAFSA (Free Application for Federal Student Aid). The Norlin Program will then work with the Office of Financial Aid to maximize opportunities for need-based assistance.

## Applying to the Program

A flexible selection system ensures that students with many different interests and talents are accepted as Norlin Scholars. The fall 2001 class was selected from more than 400 highly talented, high achieving applicants and contains an extremely broad range of students with varied backgrounds, interests, and experiences.

Students may apply either as high school seniors (to enter the program as incoming first-year students) or as second-semester sophomores in college (to enter the program as juniors). Colorado residents as well as out-of-state and foreign students are eligible.

Applicants must demonstrate exceptional achievement or creativity in their academic work or other areas.

All applicants should complete the special Norlin Scholars application form, write their individual essay and submit these pieces in a single application packet. Application forms can be downloaded directly from the web site ([www.colorado.edu/norlin-scholars](http://www.colorado.edu/norlin-scholars)) or requested from the Norlin Scholars Program, University of Colorado at Boulder, 365 UCB, Boulder, CO 80309-0365.

All materials should be submitted in a single package. The deadline for receipt of the application materials is February 1. For freshmen and transfer students, the campus's standard application form must also be submitted separately to the Office of Admissions.

## Preprofessional Programs

Preprofessional programs have been developed at CU-Boulder to prepare undergraduate students and previously graduated students for later study at professional schools. None of Boulder's preprofessional programs offers an undergraduate degree, and completion of any of the programs does not guarantee later admission to a professional school. However, these programs are linked to professional schools within Colorado, and completion of a preprofessional program can prepare a student well for later professional study.

## Prehealth Programs

Students can prepare to enter undergraduate professional health science programs at the University of Colorado Health Sciences Center in Denver in the areas of dental hygiene and nursing by taking classes on the Boulder campus.

Students whose goals include entering the medical, dentistry, physical therapy, physician assistant, pharmacy, or public health programs and schools at the University of Colorado Health Sciences Center in Denver, or the veterinary medicine or occupational therapy programs at Colorado State University in Fort Collins, can complete any undergraduate major at CU-Boulder. In most cases, these students are required to complete a baccalaureate degree before entering professional school. In fact, a baccalaureate degree is recommended for most health professions.

At the time of application to a professional school, students are judged on several factors, including performance in undergraduate courses. For this reason, no required course may be taken on a *pass/fail* basis. Some fields require specific preprofessional examinations before application. For most fields, interviews are an essential part of the application process.

In all cases, admission committees are concerned with students' compassion, coping, and decision-making abilities, intellectual capabilities, realistic self-appraisal, sensitivity in interpersonal relations, and staying power (physical and motivational). In addition to formal course work, students should have experience in people-related activities (especially those related to their field of choice), so they can be more certain of their motivation for health careers. Also, health-related activities expose premed and other health science hopefuls to various patients and illnesses. The health professions require, or strongly recommend, such experience.

Some of the professional programs at the University of Colorado Health Sciences Center give preference to Colorado residents and residents of WICHE (Western Interstate Commission on Higher Education) states; interested students should check with individual programs for specific policies. Students from other states usually can obtain at CU-Boulder the preprofessional courses required by their state schools, but should check with those schools in advance. Students are encouraged to apply to their state school as well as to other public and private professional schools to increase their chances of gaining acceptance to the professional program of their choice.

During the preprofessional years, personal intellectual development leads many students to change professional goals. Since there are usually more applicants for these programs than there are spaces available, many students need to pursue alternative goals. Under these circumstances, students should plan college programs to give themselves the greatest flexibility in considering other vocations.

Advising for preprofessional study in the health sciences is conducted through the Preprofessional Advising Office in Old Main 1B-90. Check the prehealth advising web site at [www.colorado.edu/artsscience/aacforstudents](http://www.colorado.edu/artsscience/aacforstudents) (click on Preprofessional and then Prehealth) for information on prerequisite courses,

events, volunteer opportunities, student prehealth organizations, applications, and many other useful resources. Students should schedule an appointment with a prehealth advisor ([aac.colorado.edu](http://aac.colorado.edu)) as early as possible in their undergraduate careers to help plan course work and extracurricular experience in preparation for applying to programs of their choice.

## Other Preprofessional Programs

### *Prejournalism*

A specific prejournalism and mass communication major is offered at CU-Boulder in the College of Arts and Sciences. Students complete two specific courses while working toward arts and sciences core curriculum requirements. See the School of Journalism and Mass Communication for more specific information.

### *Prelaw*

Students who plan to apply to law school upon completing their baccalaureate degree do not have to complete any specific requirements for admission to law school. Instead, they should major in the discipline that best suits their intellectual interests and talents. Prelaw students should seek a rigorous and broad-based education that will ensure them a fundamental understanding of American society and its institutions. Students should become familiar with mathematical analysis and scientific reasoning, and develop excellent oral and written communication skills.

Prelaw advising is available in the Preprofessional Advising Center. In addition, there are faculty members who have special interest and expertise in the theoretical and practical aspects of the law and judicial systems. These faculty advisors are available for consultation with students on the CU-Boulder campus. Contact the Preprofessional Advising Center in Old Main 1B-90 for more information.

## Presidents Leadership Class

The Presidents Leadership Class (PLC) is a specially designed academic curriculum that focuses on leadership development, personal development, and community service initiatives. Skills are developed in an interdisciplinary, experiential environment through exposure to government, education, the humanities, business, and science. Students from all of the schools and colleges participate in the Presidents Leadership Class curriculum as a part of their regular course work.

The Presidents Leadership Class is a program of CU-Boulder and the Colorado Leadership Alliance and is overseen by a Board of Trustees representing the Colorado business, educational, nonprofit, and governmental communities.

## Admission and Enrollment

Admission to the Presidents Leadership Class is considered one of the highest honors awarded to incoming University of Colorado at Boulder students. Presidents Leadership Class scholars are admitted prior to the beginning of their first year. Selection criteria include academic excellence, a demonstrated commitment outside of self, demonstrated leadership potential, and uniqueness of contribution. Each year, 50 first-year scholars are enrolled, comprising both Colorado residents and nonresidents. A separate admission application must be obtained from the PLC office and returned prior to February 1. Applications may be obtained by visiting the web site at [www.coloradoleadership.org](http://www.coloradoleadership.org) or by calling the PLC office at 303-492-4PLC.

Only students who are accepted into the Presidents Leadership Class are eligible to enroll in PLC courses. Students receive arts and sciences core credit in ideas and values for PRLC 1810 Ethical Leadership, and core credit in contemporary societies for PRLC 1820 Community Issues in Leadership. Additional credits may vary by school or college.

## Academic Program

The Presidents Leadership Class is a rigorous academic and experiential program that focuses on leadership development at personal, organizational, community, and global levels. The curriculum is centered on empowerment of others, open-mindedness, a bias toward action, service to the broader good, the ability to balance reason and intuition, the ability to recognize and work with interconnectedness, ethical considerations, and the capacity to inspire a shared vision.

Fundamental intellectual skills are developed in the program, including effective research ability, speaking, and writing, multicultural and gender communication, critical thinking, ethical thinking, interdisciplinary thinking, introspection and self-awareness, facilitation of group processes, and basic teaching skills.

First-year courses focus on leadership theory and its application, and ethical and community issues in leadership. Programs include experiential outdoor team initiatives, a weekly speaker series, off-campus seminars, a student-run high school leadership development workshop, and other community service projects.

The sophomore-year course focuses on issues in leadership and change (such as environmental issues, economics, and politics) and multilevel analyses of leadership areas (issues originating at the organizational level that carry community and global implications). Experiential programs include a lecture workshop series, and individual contract learning.

During the “walkabout” experience, PLC scholars pursue a semester-long internship with business or civic leaders from Colorado. Students also have the opportunity to participate in a self-developed “leadership quest,” or foreign immersion experience, in their junior year. A senior-level capstone course culminates scholars’ PLC experience.

Upper-division scholars (juniors and seniors) can also participate in PLC as class advisors or as administrative staff members. Staff members continue to receive merit-based scholarships during their tenure in the Presidents Leadership Class. Additional courses for juniors and seniors are also available.

## Scholarship Programs and Opportunities

PLC scholars receive a merit-based scholarship of \$2,000–\$9,000 (dependent upon participation). Scholars must enroll in PRLC course work to maintain their scholarship.

Scholars are also eligible to be selected for a variety of other merit-based scholarship programs, including the FirstBank Colorado Scholarship Fund (\$6,000 over four years), the Alvin G. Flanagan Scholarship Fund (annual \$1,000 minimum awards), and the Michael Lee Hoelscher Memorial Scholarship (annual \$2,000 award).

## Faculty

P. JOHN LYMBEROPoulos, executive director, professor emeritus, Leeds School of Business. BSC, Ohio University; MBA PhD, University of Texas at Austin.

EDWARD J. GAC, academic director. BA, Western Illinois; AA, Wright College; JD, University of Illinois.

TY TASHIRO, assistant academic director, Presidents Leadership Class. BA, University of Colorado; PhD candidate, University of Minnesota, Twin Cities.

## Reserve Officer Training Corps

Enrollment in Reserve Officer Training Corps (ROTC) programs is open to both men and women, and ROTC courses are open to all students whether or not they are enrolled in ROTC programs.

All services provide undergraduate and selected graduate students with the opportunity to combine academic study with a military officer's educational program. The three services conduct courses in their respective areas leading to a regular or reserve commission upon graduation. The Navy also offers a program leading to a regular or reserve commission in the Marine Corps.

### Air Force Aerospace Studies

U.S. Air Force ROTC offers several programs leading to a commission in the U.S. Air Force upon receipt of at least a baccalaureate degree.

#### *Standard Four-Year Program*

This standard program is designed for incoming freshmen, or any student with four years remaining until degree completion. It consists of three parts: the general military course (GMC) for lower-division (normally freshman and sophomore) students; the professional officer course (POC) for upper-division students (normally juniors and seniors); and the leadership laboratory (LLAB) attended by all cadets. Completion of a four-week summer training course is required prior to commissioning.

#### *Modified Two-Year Program*

All undergraduate and graduate students are eligible for this program. It is offered to full-time, regularly enrolled degree students and requires at least two years of full-time college work (undergraduate or graduate level, or a combination). Those selected for this program must complete a five-week field training program during the summer months as a prerequisite for entry into the professional officer course the following fall semester.

#### *Leadership Lab*

All AFROTC cadets must attend leadership lab (two hours per week). The laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, career opportunities, and the life and work of an Air Force junior officer.

#### *Other Air Force ROTC Programs*

Other programs are frequently available based on current Air Force needs. Any AFROTC staff member in Boulder (303-492-8351) can discuss the best alternatives. Interested students should make initial contact as early as possible to create the best selection opportunity, as selection is on a competitive basis. There is no obligation until a formal contract is entered.

#### *Air Force College Scholarship Program*

Normally a scholarship board is held at the end of each semester for students who have at least one semester of full-time college credit. Prior participation in AFROTC is not required to compete for these scholarships. Students can compete for scholarships in most academic majors. Students selected for this program receive scholarships that pay up to \$15,000 in tuition, a book allowance, nonrefundable educational fees, and subsistence of \$250 for freshmen and sophomores, \$300 for juniors, and \$400 for seniors, per month, tax-free. All cadets enrolled in the professional officer course receive \$200 per month subsistence during the regular academic year. These scholarships are available in all academic disciplines and are two to three years in length.

#### *USAF Medical Programs*

Qualified premed or nursing students can compete for medical or nursing scholarships. These scholarships can lead to a career as an Air Force officer, serving as a doctor or nurse. The prehealth scholarship pays for an undergraduate degree and medical school.

#### *Air Force ROTC Course Credit*

AFROTC credit for graduation varies with each college. Students should contact the appropriate college for credit determination.

#### *Registration*

CU-Boulder students who wish to register for AFROTC classes sign up for them through the normal course registration process.

### Military Science (U.S. Army)

The Department of Military Science offers programs leading to an officer's commission in the active Army, Army Reserve, or National Guard in conjunction with an undergraduate or graduate degree. Military science courses are designed to supplement a regular degree program by offering practical leadership and management experience.

#### *Four-Year Program*

The four-year program consists of two phases: the basic course (freshman and sophomore years) and the advanced course (junior and senior years). The basic course offers a 2- or 3-credit course each semester, covering Army history and organization as well as military leadership and management. Laboratory sessions provide the opportunity to apply leadership skills while learning basic military skills. Enrollment in the basic course incurs no military obligation except for Army scholarship recipients.

The advanced course covers leadership, tactics and unit operations, training techniques, military law, and professional ethics, and includes a leadership practicum each semester. A 35-day summer advanced camp at Fort Lewis, Washington, provides challenging leadership training, and is a prerequisite for commissioning.

#### *Two-Year Program*

The two-year program consists of the advanced course, preceded by a five-week summer ROTC basic camp. Veterans or students who have participated in Junior ROTC, Civil Air Patrol, or similar organizations may be eligible to enroll in the advanced course without attendance at basic camp or completion of the basic course. Inquiries on advanced placement should be directed to the Department of Military Science.

#### *Scholarship Programs*

Four-year college scholarships are available to high school seniors, who should apply before November 15 of their senior year. Competition for two- and three-year scholarships is open to all University of Colorado students, regardless of academic major and whether or not they are currently enrolled in ROTC. Scholarship students receive tuition assistance, laboratory fees, a book allowance, and an allowance of \$250–\$400 per month during the academic year. Students interested in the scholarship program should contact the scholarship officer no later than the beginning of the spring semester to apply for the following academic year.

### *Simultaneous Membership Program*

Students entering the advanced phase of instruction may participate with an Army Reserve or Army National Guard unit as an officer trainee. Students participating in this program earn approximately \$230 monthly in addition to the \$350–\$400 monthly stipend. Additionally, the Army Reserve or participants in the SMP program can be eligible for Army National Guard education benefit that provides up to 75 percent tuition assistance.

### *Professional Military Education*

The Army ROTC course curriculum cuts across traditional subject boundaries. It involves elements of various disciplines and encourages students to integrate academic training with the problem-solving and decision-making challenges they will encounter as junior officers in the Army of the 21st century. Additionally, the formal curriculum is supplemented by field trips, guest speakers, and specialized military training. Prior to their commissioning, cadets are also required to take non-ROTC university courses in written communications, military history, and computer literacy.

**Leadership Laboratories.** These 90-minute periods provide cadets with practical leadership experience and performance-oriented instruction outside the classroom. Diagnostic evaluations of cadets in leadership roles are frequently administered. Leadership labs are compulsory for enrolled cadets.

**Preprofessional Programs.** Students pursuing medical or nursing degrees may enroll in military science and may be eligible for specially funded programs in these disciplines.

### *Naval Science*

Naval science course work is offered in the fall and spring semesters only. All naval science students enroll in NAVR 1010, 2020, 4010, and 4020. Those desiring commissions in the U.S. Navy enroll in NAVR 3020, 3030, 3040, and 4030 for upper-division work. Those desiring commissions in the U.S. Marine Corps enroll in NAVR 3101 and 4101 for upper-division work.

### *Scholarship Programs*

NROTC offers two-, three-, and four-year scholarship programs, and two-year and four-year college (non-scholarship) programs. Navy scholarships may be earned while students are enrolled in the college program. Scholarship students receive tuition and fees, books, and a \$250 per month subsistence allowance. This subsistence allowance gradually rises to \$400 by the student's senior year. College program students receive a \$350 per month subsistence allowance their junior year and \$400 per month subsistence allowance their senior year in the program.

Naval science (Navy option) students must complete one year of calculus, physics, and English, and one semester of American military history or national security policy, and computer science. Students should check with their naval science instructor to determine specific course offerings that fulfill the above requirements.

### *Degree Credits*

The number of NROTC semester hours of credit that may count toward degree requirements is determined by the individual colleges. Students should therefore consider their college's policy when formulating their degree plan.

### *Commissioned Service*

Opportunities for commissioned service are presently available in the unrestricted line (surface, subsurface, aviation, special warfare, and special operations) and staff corps (nursing) in the U.S. Navy. Opportunities in ground and aviation specialties are available in the U.S. Marine Corps. Students interested in other programs leading to commissions in either the U.S. Navy or U.S. Marine Corps are encouraged to contact the NROTC unit on campus. All commissioning programs require that the student be working toward, and receive, a college degree.

### *Faculty*

#### *Aerospace Studies*

GEORGE W. BALLINGER, colonel, U.S. Air Force; chair and professor of aerospace studies. BS, United States Air Force Academy; MA, Ohio State University.

SANDRA F. BRUNSON, captain, U.S. Air Force; assistant professor of aerospace studies. BA, Park University, Parkhill, Missouri; MA, Webster University, St. Louis.

MICHELLE MIDDLESWORTH, lieutenant colonel, U.S. Air Force; assistant professor of aerospace studies. BS, Montana State University; MS, University of Southern California.

JULIE NEWLIN, captain, U.S. Air Force; assistant professor of aerospace studies. BS, Wright State University; MPA, Valdosta State University.

RICHARD SAYLES, captain, U.S. Air Force; assistant professor of aerospace studies. BA, University of Florida, Gainesville; MA, Central Michigan University, Mount Pleasant.

#### *Military Science (U.S. Army)*

MARVIN MEEK, lieutenant colonel, U.S. Army; chair and professor of military science. BS, West Point; MS, Central Michigan University

WAYNE L. MEEUSEN, lieutenant colonel, assistant professor of military science. BS, Grand Valley State University; MSBA, Boston University.

LAURA L. CLELLAN, major, U.S. Army; assistant professor of military science. BS, Rio Grande College; MA, University of Phoenix.

#### *Naval Science*

GREGORY S. AKERS, colonel, U.S. Marine Corps; chair and professor of naval science. BS, Fort Hays State University; MS, Marine Corps War College.

JONATHAN L. ALEXANDER, lieutenant, U.S. Navy; assistant professor. BS, University of Arizona.

JOHN O. HONEMANN, lieutenant, U.S. Navy; assistant professor. BEnvD, University of Colorado.

JAMES M. KOEHLER, captain, U.S. Marine Corps; assistant professor. BS, U.S. Naval Academy; MA, University of Maryland.

BRIAN D. VANCE, lieutenant, U.S. Navy; assistant professor. BS, Cornell University.

DONALD K. ULRICH, commander, U.S. Navy; associate professor. BS, California State University at Long Beach; MA, San Diego State University.

CHRISTOPHER A. WLASCHIN, lieutenant, U.S. Navy; assistant professor. BS, University of Nebraska; MS, Southern Illinois University.

## Technology, Arts, and Media Certificate Program

We are in the midst of an information systems and communication revolution. New multimedia technologies and networked communications have swiftly created a demand for citizens who understand the multidisciplinary nature of today's information technologies, business and other applications, and society. The Technology, Arts, and Media (TAM) certificate provides this preparation. The program, which is open to students from every school and department at CU-Boulder, teaches students from a broad range of disciplines how to use each others' tools and speak each others' languages. The certificate provides a flexible structure for students to question and analyze the convergence of technology, arts, and media across disciplines. It exposes students to new worlds of knowledge, introducing them to the possibilities offered by disciplines other than their own. The combined effect is to enable students to develop the practical and critical thinking skills required for effective participation in the digital world and in a variety of new career paths.

The certificate encourages humanities students to explore the potential of new information technologies and artistic design to revolutionize their fields of study. TAM allows design students to explore how such subjects as narrativity, cognitive sciences, communicative theory, or computer programming might reshape their area of expertise. For science and engineering students, the TAM certificate provides the opportunity to mix technical knowledge with creative perspectives from the arts and humanities. Through its project courses, the certificate program emphasizes multidisciplinary collaboration, communication, and teamwork. In sum, the TAM certificate encourages all students to discover new technological possibilities as well as artistic and informational media and to appreciate the social and historical implications of those media.

### Program Requirements

The certificate program comprises six courses, offered for a total of 18 credits.

An introductory course, the Future of Technology, Arts, and Media, offers entry-level students an overview of the breadth and range of the information technology, arts, and media-related fields open to them. This course outlines the various skills that certificate students acquire during their tenure at CU-Boulder. Students meet and exchange ideas with CU faculty from a broad range of disciplines, and with outside guests from local and national industry, government, and arts institutions. By the end of the course, students have acquired some basic technical skills, such as e-mailing, web-browsing, and basic web page creation; they will be aware of the rapid expansion of new technology, arts, and media fields open to them and of the skills necessary for success in each field; and they will have begun to think critically about the implications and impacts of new information technologies, media, and artistic forms. This course requires no prior technical knowledge.

Two projects courses are required, one introductory and one capstone, in which students from a variety of backgrounds and disciplines engage in applied multimedia projects. The courses encourage collaboration, invention, and problem solving throughout by students of specific technical, artistic, and analytical skills developed during the course of the semester. Students produce several multimedia works, both as individuals and in interdisciplinary groups, and demonstrate a critical appreciation of the social, communicative, and technical implications of these products. By the end of the capstone course, students have portfolios that demonstrate their development and potential as well as written analyses of their work during the certificate program. Additionally, the capstone projects course involves some degree of production for real-world clients, largely outside of the university. During the next year TAM will increase the number of projects courses to between three and four per semester.

From a list of courses offered campuswide, students take three core courses, one in each of the following categories: the history and social implications of technology, arts, and media; theories and foundations of technology, arts, and media; and invention and practice in technology, arts, and media. Students may not take more than one core course within a single academic department. The purpose of the core is to provide students with a broad perspective on technology, arts, and media; to encourage students to take courses in a variety of disciplines and to experience the environments and problem-solving techniques in other fields of specialization; and to learn to apply new skills to their own academic endeavors.

For more information, see [www.colorado.edu/ATLAS](http://www.colorado.edu/ATLAS).

### Faculty

ROBERT B. SCHNABEL, director; professor, Department of Computer Science. BA, Dartmouth College; MS, PhD, Cornell University.

DIANE E. SIEBER, faculty associate director; associate professor, Department of Spanish and Portuguese. BA, University of Virginia; MA, PhD, Princeton University.

### Undergraduate Academy

The Undergraduate Academy (UA) at CU-Boulder, begun in fall 2000, consists of approximately 200 of the university's very best students. They are chosen for their intellectual curiosity and commitment to learning, not just for high grades and test scores. UA students, coming from all the colleges on campus and from a diverse array of backgrounds, get to know each other and faculty members well, forming an intellectual community. They receive targeted advising about how to create an enhanced education for themselves at CU-Boulder, including doing independent research or creative work.

The Undergraduate Academy also supports a wide range of student-run activities designed to extend education outside the classroom. All Norlin and Boettcher Scholars are automatically members of the UA; other students need to apply as sophomores or juniors. The goal of this program is to give the most academically talented students extra attention and opportunities, comparable to those offered to undergraduates with other special abilities or needs.



# CU Changes Lives

## CU CHANGES LIVES

At CU, I not only learned more about what was happening in the world around me, but I also learned the skills I would need to go further in that world. All the while, I met the friends I will have for a lifetime, whether or not we live close to each other.

—Lara Curtis (BS, Journalism/News-Editorial, 2000),  
graduate student, Urban and Environmental Policy and Planning,  
Tufts University, Medford, Massachusetts

As a 48-year resident of Boulder, I know that the importance of the university presence here is overwhelming; from the quality of people to the varied businesses created by university entrepreneurs, CU deserves my loyalty and gratitude.

—Henry Eaton (BS, Distributive Science, 1962),  
retired dentist. Currently involved in real estate, Boulder

There will always be a need for effective and principle-centered leadership in our communities. The University of Colorado graduates leaders who will make a difference in their communities and gives students a support system that allows them to achieve their goals.

—Erik Estrada (BA, Political Science, 2002),  
El Pomar Foundation Fellow, Colorado Springs

CU has changed my life in two major ways. I completed my postgraduate work at CU and our two oldest children received their undergraduate degrees there.

I was a stay-at-home mom who needed to pursue some intellectual stimulation. I attended night school and obtained my MS in Accounting. I passed the CPA exam on the first try and received my CPA certification, which allowed me to stay at home with our children and still maintain a small accounting practice. When our children were older, I moved into the ERP consulting space and have achieved all of my professional goals including becoming a national vice president. I look to my years at CU as the springboard for a very fulfilling life as a mother, wife, and professional.

Our two oldest also attended CU. They are both duly employed and our daughter will be pursuing her law degree. The education they received and lasting friendships made are invaluable.

—Carolyn B. Duffy (MS, Accounting, 1981),  
CPA, director of IT services, Resources Connection, Denver

# Course Descriptions

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**College of Arts and Sciences 290**

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**Leeds School of Business 418**

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**School of Education 429**

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**College of Engineering and Applied Science 434**

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**School of Journalism and Mass Communication 460**

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**School of Law 463**

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**Other Academic Programs 476**

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THE FOLLOWING COURSES ARE OFFERED ON THE BOULDER campus during the 2003–04 academic year. This listing does not constitute a guarantee that any particular course will be offered during this year. Consult specific programs and major requirements within each school and college for more information. Also see the current *Registration Handbook and Schedule of Courses* for details about course offerings. Changes in course descriptions may have occurred since catalog publication; see the online catalog for course description updates at [www.colorado.edu/catalog](http://www.colorado.edu/catalog).

## Course Numbering

Always consult specific departments and programs within schools and colleges for restrictions, requirements, and prerequisites.

- **1000–2000 courses** are usually intended for lower-division students (freshmen and sophomores).
- **3000–4000 courses** are intended for upper-division students (juniors and seniors), and may require instructor's consent. Consult the program or department for other restrictions.
- **5000-level courses** usually require graduate-student status, but may be open to qualified undergraduates with instructor consent. Consult the program or department.
- **Courses at the 6000, 7000, and 8000 level** are usually open only to graduate students. Consult the program or department for restrictions.

## Abbreviations

Coreq.—corequisite  
 Lab.—laboratory  
 Lect.—lecture  
 Prereq.—prerequisite  
 Rec.—recitation

# College of Architecture and Planning

## Architecture

**ARCH 3114-3. History and Theories of Architecture 1.** Surveys architecture, landscape architecture, and urban design from 3000 B.C. to A.D. 1400, emphasizing developments in the Western world. Open to nonmajors on a space available basis.

**ARCH 3214-3. History and Theories of Architecture 2.** Surveys architecture, landscape architecture, and urban design from A.D. 1400 to the present, emphasizing developments in the Western world. Open to nonmajors on a space available basis.

**ARCH 4010-3. Architectural Appreciation and Design.** Introduces basic processes and principles of architectural design. Provides a basis for understanding and evaluating architecture. Open to AREN seniors only.

## Environmental Design

### Studios

**ENVD 2110-6. Architecture Studio 1.** Preprofessional studio in architectural design. Addresses a wide variety of architectural problems, from residential and commercial to urban design, and integrates the many factors that shape buildings, including construction, structures, climate, human behavior and values, and cultural meaning. Prereqs., ENVD 1004, 2001, 2002, and 2003.

**ENVD 2120-6. Planning Studio 1.** Applies knowledge from other courses in the curriculum; introduces the various physical systems (natural and built) affected by planning interventions; and progressively addresses more complex issues in planning for neighborhoods, central districts, and citywide and regional planning scales. Prereqs., ENVD 1004 and 2002.

**ENVD 3210-6. Architecture Studio 2.** See ENVD 2110. Prereqs., ENVD 2110, ARCH 3114 and 3214.

**ENVD 3220-6. Planning Studio 2.** See ENVD 2120. Prereq., ENVD 2120.

**ENVD 3320-2. Planning Practicum.** Supervised practicum in some aspect of urban or regional planning. Prereq., ENVD 3220.

**ENVD 4300 (1-6). Special Topics: Design.** Advanced studio or seminar course exploring new and emerging themes in design. May be repeated for credit by petition.

**ENVD 4310-6. Architecture Studio 3.** See ENVD 2110. Prereqs., ENVD 3210, AREN 4035 and 4045. Prereq. or coreq., ENVD 3115.

**ENVD 4320-6. Planning Studio 3.** See ENVD 2120. Prereq., ENVD 3220.

**ENVD 4340-6. Landscape Architecture Studio.** Preprofessional studio in landscape architecture. Prereq., ENVD 3210 or 3220.

**ENVD 4360-6. Historic Preservation Studio.** Preprofessional studio in historic preservation design. Prereq., ENVD 3210 or 3220.

**ENVD 4410-6. Architecture Studio 4.** Directs students toward the discovery and design of a personal philosophy synthesizing the varied facets of the architectural process. Involves longer and larger projects of a complex sociological, philosophical, and symbolic character. Projects address issues of urban design, emphasizing architecture in evolving, densely built environments. Prereq., ENVD 4310. Prereq. or coreq., ENVD 4314.

**ENVD 4420-3. Senior Planning Seminar.** Advanced seminar focuses on theoretical concerns and practical issues inherent in environmental design planning. Views concerns and issues in terms of setting, processes, and planning outcomes. Provides a critical synthesis of the inherently interdisciplinary nature of planning education. Open to planning seniors only, or by instructor consent.

**ENVD 4550-6. Urban Design Studio.** A preprofessional studio in urban design for architecture and planning. Prereq., ENVD 4310 or 4320.

### Social Factors

**ENVD 2001-3. Introduction to Social Factors in Environmental Design.** Critically evaluates built environments. Considers how social and individual behavior is reflected in and influenced by the built environment. Open to nonmajors on a space available basis.

**ENVD 3001-3. Environment and Behavior.** Examines the social and behavioral aspects of relationships between people and the built environment. Gives special attention to antecedent factors (why we have the environments we do), implications of given arrangements for special population groups, and responses to incongruent environments. Open to nonmajors on a space available basis.

**ENVD 4031-3. Thinking Like a Mountain: A New Land Ethic.** Critically reviews and analyzes land use policies, the ethics and economics of air and water pollution, regional sustainability, and resource management. Includes critical evaluation of empirical methodologies, and criteria of cultural and social equity. Prereq., junior or senior standing in the college.

**ENVD 4311-3. Housing Policies and Practices.** A seminar providing students with a descriptive knowledge and analytical understanding of the use and development of residential settings in different political economies, globally divided into advanced capitalist nations, collectivist economies, and the third world. Prereqs., ENVD 2001, 3001. Open to PLAN majors only, except by instructor consent.

**ENVD 4361 (1-6). Special Topics: Social Factors in Design.** Addresses variable topics in the relationship of human experience and behavior to the built environment, e.g., social research methods in environmental design. May be repeated for credit by petition.

### Methods and Techniques

**ENVD 2002-3. Environmental Design Media.** Development of graphics skills, emphasizing drawing as a means to design. Includes investigation of drawing types and methods; diagramming of ideas and systems; and informative, exploratory, and developmental sketching. Prereq., ENVD 1004. Open to nonmajors on a space available basis.

**ENVD 2052-3. Introduction to Computers in Planning.** Introduces the use of computers in design fields, including applications for word-processing, desktop publishing, graphic creation, and CAD-style design. Aims to provide basic general skills in computer use that are transferable to other computer applications.

**ENVD 2152-3. GIS for Planners.** Focuses on construction and use of computer-based information systems to represent and manipulate geographic data. Emphasizes the recording, mapping, and transforming of data for analysis and use by planners.

**ENVD 2352-3. Presenting Information on the Web.** Introductory course creating interactive web sites. Covers use of Hypertext Markup Language (HTML) and Flash to create linked pages containing text, images, animations, menus, and buttons. Covers principles of site navigation, page layout, and graphic design for designers and planners.

**ENVD 3002-3. Design Theory and Methods.** The nature of design and systematic methods for improving design. Topics include: nature of design problems; structure of design process; theory of form; problem definition; generating solution ideas; evaluation; roles of form and function. Students use computers without having to learn to program. Open to nonmajors.

**ENVD 3022-3. Technical Photography.** Introduces students to the technical and practical aspects of making photographic images: the workings of the camera and lens, principles of depth of field, black and white film processing, printing, and basic darkroom procedures. Open to nonmajors on a space available basis.

**ENVD 3052-3. Introduction to Computer Methods in Environmental Design.** Surveys existing and emerging computer methods used in the environmental design professions, with an introduction to computer programming. Prereq., MATH 1300 and PHYS 2010, or instructor consent. Open to nonmajors.

**ENVD 3122-3. Research Issues and Methods for Planning.** Explores topics of current interest in planning. Looks at the development and social consequences of the neighborhood movement, forms of municipal and regional governments, regional settlement patterns, and new communities. Introduces selected methods from the social sciences used by planners and urban designers. Prereqs., ENVD 2120, 3001, and one of the following statistics courses: BCOR 2010, ECON 3818, GEOG 3023, GEOL 3023, MATH 2510, PSYC 3101, or SOCY 2061.

**ENVD 3152-3. Introduction to Computer Graphics Applications.** Explores principles and uses of computer graphics in design. Topics include creation and modification of complex two- and three-dimensional objects; orthographic and perspective views; use of color; input using mouse and digitizer; output using screen, plotter, matrix printer, and slides; automated aids for form generation and manipulation; and analysis of current and future trends of computer usage for design. Prereq., ENVD 3352.



**ENVD 3212-3. Color Theory.** Illustrates color media techniques for the preparation, composition, and presentation of landscape and built environment drawings. Prereqs., ENVD 2002; 2110 or 2120

**ENVD 3252-3. Computer Graphic Programming.** Provides an introductory computer programming course designed to teach the capabilities of a computer in providing graphic representations of environments, including buildings. Open to nonmajors.

**ENVD 3352-3. Architectural Computer Media.** Introduces the integration of computing and the architectural design process and related representational tasks. Studies common computer-aided design programs, emphasizing two- and three-dimensional and animation techniques.

**ENVD 4012-3. Imagination and Creativity.** Offers a seminar on imagination and creativity in environmental design. Students research and prepare a class presentation and paper on a topic of interest. Open to nonmajors at all levels.

**ENVD 4092-3. Improving Imaging Ability.** Offers an advanced course dealing with theories of imaging and methods of improving imaging in the design process. Open to nonmajors.

**ENVD 4112-3. Architectural Graphics 1.** Illustrates techniques of graphics communication and presentation for architectural design. Includes advanced delineation and use of color. Prereqs., ENVD 2002 and 2110.

**ENVD 4122-3. Advanced Technical Photography.** Focuses on working with a variety of alternative photographic processes intended to give students an array of photographic techniques to incorporate into studio course presentations and portfolio work. Processes include hand-applied color to black and white images, using two or more negatives to produce black and white combination prints, shooting color slides to produce graphic arts, high-contrast black and white prints, and documentary photography of Colorado architecture and urban landscapes using color slide film. Students must provide their own 35mm SLR camera. Prereq., ENVD 3022 or ARTS 2191 or instructor consent.

**ENVD 4152-3. Computer Graphic Applications.** Introduces the mechanics of entering 2-D images and 3-D objects into the computer. Once entered, graphics are interactively rotated in space, walked through, and displayed in perspective from any position. Also covers the mechanics of other computer programs allowing additional manipulation of images and objects.

**ENVD 4192-3. Improving Imaging Ability 2.** Offers an advanced course dealing with theories of imaging and methods of improving imaging in the design process. Open to nonmajors.

**ENVD 4212-3. Architectural Graphics 2.** Covers development of an architectural set of construction documents combined with job administration, field observation, and guest speakers from related construction and architectural disciplines. Prereqs., ENVD 2002 and 2110.

**ENVD 4322 (1-6). Special Topics: Graphics.** Provides an advanced seminar on special issues in design communications. May be repeated for credit by petition. Prereq., upper-division standing. Open to nonmajors on a space available basis or by instructor consent.

**ENVD 4352 (1-6). Special Topics: Computer Methods.** Topics include animation and environmental simulation, computational methods of technical evaluation and optimization, and computational mapping and analysis. May be repeated for credit by petition. Open to nonmajors on a space available basis.

## Physical Factors

**ENVD 2003-3. Ecology and Design.** Introduces basic principles and techniques of ecology as they relate to the design and understanding of the built environment. Includes a study of hazards and the impact of modern technology on the natural and built environments. Open to nonmajors on a space available basis.

**ENVD 4023-3. Environmental Impact Assessment.** Provides a field-oriented seminar in current environmental impact controversies. Gives attention to history, theory, and application of impact analysis at state levels for designers, land-use planners, and others involved in resource decision making. Prereq., instructor consent. Open to nonmajors on a space available basis, by instructor consent.

**ENVD 4233-3. Environmental Aesthetics.** Explores the interdisciplinary field of environmental aesthetics, examining the history of landscape tastes, theoretical approaches to the study of aesthetic responses, and contemporary attempts to incorporate matters of aesthetics in American planning. Emphasizes developing analytical and critical approaches to aesthetics in the public realm.

**ENVD 4363 (1-6). Special Topics: Physical Factors in Environmental Design.**

Includes such topics as appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development. May be repeated for credit by petition. Prereq., upper-division standing.

## History and Theory

**ENVD 1004-6. Introduction to Environmental Design.** Surveys factors shaping the built environment, emphasizing architecture, planning, and landscape design. Lectures introduce theories of design and planning, offer a historical review of these fields, and present career opportunities within these professions. Open to nonmajors on a space available basis.

**ENVD 3124-3. Issues in Planning.** Broadly introduces physical environmental planning in the U.S., examining both historical roots and recent trends in American planning concepts and implementation. Emphasizes an analytical and critical approach to historical and contemporary planning issues, mechanisms, and cases. Open to nonmajors on a space available basis.

**ENVD 4114-3. History of American Architecture and Urbanism.** Surveys architecture, landscape architecture, urban design, and planning in the U.S. from ca. 1600 to the present. Prereq., ARCH 3214 or equivalent, or instructor consent. Open to nonmajors.

**ENVD 4314-3. Architectural Theory.** Surveys, through lectures and readings, the major historical developments and contemporary directions in architectural theory. Prereqs., ARCH 3114 and ARCH 3214.

**ENVD 4364 (1-6). Special Topics: History and Historiography of Environmental Design.** Provides an advanced seminar on history and historiography of environmental design, e.g., American dwellings. May be repeated for credit by petition. Prereq., ARCH 3214, equivalent, or instructor consent. Restricted to juniors and seniors. Open to nonmajors on a space available basis.

**ENVD 4764 (1-6). Special Topics: Theory and Criticism in Environmental Design.** Provides an advanced seminar on theory and criticism in environmental design, e.g., architecture now and introduction to design theory and criticism. May be repeated for credit by petition. Prereq., ARCH 3214, equivalent, or instructor consent. Open to nonmajors on a space available basis.

**ENVD 4794-3. History of Urban Design and Planning.** Examines history of European and American planning and urban design in the late 19th and 20th centuries.

## Technology and Practice

**ENVD 3015-3. Introduction to Historic Preservation.** Introduces methods for identifying historic structures and evaluating their materials. Considers techniques for preserving and restoring and legal options for promoting preservation efforts.

**ENVD 3115-3. Introduction to Building Materials and Systems.** Surveys building methods, materials, and assemblies from the designer's perspective.

**ENVD 4005-3. Design and Planning Law.** Teaches students how to research the various codes and to draft and pass laws. Covers environmental, water quality, property, zoning, and building codes and laws. Open to nonmajors on a space available basis.

**ENVD 4035-3. Solar and Sustainable Design.** Introduces aspects of solar technology relevant to the environmental design professions. Includes readings and lectures on the nature of energy limitations, energy needs, and the potential role of solar energy in meeting these needs. Prereq., PHYS 2010 or equivalent. Open to nonmajors on a space available basis.

**ENVD 4365 (1-6). Special Topics: Technology and Practice.** Provides an advanced seminar on new technologies and issues of professional practice in the environmental design professions. May be repeated for credit by petition. Restricted to juniors and seniors. Open to nonmajors on a space available basis.

## Miscellaneous

**ENVD 3909 (1-6). Independent Study.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 3919 (1-6). Teaching Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

**ENVD 4909 (1-6). Independent Study.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 4919 (1-6). Teaching Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

**ENVD 4929 (1-6). Research Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 4939 (1-6). Internship.** By special arrangement with instructor and outside sponsor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

## College of Arts and Sciences

### Anthropology

**ANTH 1030-3. Principles of Anthropology 1.** Evolution of humanity and culture from beginnings through early metal ages. Covers human evolution, race, pre-history, and rise of early civilizations. This course is taught through Continuing Education. Meets MAPS requirements for social science: general.

**ANTH 1040-3. Principles of Anthropology 2.** Surveys the world's major culture areas. Covers components of culture, such as subsistence, social organization, religion, and language. This course is taught through Continuing Education. Meets MAPS requirement for social science: general.

**ANTH 1100-3. Exploring a Non-Western Culture: The Tamils.** Surveys the social and economic patterns, ideas and values, and aesthetic achievements of the Tamils, a Hindu people who live in South India and Sri Lanka. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1110-3. Exploring a Non-Western Culture: Japan.** Examines modern Japan in terms of cultural styles, social patterns, work practices, aesthetic traditions, ecological conditions, and historical events that shape it as both a non-Western culture and a modern industrial state. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1120-3. Exploring a Non-Western Culture: Hopi and Navajo, Cultures in Conflict.** Studies the evolution of Hopi and Navajo cultures and cultural inter-relationships from the protohistoric through the contemporary period, using an integrated, holistic, and humanistic viewpoint. Principal goal is to instill an appreciation of non-Western cultural diversity in material adaptations, social patterns, ideas and values, and aesthetic achievements, thus recognizing a range of cultural solutions to common human problems. Same as AIST 1125. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1130-3. Exploring a Non-Western Culture: Amazonian Tribal Peoples.** Examines the Amazonian tribal cultures of South America, their histories, cultural attributes, and contemporary problems and dilemmas. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1140-3. Exploring a Non-Western Culture: The Maya.** Explores the culture of the Maya of Central America, emphasizing their material adaptations, social organizations, ideals and values, and artistic achievements in the past and the present. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1150-3. Exploring a Non-Western Culture: Regional Cultures of Africa.** Explores a small number of cultures in a specific sub-region of Africa from an integrated holistic viewpoint, emphasizing material adaptations, social patterns, ideas and values, and aesthetic achievements. Same as BLST 1150. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1160-3. The Ancient Egyptian Civilization.** Emphasizes the origin of the Egyptian culture, its importance, and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1170-3. Exploring Culture and Gender through Film.** Uses films and written texts to explore the concepts of culture and gender, as well as ethnicity and race. By looking at gender, ethnicity, and race cross-culturally, students will know how these concepts are constructed in their own society, as well as in others. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ANTH 1180-3. Maritime People: Fishers and Seafarers.** Explores important milestones in the development of human societies and cultures that live from the sea. Emphasizes the evolution of maritime adaptations associated with fishing and seafaring from more than 10,000 years ago through the present. Approved for arts and sciences core curriculum: historical context.

**ANTH 1190-3. Origins of Ancient Civilizations.** Examines origins of the world's first civilizations in Mesopotamia, Egypt, the Indus Valley, Meso America, and the Andes. Covers archaeology of ancient cities, trade, economy, politics, warfare, religion, and ideology. Seeks insights into general processes of cultural evolution. Approved for arts and sciences core curriculum: historical context.

**ANTH 1200-3. Culture and Power.** Compares contemporary sociopolitical systems across cultures, from non-Western tribal groups to modern states. Introduces students to anthropological approaches for understanding and analyzing political forces, processes, and institutions that affect cultures such as colonialism, warfare, violence, ethnicity, migration, and globalization. Approved for arts and sciences core curriculum: contemporary societies.

**ANTH 2009-3. Modern Issues, Ancient Times.** Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved, and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life. Same as CLAS 2009. Approved for arts and sciences core curriculum: historical context.

**ANTH 2010-3. Introduction to Physical Anthropology 1.** Detailed consideration of human biology, the place of humans in the animal kingdom, primate ecology, and fossil evidence for human evolution. Students may not receive credit for both ANTH 2010 and 2050. Meets MAPS requirement for natural science: non-lab. Approved for arts and sciences core curriculum: natural science.

**ANTH 2020-3. Introduction to Physical Anthropology 2.** Continuation of ANTH 2010. Emphasizes genetics, human variation, and microevolution. Prereq., ANTH 2010. Student may not receive credit for both ANTH 2020 and ANTH 2060. Approved for arts and sciences core curriculum: natural science.

**ANTH 2030-1. Laboratory in Physical Anthropology 1.** Lab in human osteology and musculoskeletal system emphasizing comparative primate morphology, adaptation, and the fossil record documenting the natural history of primates. Coreq., ANTH 2010. Meets MAPS requirement for natural science: lab, when taken with ANTH 2010. Approved for arts and sciences core curriculum: natural science.

**ANTH 2040-1. Laboratory in Physical Anthropology 2.** Experiments and hands-on exercises designed to enhance understanding of the principles and concepts presented in ANTH 2020. One two-hour class per week. Coreq., ANTH 2020. Approved for arts and sciences core curriculum: natural science.

**ANTH 2050-4. Honors—Human Origins 1.** Explores how the following two major bodies of evidence for human evolution are used by physical anthropologists in search of human origins: humankind's close physical and behavioral similarity to other living species, particularly living primates; and the fossil record for human evolution. Students may not receive credit for both ANTH 2010 and 2050. Approved for arts and sciences core curriculum: natural science.

**ANTH 2060-4. Honors—Human Origins 2.** Surveys evidence for the continuing evolution of *Homo sapiens*. Emphasizes how physical anthropologists use data and concepts from medicine, genetics, demography, and ecology to understand the evolution of human biological diversity and adaptation. Prereq., ANTH 2050. Students may not receive credit for both ANTH 2020 and 2050. Approved for arts and sciences core curriculum: natural science.

**ANTH 2070-3. Bones, Bodies, and Disease.** Studies the human skeleton and introduces techniques used to evaluate demographic variables. Applies techniques through evaluation of photographic images of an excellently preserved mummified skeletal population from ancient Nubia to reconstruct prehistoric patterns of adaptation and biocultural evolution. Offered through Continuing Education only. Recommended prereq., ANTH 2010.

**ANTH 2100-3. Frontiers of Cultural Anthropology.** Covers current theories in cultural anthropology and discusses the nature of field work. Explores major schools of thought and actual field studies.

**ANTH 2200-3. Introduction to Archaeology.** Discusses history, basic concepts, techniques, and theoretical construction of archaeological field and laboratory investigations, as well as a general outline of world prehistory.

**ANTH 2210-1. Laboratory Course in Archaeological Methods.** Studies analytical methods in archaeological research including those employed both in the field and in the laboratory. Deals with practical exercises illustrating many of the theoretical principles covered in ANTH 2200. Coreq., ANTH 2200.

**ANTH 2300-3. Civilization of the Ancient Near East.** Discusses civilization of the ancient Near East: ancient Israel, Phoenicia, Syria, Jordan, Mesopotamia, Egypt and Nubia, Arabia, Asia Minor, and Persia. Origins of such cultures and their influences on other cultures are also discussed with comparative study between ancient Middle East, modern Middle East, and ancient and modern Western cultures. Scholarly points of view are mentioned in detail.

**ANTH 3000-3. Primate Behavior.** Surveys naturalistic primate behavior. Emphasizes social behavior, behavioral ecology, and evolution as they lead to an understanding of human behavior. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220, and junior standing. Approved for arts and sciences core curriculum: natural science.

**ANTH 3010-3. The Human Animal.** Identifies genetic, anatomical, physiological, social, and behavioral characteristics humans share with other mammals and primates. Explores how these characteristics are influenced by modern culture. Prereqs., ANTH 2010 and 2020, or equivalent. Approved for arts and sciences core curriculum: natural science.

**ANTH 3100-3. Africa: Peoples and Societies in Change.** Examines culture and politics in Africa through scholarly works by anthropologists and historians, as well as novels, films, and journalistic accounts. Special attention is devoted to the ways in which various African cultures have creatively and resiliently responded to slave trade, European colonialism, and post-colonialism.

**ANTH 3110-3. Ethnography of Mexico and Central America.** A broad overview, focusing on Mexico and Guatemala. Major topics include ethnohistory, indigenous and mestizo peoples, and contemporary problems and issues.

**ANTH 3130-3. North American Indians: Traditional Cultures.** Comprehensive survey of native cultures of America north of Mexico, including a review of their natural environments, prehistory, languages, and major institutions for various culture areas. Same as AIST 3135.

**ANTH 3160-3. Peoples of the South Pacific.** Surveys traditional cultures and contemporary changes in Polynesia, Melanesia, and Micronesia.

**ANTH 3170-3. America: An Anthropological Perspective.** Historical and contemporary aspects of American life are considered from an anthropological perspective. Approved for arts and sciences core curriculum: United States context.

**ANTH 3180-3. Gender, Culture, and Sexuality.** Focuses on gender, that is, the making of men and women, and how gender is culturally constructed in different societies. Gender describes many areas of behavior, feelings, thoughts, and fantasies that cannot be understood as primarily biologically produced. Sexuality and sexual systems are sometimes viewed as products of particular gendering practices, but recent theories suggest that sexual systems themselves constitute gender. Prereq., ANTH 2100. Similar to WMST 2080.

**ANTH 3300-3. Elements of Religion.** Explores universal components of religion, as inferred from religions of the world, primitive and civilized. Same as ETHN 3300.

**ANTH 4000-3. Quantitative Methods in Anthropology.** Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures. Prereqs., ANTH 2010 and 2020. Same as ANTH 5000.

**ANTH 4020-3. Explorations in Anthropology.** Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings. May be repeated up to 6 total credit hours. Prereq., 15 hours of anthropology course work. Same as ANTH 5020.

**ANTH 4060-3. Nutrition and Anthropology.** Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220, or EBIO 1030 and 1040. Same as ANTH 5060.

**ANTH 4080-3. Anthropological Genetics.** Considers data and theory of human genetics. Emphasizes analytical techniques relating to a genetic analysis of individual, family, and populations. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220. Same as ANTH 5080.

**ANTH 4110-3. Human Evolutionary Biology.** Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes, and molecular studies that have bearing on the study of human evolution. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220. Same as ANTH 5110.

**ANTH 4120-3. Advanced Physical Anthropology.** Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. May be repeated up to 6 total credit hours. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220. Same as ANTH 5120.

**ANTH 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C. Emphasis will be on palace states. Same as ANTH 5129, CLAS 4129, and ARTH 4129.

**ANTH 4130-3. Advanced Osteology.** Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations. Prereqs., ANTH 2010, 2020. Same as ANTH 5130.

**ANTH 4150-3. Human Ecology: Biological Aspects.** Discusses role of human populations in local ecosystems, factors affecting population growth, and human adaptability to environmental stress. Detailed consideration of case studies of small-scale societies in different ecosystems. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220. Same as ANTH 5150.

**ANTH 4170-3. Primate Evolutionary Biology.** Focuses on the fossil record of nonhominoid primates. Special emphasis placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini, and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations. Prereqs., ANTH 2010 or EBIO 1210. Same as ANTH 5170.

**ANTH 4180-3. Anthropological Perspectives: Contemporary Issues.** Students read, discuss, and write critical evaluations of contemporary publications in anthropology. Identifies basic themes that inform major anthropological perspectives. Students then bring these perspectives to bear on issues currently facing the human species. May be repeated up to 6 total credit hours. Prereqs., background knowledge of general areas in anthropology, upper-division standing, and instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**ANTH 4200-3. North American Archaeology.** Surveys archaeological evidence for the development and diversity of Native American ways of life in North America.

**ANTH 4210-3. Southwestern Archaeology.** Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity. Prereq., ANTH 2200. Same as ANTH 5210.

**ANTH 4220-3. Archaeology of Mexico and Central America.** Studies prehistoric and protohistoric cultures and areas of Mexico and Central America, including the Aztecs and Mayas. Prereq., ANTH 2200. Same as ANTH 5220.

**ANTH 4230-3. Settlement Archaeology.** Explores prehistoric human spatial use of the landscape including both the organization of communities and their distribution on a regional level. Considers prehistoric settlement data as well as inferences about ancient population, community organization, architecture, and land use. Prereq., ANTH 2200. Same as ANTH 5230.

**ANTH 4240-3. Geoarchaeology.** Applies geological principles and instruments to help solve archaeological problems. The focus is on site formation processes, soils, stratigraphy, environments, dating, remote sensing, and geophysical exploration. Environmental and ethical considerations are included. Prereq., ANTH 2200. Same as ANTH 5240.

**ANTH 4270-3. Plains Archaeology.** Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century. Prereq., ANTH 2200. Same as ANTH 5270.

**ANTH 4330-3. Human Ecology: Archaeological Aspects.** Surveys archaeological approaches to ecology, economy, and landscape: glaciation, geomorphology, and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural, and complex societies; and ideologically structured landscapes. Prereq., ANTH 2200. Same as ANTH 5330.

**ANTH 4340-3. Archaeological Method and Theory.** Surveys archaeological theories and methods within the context of the history of archaeology. Includes archaeological approaches to data recovery, analysis, and interpretation as well as an overview of cultural resources management and ethical issues in contemporary archaeology.

**ANTH 4350 (2-6). Archaeological Field and Laboratory Research.** Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken. May be repeated up to 6 total credit hours. Prereq., instructor consent. Same as ANTH 5350.

**ANTH 4360 (1-6). Field Methods in Primate Ecology.** Intensive lectures and field training teaches the basics of primate ecological method and theory, and develops concepts and skills to formulate and implement independent field research projects. Offered abroad only. Prereqs., ANTH 3000 or EBIO 1210 and 1220; junior standing. Same as ANTH 5360.

**ANTH 4380-3. Lithic Analysis and Replication.** Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment, and functional analysis. Percussion and pressure-flaking experiments are performed. Prereq., ANTH 2200. Same as ANTH 5380.

**ANTH 4390-3. Research Methods in Archaeology I.** Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines. Prereq., ANTH 2200. Same as ANTH 5390.

**ANTH 4420-3. Archaeology of Ancient Egypt.** Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through the end of its history. Same as ANTH 5420.

**ANTH 4430-3. Biblical Archaeology.** Old Testament history in the light of archaeological investigation; the Old Testament within the framework of the literature of the ancient near East. Same as ANTH 5430.

**ANTH 4440-3. Egyptian Hieroglyphics 1.** Studies the ancient Egyptian language to shed light on the history and cultures of ancient Egypt. Involves reading and translating hieroglyphics into the English language. Same as ANTH 5440.

**ANTH 4450-3. Egypt after the Pharaohs.** Includes the history, religion, culture, and archaeology of the Egyptians after the Pharaohs during the Greco-Roman, Byzantine, and Arab Empires until modern times. Emphasizes the influence of the ancient Egyptians on culture. Different points of view of classical writers and modern scholars are explained and discussed in detail. Comparisons with modern culture of Egypt are made according to the different periods of the history of Egypt.

**ANTH 4500-3. Cross-Cultural Aspects of Socioeconomic Development.** Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development, and land reform. Same as ANTH 5500.

**ANTH 4510-3. Applied Cultural Anthropology.** Analysis of problems of cultural change due to contacts between people of different cultures. Same as ANTH 5510 and ETHN 4520.

**ANTH 4520-3. Symbolic Anthropology.** Explores anthropological approaches to the study of symbolic systems, including cosmology, myth, religion, ritual, and art, as well as everyday patterns of metaphor and the presentation of self. Theoretical issues include semiotics, psychoanalysis, structuralism, liminality, and critical theory. Prereq., ANTH 2100. Same as ANTH 5520. Approved for arts and sciences core curriculum: critical thinking.

**ANTH 4530-3. Theoretical Foundations of Sociocultural Anthropology.** Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, structuralism, postmodernism, and contemporary anthropological approaches. Includes primary readings and seminar-style discussion. Prereq., ANTH 2100 or instructor consent. Same as ANTH 5530.

**ANTH 4560-3. North American Indian Acculturation.** Comprehensive survey of changes in the native cultures of America north of Mexico caused by occupation of the continent by Old World populations, including a review of processes of contact, environmental changes, changes in major institutions, the nature of federal/state administration, the reservation system, and contemporary developments. Same as ANTH 5560 and AIST 4565. Approved for arts and sciences core curriculum: contemporary societies or cultural and gender diversity.

**ANTH 4570-3. Anthropology of Fishing.** Examines fishing methods, peoples, societies, and cultures, emphasizing anthropology's role in shaping fisheries management and development policy. Same as ANTH 5570.

**ANTH 4580-3. The Holocaust.** Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics, and consequences as well as other genocides of the 20th century, using an anthropological approach.

**ANTH 4600-3. Human Ecology: Cultural Aspects.** Examines the relationship between environment and human behavior, emphasizing social organization. Special attention given to examining the extent to which the environment influences subsistence strategies, settlement patterns, social relationships among different groups, and family structure.

**ANTH 4610-3. Medical Anthropology.** Cultural factors determine states of health and illness in both Western and non-Western societies. The transition from traditional to modern status creates new problems including population growth, aging, changing patterns of morbidity, mortality and health care, and new socioeconomic consequences. Same as ANTH 5610.

**ANTH 4630-3. Nomadic Peoples of East Africa.** Examines the issues of current concern in the study of East African pastoral peoples. The first half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies. Restricted to junior and senior ANTH majors. Same as ANTH 5630.

**ANTH 4650-3. The History and Theory of Ethnographic Film.** Explores the history and theory of ethnographic filmmaking. Students screen a broad range of anthropological films and related genres, analyzing them in terms of subject matter, anthropological methodology, and strategies of representation or evocation. Recommended prereq., ANTH 2100 or 1170. Same as ANTH 5650.

**ANTH 4660-3. Contemporary Innovations in Ethnographic Film and Transcultural Filmmaking.** Explores contemporary innovations in ethnographic film and transcultural filmmaking. Studies a broad range of recent nonfiction films and videos, each of which seeks to reveal various dimensions of culture, identity, and cultural change. Recommended prereqs., ANTH 2100 or ANTH 1170 and ANTH 4650/5650. Same as ANTH 5660.

**ANTH 4670-3. Ethnographic Film Production 1.** Create short ethnographic documentary on local topic of choice. The first half of a year-long sequence in ethnographic filmmaking. With instructor approval, students may complete a film in a single semester. Recommended prereqs., ANTH 2100 and ANTH 1170. Same as ANTH 5670.

**ANTH 4680-3. Ethnographic Film Production 2.** Complete short ethnographic documentary on local topic of choice. The second half of a year-long sequence course in ethnographic filmmaking. With instructor approval, students may enroll in this course alone and complete a film in a single semester. Recommended prereqs., ANTH 2100 or ANTH 1170. Same as ANTH 5680.

**ANTH 4710-3. Departmental Honors in Anthropology 1.** Course work built around theme of research design as a means of integrating previous training in the field of anthropology as well as providing an opportunity to perform creative scientific investigations.

**ANTH 4720-3. Departmental Honors in Anthropology 2.** Continuation of ANTH 4710. Prereq., ANTH 4710.

**ANTH 4740-3. Peoples and Cultures of Brazil.** Thematically surveys theoretical and ethnographic issues that have been important in understanding Brazil. Read and write critically about textual and visual representations of Brazil presented in the course. Prereq., ANTH 2100; three or more cultural anthropology courses recommended. Approved for arts and sciences core curriculum: critical thinking.

**ANTH 4750-3. Culture and Society in South Asia.** Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal, and Sri Lanka), including kinship, gender, marriage, caste system, reli-

gion and ritual, ethnic conflict, and social change. Prereq., ANTH 2100. Same as ANTH 5750.

**ANTH 4760-3. Ethnography of Southeast Asia and Indonesia.** Same as ANTH 5760.

**ANTH 4800-3. Language and Culture.** Same as LING 4800.

**ANTH 4840 (1-6). Independent Study.** For upper-division undergraduate students. May be repeated up to 6 total credit hours.

**ANTH 4910 (1-3). Teaching Anthropology.** Practicum by special arrangement only. Students learn to teach anthropology by serving as recitation leaders or tutors in introductory courses or as small group leaders in advanced courses. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ANTH 4930 (1-6). Anthropology Internship.** Provides academically supervised opportunities for junior and senior anthropology majors and graduate students to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning. May be repeated up to 9 total credit hours. Prereqs., ANTH 2010, 2100, and 2200, junior standing, anthropology major with a minimum 3.25 GPA, and departmental consent. Same as ANTH 5930.

**ANTH 5000-3. Quantitative Methods in Anthropology.** Same as ANTH 4000.

**ANTH 5020-3. Explorations in Anthropology.** Same as ANTH 4020.

**ANTH 5060-3. Nutrition and Anthropology.** Same as ANTH 4060.

**ANTH 5080-3. Anthropological Genetics.** Same as ANTH 4080.

**ANTH 5110-3. Human Evolutionary Biology.** Same as ANTH 4110.

**ANTH 5120-3. Advanced Physical Anthropology.** Same as ANTH 4120.

**ANTH 5129-3. Aegean Art and Archaeology.** Same as ANTH 4129, CLAS 5129, and ARTH 5129.

**ANTH 5130-3. Advanced Osteology.** Same as ANTH 4130.

**ANTH 5150-3. Human Ecology: Biological Aspects.** Same as ANTH 4150.

**ANTH 5170-3. Primate Evolutionary Biology.** Same as ANTH 4170.

**ANTH 5210-3. Southwestern Archaeology.** Same as ANTH 4210.

**ANTH 5220-3. Archaeology of Mexico and Central America.** Same as ANTH 4220.

**ANTH 5240-3. Geoarchaeology.** Same as ANTH 4240.

**ANTH 5270-3. Plains Archaeology.** Same as ANTH 4270.

**ANTH 5330-3. Human Ecology: Archaeological Aspects.** Same as ANTH 4330.

**ANTH 5340-3. Archaeological Method and Theory.** Provides an advanced historical introduction to archaeological theory and methods. Designed to help students understand why certain issues have been and are important to the development of archaeology, especially American archaeology. Explores issues within the context of the history of anthropology and American society as a whole.

**ANTH 5350 (2-6). Archaeological Field and Laboratory Research.** Same as ANTH 4350.

**ANTH 5360 (1-6). Field Methods in Primate Ecology.** Same as ANTH 4360.

**ANTH 5380-3. Lithic Analysis and Replication.** Same as ANTH 4380.

**ANTH 5390-3. Research Methods in Archaeology 1.** Same as ANTH 4390.

**ANTH 5400-3. Research Methods in Archaeology 2.** Focuses on the design of research including constructing empirical arguments and testing them, data gathering, site formation processes, field strategies (archival resources, mapping, field survey, surface collecting/recording, excavation and preliminary analysis) and artifact analysis as it relates to research design.

**ANTH 5420-3. Archaeology of Ancient Egypt.** Same as ANTH 4420.

**ANTH 5430-3. Biblical Archaeology.** Same as ANTH 4430.

**ANTH 5440-3. Egyptian Hieroglyphics 1.** Same as ANTH 4440.

**ANTH 5450-3. Archaeology and Contemporary Society.** Explores the intellectual climate in which archaeology is practiced and how it influences archaeological research and reconstructions of the past. Teaches archaeological laws and regulations and discusses ethical issues that surround the practice of archaeology today. Recommended prereq., ANTH 5770.

**ANTH 5500-3. Cross-Cultural Aspects of Socioeconomic Development.** Same as ANTH 4500.

**ANTH 5510-3. Applied Cultural Anthropology.** Same as ANTH 4510, ETHN 4520.

**ANTH 5520-3. Symbolic Anthropology.** Same as ANTH 4520.

**ANTH 5530-3. Theoretical Foundations of Sociocultural Anthropology.** Same as ANTH 4530.

**ANTH 5560-3. North American Indian Acculturation.** Same as ANTH 4560, AIST 4565.

**ANTH 5570-3. Anthropology of Fishing.** Same as ANTH 4570.

**ANTH 5600-3. Human Ecology: Cultural Aspects.** Reviews and critically examines the major theoretical perspectives for understanding the relationship between human social behavior and the environment developed in the social sciences, especially anthropology, over the last 100 years.

**ANTH 5610-3. Medical Anthropology.** Same as ANTH 4610.

**ANTH 5630-3. Nomadic Peoples of East Africa.** Same as ANTH 4630.

**ANTH 5650-3. The History and Theory of Ethnographic Film.** Same as ANTH 4650.

**ANTH 5660-3. Contemporary Innovations in Ethnographic Film and Transcultural Filmmaking.** Same as ANTH 4660.

**ANTH 5670-3. Ethnographic Film Production 1.** Same as ANTH 4670.

**ANTH 5680-3. Ethnographic Film Production 2.** Same as ANTH 4680.

**ANTH 5750-3. Culture and Society in South Asia.** Same as ANTH 4750.

**ANTH 5760-3. Ethnography of Southeast Asia and Indonesia.** Same as ANTH 4760.

**ANTH 5770-3. Core Course—Archaeology.** Provides a graduate-level overview of analytic issues relevant to all phases of archaeological research and of the diversity of theoretical perspectives within the field as a whole. Course is required for all first-year graduate students in anthropology. Prereq., graduate status in anthropology.

**ANTH 5780-3. Core Course—Cultural Anthropology.** Provides an intense, graduate-level introduction to the discipline of cultural anthropology, with an emphasis upon critically assessing those methods, theories, and works that have shaped the field from the 19th century to the present time. Prereq., graduate status in anthropology or instructor consent.

**ANTH 5790-3. Core Course—Biological Anthropology.** Discusses how biological anthropologists use evidence and concepts from evolutionary theory, human biology, and ecology to understand the evolution, diversification, and adaptation of human populations. Required of all first-year graduate students in anthropology. Prereq., graduate status in anthropology.

**ANTH 5840 (1-6). Guided Study.** Directed individual research based on a specific area of specialization. May be repeated up to 6 total credit hours.

**ANTH 5930 (1-6). Anthropology Internship.** Same as ANTH 4930.

**ANTH 6940-3. Candidate for Degree.**

**ANTH 6950 (1-6). Master's Thesis.**

**ANTH 7000-3. Seminar: Current Research Topics.** Discusses current research and theoretical issues in the field of cultural anthropology. May be repeated up to 6 total credit hours.

**ANTH 7010-3. Seminar: Contemporary Theory in Cultural Anthropology.** Addresses current theoretical perspectives in cultural anthropology and controversies surrounding them. Discusses science, history, interpretation, and postmodernism. Includes the relationship between theory and method as well as the production of ethnography. May be repeated up to 9 total credit hours.

**ANTH 7020-3. Seminar: Physical Anthropology.** In-depth discussion of selected topics in physical anthropology with emphasis on recent research. May be repeated up to 6 total credit hours.

**ANTH 7030-3. Seminar: Archaeology.** Intensive examination of selected theoretical or methodological topics in archaeology. Topics vary with current research emphasis. May be repeated up to 6 total credit hours.

**ANTH 7040-3. Seminar: Anthropological Linguistics.** Examines the manner in which language is involved in power relations, gender roles, ethnic identity, and culture in the world's societies. Also examines the relationship to cognition with the search for a universal human grammar. May be repeated up to 6 total credit hours.

**ANTH 7140-3. Seminar: Archaeology of Selected Areas.** Considers archaeology of a specified area, either geographical or topical. Areas selected in accordance with current research interests. May be repeated up to 9 total credit hours.

**ANTH 7300-3. Seminar: Research Methods in Cultural Anthropology.** May be repeated up to 6 total credit hours.

**ANTH 7400-3. Nation/Culture/Citizen.** Explores the nature of ethnic conflict, nationalism, and cultural citizenship in different geographical/regional contexts. Also explores the way anthropologists have shifted from the theoretical study of homogeneous communities to transnational ones. Prereq., graduate standing with a defined regional/geographical interest.

**ANTH 7620-3. Seminar: Ethnography and Cultural Theory.** Explores how ethnographic writing has evolved over the past century to incorporate different forms of cross-cultural representation and to accommodate new theoretical paradigms. Includes ethnographic authority and reflexivity, as well as embedded theories and blurred genres of cultural research.

**ANTH 7840 (1-6). Independent Research.** Research aimed at developing a solution to an originally conceived research problem. May be repeated up to 6 total credit hours.

**ANTH 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Applied Mathematics

**APPM 1350-4. Calculus 1 for Engineers.** Topics in analytical geometry and calculus including limits, rates of change of functions, derivatives and integrals of algebraic and transcendental functions, applications of differentiations and integration. Prereqs., 2 years high school algebra, 1 year geometry, and 1/2 year trigonometry; or approval by faculty advisor. Students with credit in APPM 1350 may not receive credit for MATH 1080, 1081, 1090, 1100, 1300, 1310, or ECON 1088. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**APPM 1360-4. Calculus 2 for Engineers.** Continuation of APPM 1350. Focuses on applications of the definite integral, methods of integration, improper integrals, Taylor's theorem, and infinite series. Students may not receive credit for both APPM 1360 and MATH 2300. Prereq., APPM 1350 or MATH 1300, with a grade of C- or better.

**APPM 2350-4. Calculus 3 for Engineers.** Covers multivariable calculus, vector analysis, and theorems of Gauss, Green, and Stokes. Students may not receive credit for APPM 2350 and MATH 2400, or APPM 2350 and MATH 2420. Prereq., APPM 1360 or MATH 2300, with a grade of C- or better.

**APPM 2360-4. Introduction to Differential Equations with Linear Algebra.** Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, and systems of linear differential equations. No credit for APPM 2360 will be awarded to students already having credit in both MATH 3130 and 4430, both APPM 3310 and MATH 4430, or APPM 2380. Prereq., APPM 1360 or MATH 2300, with a grade of C- or better.

**APPM 2380-4. Introduction to Ordinary Differential Equations.** Studies basic concepts of ordinary differential equations and solutions of first order, linear, and systems of differential equations. Advanced topics include series solutions and boundary value problems. Also studies numerical techniques with some laboratory experience. Prereq., APPM 2350 or MATH 2400, with a grade of C- or better. Students may not receive credit for both APPM 2360 and 2380.

**APPM 2450-1. Calculus 3 Computer Lab.** Selected topics in analytic geometry and calculus with a focus on symbolic computation using Mathematica or Matlab. Coreq., APPM 2350.

**APPM 2460-1. Differential Equations Computer Lab.** Selected topics in differential equations and linear algebra with a focus on symbolic computation using Mathematica or Matlab. Coreq., APPM 2360.

**APPM 2480-1. Ordinary Differential Equations: Computer Lab.** Selected topics in differential equations with a focus on symbolic computation using Mathematica or Matlab. Coreq., APPM 2380.

**APPM 2710-3. Java I Training and Mathematical Algorithms.** Preparatory course for Java programming. Provides necessary background for Java lan-

guage: basic object-oriented concepts, analysis, and design. Introduces Java programming language constructs in the context of mathematical algorithms from Calculus 1 and 2. Prereqs., APPM 1350 and some programming experience. Recommended coreq., APPM 1360.

**APPM 2750-4. Java 2 Training and Mathematical Algorithms.** Designed for students familiar with object-oriented concepts. Learn to create Java applets and applications, create graphics context, identify the key features of Java foundation classes as well as other Java-related technology. Material is taught in the context of mathematical algorithms from calculus. Prereq., understanding of object-oriented principles, CALC 1, and concurrent enrollment in CALC 2. Recommended prereq., programming language such as C or C++.

**APPM 3010-3. An Introduction to Nonlinear Systems: Chaos.** Both majors and minors in the physical sciences are introduced to classes of tools useful in the analysis of nonlinear systems. Prereqs., APPM 1360 and 2360.

**APPM 3050-3. Scientific Computing in Matlab.** Topics covered include: approximations in computing, computer arithmetic, interpolation, matrix computations, nonlinear equations, optimization, and initial-value problems with emphasis on the computational cost, efficiency, and accuracy of algorithms. The problem sets are application-oriented with examples taken from orbital mechanics, physics, genetics, and fluid dynamics. Prereqs., APPM 1360 and 2360.

**APPM 3170-3. Discrete Applied Mathematics.** Emphasizes selected applications of graph theory to computer science, engineering, operations research, social sciences, and biology. Topics include the basic properties of graphs and diagrams, and their matrix representations. Relates graph properties to applications such as scheduling, architecture of parallel processors, gray codes, traveling salesman problems, and assignment problems. Prereq or coreq., APPM 3310.

**APPM 3310-3. Matrix Methods and Applications.** Introduces linear algebra and matrices, with an emphasis on applications, including methods to solve systems of linear algebraic and linear ordinary differential equations. Discusses computational algorithms that implement these methods. Some applications in operations research may be included as time permits. Students may not receive credit for both APPM 3310 and MATH 3130. Prereq., APPM 2350. Similar to MATH 3130.

**APPM 3570-3. Applied Probability.** Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, moment generating functions, law of large numbers, central limit theorem, Poisson process, and multivariate Gaussian distribution. Prereq., APPM 2350 or MATH 2400. Students may not receive credit for both APPM 3570 and either ECEN 3810 or MATH 4510.

**APPM 4120-3. Introduction to Operations Research.** Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits. Prereqs., APPM 3310 or MATH 3130. Same as APPM 5120 and MATH 4120.

**APPM 4350-3. Methods in Applied Mathematics: Fourier Series and Boundary Value Problems.** Reviews ordinary differential equations, including solutions by Fourier series. Physical derivation of the classical linear partial differential equations (heat, wave, and Laplace equations). Solution of these equations via separation of variables, with Fourier series, Fourier integrals, and more general eigenfunction expansions. Prereqs., APPM 2350, and 2360 or 2380 with a minimum grade of C-. Coreq., APPM 3310. Same as APPM 5350.

**APPM 4360-3. Methods in Applied Mathematics: Complex Variables and Applications.** Introduces methods of complex variables, contour integration, and theory of residues. Applies solving partial differential equations by transform methods, Fourier and Laplace transforms, and Reimann-Hilbert boundary-value problems. Also applies conformal mapping to ideal fluid flow and/or electrostatics. Prereqs., APPM 2350 and 2360, or 3310 with a minimum grade of C-, or instructor consent. Same as APPM 5360.

**APPM 4380-3. Modeling in Applied Mathematics.** An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics can vary: GPS navigation, medical imaging, ocean waves, computerized facial recognition. Prereqs., APPM 2350 and 2360. Recommended prereqs., APPM 3310, 4350 and 4650. Same as APPM 5380.

**APPM 4520-3. Introduction to Mathematical Statistics.** Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness; tests of simple and composite hypotheses, linear models,

and multiple regression analysis. Analyzes variance distribution-free methods. Prereq., MATH 4510 or APPM 3570. Same as APPM 5520 and MATH 4520.

**APPM 4540-3. Introduction to Time Series.** Single and multivariable regression, forecasting using regression models, time series models, and modeling with MA, AR, ARMA, and ARIMA models, forecasting with time series models, and spectral analysis. Prereqs., APPM 3570 or MATH 4510, and APPM 4520 or MATH 4520. Same as APPM 5540, MATH 4540.

**APPM 4560-3. Markov Processes, Queues, and Monte Carlo Simulations.** Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time. Queuing theory, terminology, and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study. Prereq., APPM 3570 or equivalent. Same as APPM 5560.

**APPM 4570-3. Statistical Methods.** Covers discrete and continuous probability laws, random variables; expectations; laws of large numbers and central limit theorem; estimation, testing hypothesis, analysis of variance, regression analysis, and nonparametric methods. Emphasizes applications with an introduction to packaged computer programs. Prereq., APPM 1360 or equivalent Calculus 2 course. Same as APPM 5570.

**APPM 4580-3. Statistical Applications: Software and Methods.** Combines statistical methods with practical applications and computer software. Develops commonly used statistical models such as analysis of variance as well as linear and logistic regression. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software. Prereq., APPM 4570 or any course in statistics. Same as APPM 5570.

**APPM 4650-3. Intermediate Numerical Analysis 1.** Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Prereqs., APPM 3310 or MATH 3130, and knowledge of a programming language. Same as MATH 4650.

**APPM 4660-3. Intermediate Numerical Analysis 2.** Continuation of APPM 4650. Examines numerical solution of initial-value problems and two-point, boundary-value problems for ordinary differential equations. Also looks at numerical methods for solving partial differential equations. Prereq., APPM 4650 and knowledge of a programming language. Same as MATH 4660.

**APPM 4720-3. Open Topics in Applied Mathematics.** Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Prereqs., APPM 4350, 4360, 4650, and 4660 or equivalent, or instructor consent. Same as APPM 5720.

**APPM 4840 (1-3). Reading and Research in Applied Mathematics.** Introduces undergraduate students to the research foci of the Department of Applied Mathematics. May be repeated up to 9 total credit hours. Prereq., APPM 3310 or MATH 3130. Recommended prereq., a course in ordinary or partial differential equations.

**APPM 4950 (1-3). Seminar in Applied Mathematics.** Introduces undergraduate students to the research foci of the program in applied mathematics. It is also designed to be a capstone experience for the program's majors. Prereq., APPM 3310 or MATH 3130. Recommended prereq., course in ordinary or partial differential equations. Similar to APPM 4955.

**APPM 5040 (1-2). Calculus Applications for High School Teachers.** A fast-paced, intensive calculus course designed for high school mathematics teachers. Provides a deeper understanding of fundamental calculus concepts and an introduction to technological tools, including computer software used in the analysis of real-world problems. Offered through Continuing Education only. Prereqs., APPM 1350 and 1360. Recommended prereqs., APPM 2350 and 2360.

**APPM 5050 (1-2). Discrete Math for K-12 Teachers.** An intensive study of selected topics in discrete math, including Boolean algebra, inductive proofs, discrete probability, election theory and fair division, graph theory, and recursion. Focus on applications and technological tools to increase understanding. Offered through Continuing Education only. Prereq., one undergrad probability course. Recommended prereq., APPM 3310 or MATH 3130.

**APPM 5070 (1-2). Applied Statistics for High School Teachers.** A fast-paced, intensive course in statistics designed for high school mathematics teachers. Covers selected topics from probability and statistics, including random variables, central limit theorem, sampling design, regression, and interference.

Uses technological tools, including Minitab and SPSS, to analyze real-world statistical problems. Offered through Continuing Education only. Prereq., undergraduate course in probability and statistics.

**APPM 5120-3. Introduction to Operations Research.** Same as APPM 4120 and MATH 5120.

**APPM 5350-3. Methods in Applied Mathematics: Fourier Series and Boundary Value Problems.** Same as APPM 4350.

**APPM 5360-3. Methods in Applied Mathematics: Complex Variables and Applications.** Prereq., graduate status in engineering or arts and sciences, or instructor consent. Same as APPM 4360.

**APPM 5380-3. Modeling in Applied Mathematics.** Same as APPM 4380.

**APPM 5430-3. Methods in Applied Mathematics: Applications of Complex Variables.** Reviews basic ideas of complex analysis, including solutions of ODEs and PDEs of physical interest via complex analysis; conformal mapping, including Schwarz-Christoffel transformations and generalizations; computational methods; Riemann-Hilbert problems; and topics in asymptotic methods. Prereq., APPM 4360 or 5360, or instructor consent.

**APPM 5440-3. Applied Analysis 1.** Discusses the elements of basic real and complex analysis, Banach spaces, LP spaces, and many relevant inequalities. Includes applications of existence and uniqueness of solutions to various types of ordinary differential equations, partial differential equations, and integral equations. Prereqs., MATH 4310 and 4320, or equivalent; MATH 3130 or equivalent; or instructor consent.

**APPM 5450-3. Applied Analysis 2.** Continuation of APPM 5440. Prereq., APPM 5440 or instructor consent.

**APPM 5460-3. Methods in Applied Mathematics: Dynamical Systems and Differential Equations and Chaos.** Introduces the theory and applications of dynamical systems through solutions to differential equations. Covers existence and uniqueness theory, local stability properties, qualitative analysis, global phase portraits, perturbation theory, and bifurcation theory. Special topics may include Melnikov methods, averaging methods, bifurcations to chaos, and Hamiltonian systems. Prereqs., undergraduate courses equivalent to APPM 2360, 3310, and MATH 4310.

**APPM 5470-3. Methods of Applied Mathematics: Partial Differential and Integral Equations.** Studies properties and solutions of partial differential equations. Covers methods of characteristics for partial differential equations, well-posed problems, main results for the well-known equations, Green's functions, and related integral equations. Prereqs., APPM 4350 and 4360, or MATH 4430, or equivalent. Same as MATH 5470.

**APPM 5480-3. Methods of Applied Mathematics: Approximation Methods.** Covers asymptotic evaluation of integrals (stationary phase and steepest descent), perturbation methods (regular and singular methods, and inner and outer expansions), multiple scale methods, and applications to differential and integral equations. Prereq., APPM 5470 or instructor consent.

**APPM 5520-3. Introduction to Mathematical Statistics.** Same as APPM 4520 and MATH 5520.

**APPM 5540-3. Introduction to Time Series.** Same as APPM 4540 and MATH 5540.

**APPM 5560-3. Markov Processes, Queues, and Monte Carlo Simulations.** Same as APPM 4560.

**APPM 5570-3. Statistical Methods.** Same as APPM 4570.

**APPM 5580-3. Statistical Applications: Software and Methods.** Prereq., one semester of statistics. Same as APPM 4580.

**APPM 5600-3. Numerical Analysis 1.** Solution of nonlinear algebraic equations, interpolation, approximation theory, and numerical integration. Prereqs., APPM 3310 or MATH 3130, and experience with a scientific programming language. Same as MATH 5600.

**APPM 5610-3. Numerical Analysis 2.** Solution of linear systems, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Prereq., APPM 5600 or MATH 5600. Same as MATH 5610.

**APPM 5720-3. Open Topics in Applied Mathematics.** Same as APPM 4720.

**APPM 6520-3. Mathematical Statistics.** Emphasizes mathematical theory of statistics. Topics include distribution theory, estimation and testing of hypotheses, multivariate analysis, and nonparametric inference, all with emphasis on theory. Prereq., APPM 5520 or MATH 5520. Same as MATH 6520.

**APPM 6540-3. Time Series Analysis.** Focuses on basic properties, linear extrapolation, and filtering of stationary random functions. Also looks at spectral and cross-spectral analysis, estimation of the power spectrum using computers, nonstationary time series, and comparison of various computer programs. Prereq., MATH 4510 or APPM 4560 or instructor consent. Same as MATH 6540.

**APPM 6550-3. Introduction to Stochastic Processes.** Systematic study of Markov chains and some of the simpler Markov processes including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Prereqs., MATH 4310, MATH 4510 or APPM 3570, or APPM 4560, or instructor consent. Same as MATH 6550.

**APPM 6610-3. Introduction to Numerical Partial Differential Equations.** Covers finite difference, finite element, finite volume, pseudo-spectral, and spectral methods for elliptic, parabolic, and hyperbolic partial differential equations. Prereq., APPM 5600. Recommended prereq., APPM 5610 or graduate numerical linear algebra.

**APPM 6620-3. Numerical Computation in Applied Mathematics 1.** Advanced topics in the numerical solution of ordinary and partial differential equations, initial and boundary value problems, and stability and convergence of difference schemes. Prereq., APPM 4650, MATH 4650, or instructor consent.

**APPM 6630-3. Numerical Computation in Applied Mathematics 2.** Continuation of APPM 6620. Prereq., APPM 6620 or instructor consent.

**APPM 6900 (1-3). Independent Study.** Introduces graduate students to research focuses of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 6950 (1-6). Master's Thesis.** May be repeated up to 12 total credit hours.

**APPM 7100-3. Mathematical Methods in Dynamical Systems.** Covers dynamical systems defined by mappings and differential equations. Hamiltonian mechanics, action-angle variables, results from KAM and bifurcation theory, phase plane analysis, Melnikov theory, strange attractors, chaos, etc. Prereq., APPM 5460.

**APPM 7300-3. Nonlinear Waves and Integrable Equations.** Includes basic results associated with linear dispersive wave systems, first-order nonlinear wave equations, nonlinear dispersive wave equations, solitons, and the methods of the inverse scattering transform. Prereqs., APPM 5470–5480, PHYS 5210, or instructor consent.

**APPM 7400 (1-3). Topics in Applied Mathematics.** Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the core courses in applied mathematics. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**APPM 7900 (1-3). Reading and Research in Applied Mathematics.** Introduces graduate students to research focuses of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 8000-1. Colloquium in Applied Mathematics.** Introduces graduate students to the research focuses of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 8100-1. Seminar in Dynamical Systems.** Introduces advanced topics and research in dynamical systems. Prereq., instructor consent.

**APPM 8600-3. Seminar in Computational Mathematics.** Introduces advanced topics and research in computational mathematics. Prereq., instructor consent.

**APPM 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. No more than 10 credit hours may be taken in any one semester.

## Arabic

*See East Asian Languages and Civilizations.*

## Art and Art History

### Foundations

**ARTS 1010-3. Introduction to Studio Art.** Presents creative activity conceptually, and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Fine arts majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development. Formerly FINE 1010.

**ARTS 1030-3. Principles of Color.** Introduces the relative effects of color as used by the artist. Emphasizes the practice of color relations including basic characteristics, mixtures, illusions, optical mixture, color intervals, and color quantity. May not be repeated. Formerly FINE 1030.

**ARTS 4540-3. Generative Art.** Interdisciplinary studio course for artists, scientists, humanists, and anyone interested in creating works of visual art according to step by step procedures as in musical compositions, mathematical formulae, linguistic rules, computer programs, etc. Includes collaborative and individual projects. May be repeated up to 6 total credit hours. Same as ARTS 5540. Formerly FINE 4540.

**ARTS 5540-3. Generative Art.** Same as ARTS 4540. Formerly FINE 5540.

## Photography

**ARTS 1171-3. Photography 1.** Introduces techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends. Students must have an adjustable camera. Prereqs., ARTS 1010, and ARTH 1300 or 1400. Formerly FINE 1171.

**ARTS 2191-3. Photography 2.** Explores more sophisticated technical and conceptual skills to the creative process. Prereq., ARTS 1171. Formerly FINE 2191.

**ARTS 3191-3. Photography 3.** Continues the exploration of the possibility of individual photographic expression. Students are encouraged to discover and develop a personal position in relation to the medium. May be repeated once. Prereq., ARTS 2191. Formerly FINE 3191.

**ARTS 3841 (1-3). Undergraduate Independent Study—Photography.** Reserved only for special projects in photography, not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3191 or 4161. Requires a detailed proposal, instructor's signature, and departmental approval. Formerly FINE 3841.

**ARTS 4161-3. Photography 4.** Explores advanced techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends. May be repeated up to 12 total credit hours. Prereq., ARTS 3919. Formerly FINE 4161.

**ARTS 4171-3. New Directions in Photography.** Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester. May be repeated twice. Prereq., ARTS 3191 or equivalent. Same as ARTS 5171. Formerly FINE 4171.

**ARTS 5161-3. Graduate Photography.** May be repeated up to 18 total credit hours. Formerly FINE 5161.

**ARTS 5171-3. New Directions in Photography.** May be repeated up 9 total credit hours. Same as ARTS 4171. Formerly FINE 5171.

**ARTS 5901 (1-3). Graduate Independent Study—Photography.** May be repeated up to 6 total credit hours. Formerly FINE 5901.

## Painting/Drawing

**ARTS 1012-3. Drawing 1.** Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated. Prereqs., ARTS 1010 and either ARTH 1300 or 1400. Formerly FINE 1012.

**ARTS 1212-3. Painting 1.** Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. May not be repeated. Prereqs., ARTS 1010, and ARTH 1300 or 1400. Formerly FINE 1212.

**ARTS 2002-3. Drawing 2.** Continuation of Drawing 1. Offers more sophisticated technical and conceptual understanding of content and form. Introduces the expectation of creative expression. Prereq., ARTS 1012. Formerly FINE 2002.

**ARTS 2202-3. Painting 2.** Continuation of Painting 1. Offers more sophisticated technical and conceptual understanding of content and form. Introduces the expectation of creative expression. Prereq., ARTS 1212. Formerly FINE 2202.

**ARTS 3002-3. Drawing 3.** Continuation of Drawing 2. Offers creative possibilities in drawing and related media. Emphasizes experimentation and individual expression. Content varies by semester according to instructor; contact indi-



vidual instructor for more information. May be repeated once. Prereq., FINE 2002. Formerly FINE 3002.

**ARTS 3202-3. Painting 3.** Continuation of Painting 2. Offers creative possibilities in painting and related media. Emphasizes experimentation and individual expression. Content varies by semester according to instructor; contact individual instructor for more information. May be repeated once. Prereq., ARTS 2202. Formerly FINE 3202.

**ARTS 3702-3. Special Focus in Painting and Drawing.** Offers varied focus and special topics in painting, drawing, and related media to explore specialized directions and creative possibilities. Emphasizes experimentation. Content varies by semester; contact individual instructor for more information. May be repeated up to 6 total credit hours. Prereq., ARTS 2002 or 2202. Recommended prereq., ARTS 3002 or 3202. Formerly FINE 3702.

**ARTS 3842 (1-3). Undergraduate Independent Study—Painting.** Reserved for special projects in painting not offered in the curriculum. May be repeated up to 6 total credit hours. Prereqs., ARTS 3202 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval. Formerly FINE 3842.

**ARTS 3852 (1-3). Undergraduate Independent Study—Drawing.** Reserved for special projects in drawing not offered in the curriculum. May be repeated up to 6 total credit hours. Prereqs., ARTS 3002 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval. Formerly FINE 3852.

**ARTS 4002-3. Drawing 4.** Continuation of Drawing 3. Advanced studio class in drawing for creative expression and individual portfolio development. Emphasis varies by semester; contact individual instructor for more information. May be repeated up to 12 total credit hours. Prereq., ARTS 3002. Formerly FINE 4002.

**ARTS 4202-3. Painting 4.** Continuation of Painting 3. Advanced studio class in painting for creative expression and individual portfolio development. Emphasis varies by semester; contact individual instructor for more information. May be repeated up to 12 total credit hours. Prereq., ARTS 3202. Formerly FINE 4202.

**ARTS 5202-3. Graduate Painting.** May be repeated up to 18 total credit hours. Formerly FINE 5202.

**ARTS 5852 (1-3). Graduate Independent Study—Painting.** May be repeated up to 6 total credit hours. Formerly FINE 5852.

## Printmaking

**ARTS 1003-3. Printmaking Survey.** Emphasizes processes involved with both nonmultiple and multiple methods, including but not limited to metal plate etching (intaglio), lithography, collagraph, woodcut, linoleum cut, Xerox transfer, and monotype. Places equal emphases on developing drawing skills and understanding design principles. Formerly FINE 1003.

**ARTS 3403-3. Intaglio and Relief 1.** Introduces the study and experimentation of intaglio and relief processes in black and white, color, and possible photo imagery. May be repeated once. Not available for freshmen. Taught with ARTS 4403/5403. Formerly FINE 3403.

**ARTS 3413-3. Lithography 1.** Introduces the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. May be repeated once. Not available to freshmen. Taught with ARTS 4413/5413. Formerly FINE 3413.

**ARTS 3423-3. Screen Printing 1.** Introduces the study of silkscreen techniques, emphasizing creativity, individual development, and experimentation in contemporary silkscreen processes. May be repeated once. Not available to freshmen. Formerly FINE 3423.

**ARTS 3843 (1-3). Undergraduate Independent Study—Printmaking.** Reserved for special projects in printmaking not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., level 1 in a related area. Requires a detailed proposal, instructor's sponsorship, and departmental approval. Formerly FINE 3843.

**ARTS 4403-3. Intaglio and Relief 2.** Continues the study and experimentation of intaglio and relief processes in black and white, color, digital imagery, and nontoxic processes as much as possible. May be repeated up to 12 total credit hours. Prereq., ARTS 3403. Taught with ARTS 3403/5403. Formerly FINE 4403.

**ARTS 4413-3. Lithography 2.** Continues the study of stone and metal plate lithography, emphasizing individual creative development in black and white,

and further development in color printing processes. In addition, digital imaging and nontoxic processes are emphasized as much as possible. May be repeated up to 12 total credit hours. Prereq., ARTS 3413. Taught with ARTS 3413/5413. Formerly FINE 4413.

**ARTS 4423-3. Screen Printing 2.** Introduces advanced screen printing technology, emphasizing individual creativity and the ability to resolve problems of two-dimensional form. May be repeated up to 12 total credit hours. Prereq., ARTS 3423. Formerly FINE 4423.

**ARTS 4433-3. Alternative Printmaking (Non-Toxic).** Introduces computer-generated imaging and developing ideas as related to traditional forms of Printmaking. Emphasizes original development of ideas and skills involved in learning advanced printing processes in Lithography and Intaglio media. May be repeated up to 12 total credit hours. Same as ARTS 5433. Formerly FINE 4433.

**ARTS 4443-3. Papermaking.** Papermaking is the study of plant fibers and cellulose structure relating to the making of paper pulp as an art medium. Emphasizes creative use of the paper pulp as related to two- and three-dimension form. May be repeated up to 6 total credit hours. Same as ARTS 5443. Formerly FINE 4443.

**ARTS 4453-3. Monotype Printing.** Monotype printing is unique and diverse in its methods of producing art. The process uses some of the best qualities of painting, print making, and drawing. Emphasizes creative individual development, along with processes inherent to this media. May be repeated once. Same as ARTS 5453. Formerly FINE 4453.

**ARTS 5403-3. Graduate Intaglio and Relief.** May be repeated up to 18 total credit hours. Formerly FINE 5403.

**ARTS 5413-3. Graduate Lithography.** May be repeated up to 18 total credit hours. Taught with ARTS 3413/4413. Formerly FINE 5413.

**ARTS 5423-3. Graduate Screen Printing.** May be repeated up to 18 total credit hours. Formerly FINE 5423.

**ARTS 5433-3. Alternative Printmaking (Non-Toxic).** Same as ARTS 4433. Formerly FINE 5433.

**ARTS 5443-3. Graduate Papermaking.** Same as ARTS 4443. Formerly FINE 5443.

**ARTS 5453-3. Monotype Printing.** Same as ARTS 4453. Formerly FINE 5453.

**ARTS 5843 (1-3). Graduate Independent Study—Printmaking.** May be repeated up to 6 total credit hours. Formerly FINE 5843.

## Sculpture

**ARTS 1514-3. Sculpture 1.** Offers an orientation involving three-dimensional form and application. Studies expressive problems based on non-objective form relationships in various sculptural materials. May not be repeated. Prereqs., ARTH 1010, and ARTH 1300 or 1400. Formerly FINE 1514.

**ARTS 2504-3. Sculpture 2: Materials and Techniques.** Explores a variety of materials, methods, and techniques and their application with reference to contemporary sculpture, i.e., moldmaking, welding, casting, vacuforming, photo techniques, and woodworking. Prereq., ARTS 1514. Formerly FINE 2504.

**ARTS 2524-3. Sculpture 2: Visual Thinking in Three-Dimensional Form.** Explores ideas concerning the structure and nature of visual thinking and their relationship to the creative thought process. Also investigates form in terms of the organizing principles of three-dimensional design and its application to contemporary sculpture. Includes lecture and studio projects. May be repeated up to 6 total credit hours. Prereq., ARTS 1514. Formerly FINE 2524.

**ARTS 3504-3. Sculpture 3: Experiments 1.** Explores materials, methods, and techniques through a series of assignments emphasizing individual ideas and their relationship to contemporary aesthetics. Prereqs., ARTS 2504 and 2524. Formerly FINE 3504.

**ARTS 3514-3. Sculpture 3: Experiments 2.** Explores individual concepts and ideas and their relationship to contemporary issues and aesthetics. A series of assignments are worked out with the instructor based on individual interest. Prereq., ARTS 3504. Formerly FINE 3514.

**ARTS 3844 (1-3). Undergraduate Independent Study—Sculpture.** Reserved for special projects in sculpture not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3504 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval. Formerly FINE 3844.

**ARTS 4104-3. Performance/Installation.** Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration, and may also take on the visual linguistic form of solo performer or of a multimedia presentation. Prereqs., ARTS 1010, and ARTH 1300 or 1400. May be repeated up to 6 total credit hours with instructor consent. Same as ARTS 5104. Formerly FINE 4104.

**ARTS 4504-3. Sculpture 4.** Individual studies in selected media. May be repeated up to 6 total credit hours. Prereqs., ARTS 3504 and 3514. Formerly FINE 4504.

**ARTS 5104-3. Performance/Installation.** May be repeated up to 6 total credit hours with instructor consent. Same as ARTS 4104. Formerly FINE 5104.

**ARTS 5504-3. Graduate Sculpture.** Formerly FINE 5504. May be repeated for a total of 18 credit hours.

**ARTS 5844 (1-3). Graduate Independent Study—Sculpture.** May be repeated up to 6 total credit hours. Formerly FINE 5844.

## Ceramics

**ARTS 1875-3. Ceramics 1: Survey.** Encompasses broad and fundamental uses of clay. Basic instruction and demonstration of throwing, hand building, and primitive clay forming methods. Investigates utility, function, and ceramics in the broader context of contemporary art. Slide presentations explore historical and contemporary attitudes involving ceramics. For nonart and art majors. Formerly FINE 1875.

**ARTS 2085-3. Ceramics 2: Handbuilding.** Introduces techniques of hand-built clay forms as they relate to function and nonfunction. Various clay techniques, glazing, and firing procedures are explored. Emphasizes ceramics in the broader context of contemporary art. May not be repeated. Prereqs., ARTS 1010, and ARTH 1300 or 1400. Formerly FINE 2085.

**ARTS 2095-3. Ceramics 2: Wheelthrowing.** Introduces techniques of wheel-thrown forms as they relate to function and nonfunction. Explores various glazing and firing methods. May not be repeated. Prereqs., ARTS 1010, or ARTH 1300 or 1400. Previously FINE 2095.

**ARTS 3085-3. Ceramics 3.** Deals with further exploration of techniques approached in ARTH 2085 and 2095. Students are encouraged to develop personal concentration in relation to medium. May be repeated once. Prereqs., ARTS 2085, 2095. Formerly FINE 3085.

**ARTS 3845 (1-3). Undergraduate Independent Study—Ceramics.** Reserved for special projects in ceramics not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3085 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval. Formerly FINE 3845.

**ARTS 4085-3. Ceramics 4.** Includes lectures, research, and experimentation in clay (wheel and hand construction techniques). May be repeated up to 12 total credit hours. Prereq., ARTS 3085. Formerly FINE 4085.

**ARTS 4095-3. Special Topics in Ceramics.** Designed for students majoring in ceramics. May be repeated up to 9 total credit hours. Prereq., ARTS 3085. Formerly FINE 4095.

**ARTS 5075-3. Graduate Ceramics.** Formerly FINE 5075. May be repeated for a total of 18 credit hours.

**ARTS 5095-3. Graduate Special Topics in Ceramics.** Taught with ARTS 4095. Formerly FINE 5095.

## Media Arts

**ARTS 2126-3. Digital Art 1.** An introductory course in the use of the personal computer to create and process images in the visual arts. Restricted to majors. Prereqs., ARTS 1010, or ARTH 1300 or 1400. Formerly FINE 2126.

**ARTS 3196-3. Digital Photography I.** Introduces techniques, software, and related concepts of digital photography as art. Emphasizes digital photography as a means to formal and expressive ends. Prereq., ARTS 1171. Formerly FINE 3196.

**ARTS 3236-3. Electronic Arts Survey.** Explores the development of video as an art form through tape screenings, readings, lectures, and discussions. Prereq. website for further studies in video production. Formerly FINE 3236.

**ARTS 3906 (1-3). Undergraduate Independent Study—Video.** Formerly FINE 3906.

**ARTS 4126-3. Digital Art 2.** Offers studio experience using personal computer in the generation and processing of imagery in the visual arts. Prereq., ARTS 2126. Same as ARTS 5126. Formerly FINE 4126.

**ARTS 4176-3. New Directions in Digital Art.** Investigates the use of digital art in various contexts including digital narrative, web publishing, Internet art, multimedia performance, animation, conceptual art, information art, sound art, language art, and network installations. Prereqs., ARTS 2126 and 4316/5316 or instructor consent. Same as ARTS 5176. Formerly FINE 4176.

**ARTS 4196-3. Advanced Digital Photography.** Offers an in-depth exploration of digital imaging in the context of the history, aesthetics, and tradition of photography as contemporary art. Emphasis is on digital manipulation, output, and individual growth and development. Prereq., ARTS 2191 or advanced standing in photography or media arts. Same as ARTS 5196. Formerly FINE 4196.

**ARTS 4226-3. Advanced Computer Imaging.** Explores advanced techniques and concepts of digital image-making. Emphasizes the creative application of computer imaging in the production of visual art through individual projects. Prereq., ARTS 4126. Restricted to junior or senior ARTS or ARTH majors. Same as ARTS 5226. Formerly FINE 4226.

**ARTS 4236-3. Electronic Arts Survey 2.** Continuation of electronic arts survey. Explores the development of video as an art form. Prerequisite for further studies in video production. Same as ARTS 5236. Formerly FINE 4236.

**ARTS 4246-3. Beginning Video Production and Image Processing—Computer Animation.** Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture. Prereqs., ARTS 1010, and ARTH 1300 or 1400. Same as ARTS 5246. Formerly FINE 4246.

**ARTS 4316-3. History and Theory of Digital Art.** Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality, and the networked interface. Includes collaborative and individual projects. Prereq., ARTS 2126 or instructor consent. Same as ARTS 5316. Formerly FINE 4316.

**ARTS 4346-3. Intermediate Video Production.** Continuation of beginning video production. Extends the knowledge of single camera video production strategies and concepts. Expands the concept of montage (editing) and strategies to develop a video project through class screenings, projects, discussions, and readings. Furthers theoretical understanding of video as an art form. Prereq., beginning image processing or review of work, and ARTS 4246. Same as ARTS 5346. Formerly FINE 4346.

**ARTS 4446-3. Advanced Video Production.** Continuation of intermediate video production. Explores advanced technical skills to control the quality of the video image in production, postproduction, and distribution. Emphasizes self-motivated independent projects, conceptual realization of advanced student work and basic working knowledge of distribution and life as a media artist. Promotes further theoretical understanding of video as an art form. May be repeated up to 9 total credit hours. Prereq., ARTS 4346. Same as ARTS 5446. Formerly FINE 4446.

**ARTS 5126-3. Digital Art 2.** Same as ARTS 4126. Formerly FINE 5126.

**ARTS 5176-3. New Directions in Digital Art.** Same as ARTS 4176. Formerly FINE 5176.

**ARTS 5196-3. Advanced Digital Photography.** Same as ARTS 4196. Formerly FINE 5196.

**ARTS 5226-3. Advanced Computer Imaging.** May be repeated up to 6 total credit hours. Prereq., ARTS 5126. Same as ARTS 4226. Formerly FINE 5226.

**ARTS 5236-3. Electronic Arts Survey 2.** Same as ARTS 4236. Formerly FINE 5236.

**ARTS 5246-3. Beginning Video Production and Image Processing—Computer Animation.** Same as ARTS 4246. Formerly FINE 5246.

**ARTS 5316-3. History and Theory of Digital Art.** Same as ARTS 4316. Formerly FINE 5316.

**ARTS 5346-3. Intermediate Video Production.** Prereq., ARTS 4246/5246. Same as ARTS 4346. Formerly FINE 5346.

**ARTS 5446-3. Advanced Video Production.** Same as ARTS 4446. Formerly FINE 5446.

**ARTS 5846 (1-3). Graduate Independent Study in Video.** May be repeated up to 6 total credit hours. Formerly FINE 5846.

## Seminars/Special Topics

**ARTS 3007-3. Writing in the Visual Arts.** Enables studio art and art history majors to improve their writing skills through organization, presentation, critique, and revision. Writing assignments include formal writing (analysis and argument), informal writing, and grant proposals. Prereq., junior or senior standing. Formerly FINE 3007. Approved for arts and sciences core curriculum: upper-division written communication.

**ARTS 3017 (1-3). Special Topics in Studio Arts.** Introduces timely subjects in studio arts courses that cannot be offered on a regular basis. Information concerning the topics in any given semester is available prior to pre-registration from the Department of Art and Art History. May be repeated up to 7 total credit hours. Prereqs., ARTS 1010 and ARTH 1300 or 1400. Restricted to juniors and seniors.

**ARTS 3097 (1-3). Special Topics.** Introduces timely subjects in fine arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the Department of Art and Art History. May be repeated up to 7 total credit hours. Prereqs., ARTS 1010, and ARTH 1300 or 1400. Restricted to juniors and seniors. Formerly FINE 3097.

**ARTS 3847 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Formerly FINE 3847.

**ARTS 3937 (1-6). Internship.** Gives upper-division students the opportunity to work in public or private organizations on assignments relating to their career goals, and allows them to explore the relationship between theory and practice in their major. May be repeated up to 6 total credit hours. Formerly FINE 3937.

**ARTS 4017-3. SSpecial Topics in Studio Arts.** May be repeated for a total of 6 credit hours. Same as ARTS 5017.

**ARTS 4087-3. Selected Topics in Contemporary Art.** Selectively studies significant areas of visual art of the last decade including major critical opinions. Prereq., 20 hours of ARTS or ARTH courses. Same as ARTS 5087. Formerly FINE 4087. Approved for arts and sciences core curriculum: critical thinking.

**ARTS 4097 (1-3). Special Topics—Studio.** Introduces timely subjects in visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the fine arts department. May be repeated up to 6 total credit hours. Prereqs., ARTS 1010 and ARTH 1300 or 1400. Same as ARTS 5097. Formerly FINE 4097.

**ARTS 4117-3. BFA Seminar.** For students intending to pursue graduate work and/or a professional career in art. Emphasizes the development of a critical overview of their work and interests and how they relate to the problems of professional activity. Prereq., BFA candidate and senior standing. Formerly FINE 4117.

**ARTS 4137-3. Curatorial Seminar.** Introduces curatorial practices, such as exhibition development, programming, and preparation of educational materials. Emphasizes the application of art history skills in the museum field, research, writing, and analytical and interpretive skills. Students participate in organizing exhibitions at CU-Boulder galleries. May be repeated up to 12 total credit hours. Same as ARTS 5137. Formerly FINE 4137.

**ARTS 4717 (1-3). Studio Critique.** Consists of consultations with faculty on individual studio problems and projects. May be repeated up to 6 total credit hours. Prereqs., junior standing and instructor consent. Formerly FINE 4717.

**ARTS 4957-3. Studio Honors Thesis.** May be elected during the final semester. Consists of a substantial, original, creative project and/or written thesis providing an art world context. Requires faculty sponsorship. Does not guarantee a student will receive honors. Formerly FINE 4007.

**ARTS 5087-3. Selected Topics in Contemporary Art.** Same as ARTS 4087. Formerly FINE 5087.

**ARTS 5017-3. SSpecial Topics in Studio Arts.** May be repeated for a total of 6 credit hours. Same as ARTS 4017.

**ARTS 5097 (1-3). Special Topics—Nonstudio.** May be repeated up to 6 total credit hours. Same as ARTS 4097. Formerly FINE 5097.

**ARTS 5117-2. Graduate Art Seminar.** Formerly FINE 5117.

**ARTS 5137-3. Curatorial Seminar.** Same as ARTS 4137. Formerly FINE 5137.

**ARTS 5717 (1-3). Graduate Studio Critique.** May be repeated up to 6 total credit hours with any single faculty member. Prereq., graduate standing and/or instructor consent. Formerly FINE 5717.

**ARTS 5857 (1-3). Graduate Independent Study.** May be repeated up to 6 total credit hours. Formerly FINE 5857.

**ARTS 5917-3. MFA Practicum.** Guides and supervises graduate student teachers. Students receive practical experience to organize and implement the teaching of fine arts at an introductory level. Includes a discussion of various teaching methodologies with an emphasis on cultural diversity. Formerly FINE 5010.

**ARTS 6957 (1-6). Master of Fine Arts Creative Thesis.** Formerly FINE 6957.

## Visiting Artist Program

**ARTS 4118-3. Visiting Artist Program.** Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts. May be repeated once. Prereq., portfolio review for undergraduates and senior standing. Same as ARTS 5118. Formerly FINE 4118.

**ARTS 5118-3. Graduate Visiting Artist Program.** Same as ARTS 4118. Formerly FINE 5118.

## Art History

**ARTH 1300-3. History of World Art 1.** Surveys major art styles from the Paleolithic period through the Renaissance, including European, Asian, and the Pre-Columbian/Islamic world. Emphasizes comparison of Western and non-Western visual expressions as evidence of differing cultural orientations. Credit not granted for this course and FINE 1109 or 1309. Formerly FINE 1300. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 1400-3. History of World Art 2.** Surveys major art styles from about 1600 to the present, including Europe, Asia, the Islamic world, the Americas, and tribal arts. Emphasizes comparison of Western and non-Western visual expressions as evidence of differing cultural orientations. Credit not granted for this course and FINE 1209 or 1409. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 1509-3. Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World.** Introduces the art and archaeology of ancient Egypt, the Near East, Greece, and Rome, examining various ancient approaches to power, religion, death, and the human body. Analyzes art, architecture, and everyday trash to learn about ancient humanity. Same as CLAS 1509. Formerly FINE 1509. Approved for arts and science core curriculum: historical context or literature and the arts.

**ARTH 1709-3. Experiencing Art—Image, Artist, and Idea.** Provides a broad introduction to understanding and appreciating art from all time periods and all parts of the world. Particularly directed to nonmajors. Formerly FINE 1709. Approved for arts and science core curriculum: literature and the arts.

**ARTH 2409-3. Asian Art.** Designed for those having no previous experience in the study of Asian art. Traces development of sculpture, painting, architecture, and the other visual arts of South Asia, the Far East, and Southeast Asia, with a synopsis of developments from 1453 through the 18th century. Formerly FINE 2409. Approved for arts and science core curriculum: literature and the arts.

**ARTH 3009-3. Critical Thinking in Art History.** Through structured discussions, selected readings, and written assignments provides an understanding of how art history has evolved as an academic discipline and how art historians evaluate complex issues of style, form, content, and theory in the visual arts. Prereqs., ARTH 1300, 1400. Formerly FINE 3009. Approved for arts and science curriculum: critical thinking.

**ARTH 3029-3. Medieval and Early Modern Visual Culture, A.D. 400–1750.** Introduces students to the literature, history, culture and art of Europe and the Mediterranean basin from late antiquity through the early modern period. Interdisciplinary approach to visual culture focuses on uses of sacred religious practices and lay devotion. Prereqs., FINE 1300 and 1400. Credit not granted for this course and ARTS 2029. Formerly FINE 3029.

**ARTH 3039-3. Greek Art and Archaeology.** Covers prehistoric Aegean through the fourth century B.C., considering architecture, pottery, painting, sculpture,

and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Same as CLAS 3039. Credit not granted for this course and FINE 1009 or CLAS 1009. Formerly FINE 3039. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 3049-3. Introduction to Roman Art and Architecture.** Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.) to Constantine (A.D. 306–337). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Same as CLAS 3049. Similar to FINE 1019 and CLAS 1019. Formerly FINE 3049. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 3079-3. Medieval Art Survey.** Prereqs., ARTH 1300 and 1400. Formerly FINE 3079.

**ARTH 3109-3. Art in Contemporary Society.** An examination of writings by philosophers and art critics as they address the question: What is art for? Readings focus on the 19th and 20th centuries, including current theories and some non-Western theories. Students are encouraged to develop their own responses to the question. Prereqs., ARTH 1300 and 1400. Formerly FINE 3109. Approved for arts sciences core curriculum: critical thinking.

**ARTH 3209-3. Art, Culture, and Gender Diversity, 1400–1600: Renaissance Art Out of the Canon.** Studies the rising status of painting, sculpture, and architecture in Europe and how Europeans perceived non-Western art during the early modern period. Introduces history of race/ethnicity, gender, and class concerns embodied in the European category visual arts. Emphasizes new methods for interpreting history without imposing Eurocentric viewpoints. Prereqs., ARTH 1300 and 1400. Formerly FINE 3209. Approved for arts and sciences core curriculum: cultural and gender diversity, or critical thinking.

**ARTH 3309-3. European Art, 1300–1800.** Covers high visual culture in Europe from 1300 to 1800. Discussions of this concept with its implications for aesthetics, semiotics, and ideology form the core of the course. Prereqs., ARTH 1300 and 1400. Similar to FINE 1209. Formerly FINE 3309.

**ARTH 3419-3. Modern Art Survey.** Prereqs., ARTH 1300 and 1400. Formerly FINE 3419.

**ARTH 3509-3. American Art.** Surveys American art and material culture from the precolonial era to the present day. Considers cultural and artistic interaction, ethnic expressions, patronage, European and non-Western influences, and the struggle to develop a uniquely American artistic identity. Prereqs., ARTH 1300 and 1400. Same as AMST 3509. Formerly FINE 3509. Approved for arts and sciences core curriculum: United States context.

**ARTH 3609-3. East Asian Ceramics.** Surveys the development of Chinese, Korean, and Japanese ceramics from the Neolithic to the present. Examines form, function, technique, and aesthetics in light of historical, social, and cultural contexts. Prereqs., ARTH 1300, 1400, 2409, or EALC 1011. Formerly FINE 3609.

**ARTH 3709-3. Chinese Painting.** Surveys the history of Chinese painting, with special emphasis on major masters and monuments, the history of styles, and Chinese theories on the art of painting. Focuses on Chinese painters, their lives, and art as representatives of China's artistic heritage. Prereqs., ARTH 1300, 1400, 2409, EALC 1011 or HIST 1608. Formerly FINE 3709.

**ARTH 3719-3. History of Media Arts.** Surveys the development of technological media both as sources of information and as art. Photography and related media, film, video, holography, and electronic imaging systems are surveyed as art and as technologies, emphasizing major artists, movements, exhibitions, and other productions in the 19th and 20th centuries. Prereqs., ARTH 1300 and 1400. Formerly FINE 3719.

**ARTH 3929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours when topic varies. Prereqs., ARTH 1300 and 1400. Formerly FINE 3929.

**ARTH 4019-3. Art of Ancient Egypt.** Surveys the development of Egyptian architecture, sculpture, painting, and the minor arts from their beginnings to the establishment of Christianity. Prereq., one 3000-level art history course. Same as ARTH 5019. Formerly FINE 4019.

**ARTH 4039-3. Byzantine Art.** Examines art of the East Christian Empire from the accession of Constantine to the conquest of Constantinople with a synopsis of developments from 1453 through the 18th century. Prereq., one 3000-level art history course. Same as ARTH 5039. Formerly FINE 4039.

**ARTH 4069-3. Medieval Manuscripts.** Surveys decorated books from late antiquity to the advent of the printing press. Examines the various roles

manuscripts played within different medieval communities. Prereq., ARTH 1300 and 1400. Same as ARTH 5069. Formerly FINE 4031.

**ARTH 4089-3. Romanesque and Gothic Art.** Examines major artistic trends in Europe between the years 1000 and 1300, a period that witnessed, among others, the development of gothic cathedrals and the rise of the professional artist. Particular attention will be given to exchange with other cultures. Prereqs., ARTH 1300 and 1400. Formerly FINE 4089.

**ARTH 4119-3. Roman Sculpture.** Examines ancient Roman sculpture with emphasis on the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world. Recommended prereqs., ARTH 1300, CLAS or FINE 1019. Same as ARTH 5119 and CLAS 4119. Formerly FINE 4119.

**ARTH 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the Eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states. Same as ARTH 5129, CLAS 4129 and ANTH 4129. Formerly FINE 4129.

**ARTH 4139-3. Greek Vase Painting.** A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary, and written presentation. Same as ARTH 5139 and CLAS 4139. Formerly FINE 4139.

**ARTH 4149-3. Greek Cities and Sanctuaries.** Examines Greek architecture in context, from the ninth century B.C. into the Hellenistic period, considering the use of space, both in religious and in civic settings, and using texts as well as material culture. Emphasis is on developing analytical skills. Same as ARTH 5149 and CLAS 4149. Formerly FINE 4149.

**ARTH 4169-3. Topics in Ancient and Classical Art and Archaeology.** Focuses upon an aspect of ancient Mediterranean culture. Topics vary; they may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology. Same as ARTH 5169 and CLAS 4169. Formerly FINE 4169.

**ARTH 4189-3. Medieval Art.** Surveys the history of Western art from Constantine to around the year 1300, including Carolingian, Ottonian, Anglo-Saxon, Romanesque, and Gothic. Considers "barbarian," Byzantine, and Islamic influences. Prereqs., ARTH 1300 and 1400. Formerly FINE 3089 and FINE 4189. Approved for arts and sciences core curriculum: critical thinking.

**ARTH 4199-3. Roman Architecture.** Examines the designs, functions, and construction methods of ancient Roman towns, temples, baths, houses, and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation. Same as ARTH 5199 and CLAS 4199. Formerly FINE 4199.

**ARTH 4279-3. Michelangelo (1475–1564).** Focuses on Michelangelo's long career, marked by outstanding achievements in sculpture, painting, architecture, and poetry. Emphasizes his projects and achievements in light of 16th century artistic theory, including relationships to his contemporaries in the arts and literature. Prereq., one 3000-level art history course. Same as ARTH 5279. Formerly FINE 4279.

**ARTH 4289-3. Modern Art, 1780–1970.** Surveys the loss of beauty in art and discusses whether or not that loss is regrettable. A question of equal importance is the function and historical meaning of modern and postmodern art. Is it all hype and strategic positioning by artists for fame and fortune? Is it serious? Are the fine arts still fine? Prereqs., ARTH 1300 and 1400. Formerly FINE 3409 and FINE 4289. Approved for arts and sciences core curriculum: critical thinking.

**ARTH 4309-3. Neoclassicism and Romanticism: 1760–1840.** Surveys painting and sculpture in England and France from the last quarter of the 18th century through the first half of the 19th century. Prereq., one 3000-level art history course. Same as ARTH 5309. Formerly FINE 4309.

**ARTH 4319-3. European Art from 1830 to 1886.** Survey of the major movements in painting in France and England from the Revolution of 1830 to the impressionist crisis of 1886. Emphasizes and discusses painting and major expressions in sculpture and architecture. Same as ARTH 5319. Formerly FINE 4319.

**ARTH 4329-3. Modern Art 1.** Provides an in-depth study of the *fin de siècle*, stressing postimpressionism, art nouveau, and symbolism. Concludes with fauvism in France and the expressionist movement in Germany. Prereq., one 3000-level art history course. Same as ARTH 5329. Formerly FINE 4329. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4339-3. Modern Art 2.** Begins with early Picasso and cubism, including analytic and synthetic cubism and emphasizing the various isms of the 20th century. Also studies Italian futurism, de Stijl and the Bauhaus, dada, and surrealism. Prereq., one 3000-level art history course. Same as ARTH 5339. Formerly FINE 4339.

**ARTH 4359-3. Modern Sculpture, 1870–1970.** Examines outstanding sculptors in Europe and America from Rodin to the present. Emphasizes American sculpture since World War II. Prereq., one 3000-level art history course. Same as ARTH 5359. Formerly FINE 4359.

**ARTH 4409-3. Arts of Africa and Oceania.** Covers native arts of non-Western peoples of Africa and Oceania, including sculpture, architecture, and minor arts for both archaeological and ethnological cultures. Emphasizes the function of art in society as well as aesthetic analysis. Prereq., one 3000-level art history course. Same as ARTH 5409. Formerly FINE 4409.

**ARTH 4429-3. Latin American Art since 1492.** Surveys arts of the colonies of Spain and Portugal in the Western Hemisphere from 1492 to the present. Prereq., one 3000-level art history course. Same as ARTH 5429. Formerly FINE 4429.

**ARTH 4439-3. Native North American Art.** Surveys art of North American Indian cultures, including the northwest coast, southwest, southeast, northeast, and plains, covering architecture, sculpture, and minor arts for both archaeological and ethnological cultures. Prereq., one 3000-level art history course. Same as ARTH 5439. Formerly FINE 4439.

**ARTH 4449-3. Arts of India and Southeast Asia.** Surveys the architecture, sculpture, and painting of India and those areas of Southeast Asia influenced by India from the period of Mohenjo Daro and Harappa to recent times. Includes the Himalayan region and Tantric art in general. Prereq., one 3000-level art history course. Same as ARTH 5449. Formerly FINE 4449.

**ARTH 4459-3. The Arts of Japan.** Offers an appreciation and chronological development of the arts of Japan. Emphasizes the arts of Shintoism and Buddhism as well as the particular Japanese aesthetic from prehistoric times to the present. Prereq., one 3000-level art history course. Same as ARTH 5459. Formerly FINE 4459.

**ARTH 4469-3. The Arts of China.** Surveys Chinese painting, sculpture, architecture, and other arts from neolithic to modern times. Prereq., one 3000-level art history course. Same as ARTH 5469. Formerly FINE 4469.

**ARTH 4489-3. History of Japanese Prints and Their Impact on Modern Art.** Surveys printmaking in Japan from its introduction to the present. Examines pre-Modern and Modern Japanese art and culture reflected in prints. Explores *ukiyo*, “the floating world,” and its impact on modern artists in Europe and America. Prereq., one 3000-level art history course. Recommended prereq., ARTH 4459. Same as ARTH 5489. Formerly FINE 4489.

**ARTH 4509-3. 19th Century American Art.** Examines American painting, sculpture, photography, folk, and popular art throughout the nation’s beginnings through the 19th century, with particular attention to emergence of art styles, the development of art museums and academies, and cultural interaction with Europe. Prereq., one 3000-level art history course. Recommended prereq., ARTH 3509. Same as ARTH 5509. Formerly FINE 4509.

**ARTH 4519-3. 20th Century American Art.** Traces the history of 20th century American art, focuses on painting, sculpture, and a variety of other media from the Gilded Age of the 1890s to the end of the century that came to be called the American Century. Especially focuses on the development of American styles and modes of modern art, and on the issues of cultural migration. Aims to demonstrate methods of visual analysis by which American art can be engaged in the discussion of historical problems and issues. Prereq., one 3000-level art history course. Same as ARTH 5519. Formerly FINE 4519.

**ARTH 4529-3. American Art: 1945–1970.** Examines the triumph of American painting, sculpture, architecture, and other arts after World War II and through the 1960s. Considers mainstream art (abstract expressionism, pop, minimalism) and alternative art (earthworks, feminist and minority expression, visionary architecture, funk sculpture) in New York and California. Prereq., one 3000-level art history course. Same as ARTH 5529. Formerly FINE 4529.

**ARTH 4539-3. Contemporary Art.** Examines contemporary art and theory in the transition from modern to postmodern expression. Discusses painting, sculpture, installations, performance, video, photography, and architecture with attention to historical context and criticism. Considers neoexpressionist, feminist, minority, political, and public art. Prereq., one 3000-level art history course. Same as ARTH 5539. Formerly FINE 4539.

**ARTH 4549-3. Contemporary Public Art.** Focuses on the changing relationship of architecture, art and ornament, the role of the public, and the function and patronage of contemporary public art. Considers environmental art, community murals, activist art, temporary installations, issues of censorship, and monuments and memorials. Prereq., one 3000-level art history course. Same as ARTH 5549. Formerly FINE 4549.

**ARTH 4619-3. Quattrocento Art in Florence and Central Italy.** Commences with monuments of the so-called second Renaissance style about 1440 around Florence. Deals with the later Ghiberti and Donatello, the work of Leonbattista Alberti, and the painting of Castagno, Piero della Francesca, Botticelli, Filippino Lippi, and others, ending in the late quattrocento. Offered abroad only. Same as ARTH 5619. Formerly FINE 4619. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4659-3. The Roman Baroque.** Traces main stylistic trends, along with appropriate intellectual and social contexts, for Roman art of the 17th and 18th centuries. Emphasizes classroom and on-site lectures as well as techniques appropriate to writing about the visual arts. Offered abroad only. Same as ARTH 5659. Formerly FINE 4659. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4739-3. The Intellectual Roots of Italian Renaissance Art.** Studies critical issues raised in the literature on art, focusing on Renaissance interpretations of key historical themes such as imitation and decorum. Carefully examines the language used in primary sources (available in English). Prereq., one 3000-level art history course. Formerly FINE 4739. Approved for arts and sciences core curriculum: critical thinking.

**ARTH 4749-3. Italian Renaissance Art: Studies in the Exchange between Theory and Practice.** Addresses how artists developed new compositional procedures, graphic techniques, and audiences, and how these procedures were theorized in an age when artists’ intellectual and social status rose dramatically. Explores reception of new graphic technology. Studies specific commissions and primary texts in depth. Prereq., one 3000-level art history course. Same as ARTH 5749. Formerly FINE 4749. Approved for arts and sciences core curriculum: critical thinking.

**ARTH 4759-3. 17th Century Art and the Concept of the Baroque.** Surveys 17th century European painting, sculpture, and architecture, along with a critical study of artistic theory, artistic institutions (such as the Academia di San Luca and the Academie Royal), and the concept of the term baroque. Prereq., one 3000-level art history course. Same as ARTH 5759. Formerly FINE 4759. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4769-3. Gender Studies in Early Modern Visual Culture.** Examines 15th and 16th century European ideas about women from a variety of feminist perspectives. Focuses on recent contributions to history of women as they intersect with the visual arts. Prereq., one 3000-level art history course. Same as ARTH 5769 and WMST 4769. Formerly FINE 4769. Approved for arts and sciences core curriculum: cultural and gender diversity or critical thinking.

**ARTH 4779-3. Multicultural Perspectives on New Mexican Santos.** Reflects upon the question: In what sense were the regional variants of European devotional images the effects of meaningful cultural interaction? Evidence considered includes oral traditions, pueblo pottery, and painting, emphasizing interpretations that respect rights of communities to maintain privacy. Prereqs., ARTH 1300, 1400, and one 3000-level art history course. Same as ARTH 5779. Formerly FINE 4779. Approved for arts and sciences critical thinking.

**ARTH 4819-3. Contemporary Chicano Art.** Examines Chicano art world, focusing on contemporary scene. Lecture/discussion/dialogue explored through readings and visual presentations including: video, guest lecturers, and visits to local spaces. Prereq., any 3000-level art history course or instructor consent. Formerly FINE 4819.

**ARTH 4909 (1-3). Independent Study—Art History.** May be repeated up to 7 total credit hours. Formerly FINE 4909.

**ARTH 4919-3. Undergraduate Seminar: Selected Topics in Art History.** Seminar course dealing with selected areas or problems within the history of art. Consult

current *Registration Handbook and Schedule of Courses* for seminar topic. May be repeated up to 7 total credit hours. Prereq., instructor consent. Formerly FINE 4919.

**ARTH 4929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours when topic varies. Same as ARTH 5929. Formerly FINE 4929.

**ARTH 4939 (3-6). Art Museum Internship.** Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums. May be repeated up to 6 total credit hours. Prereqs., ARTH 1300 and 1400. Same as ARTH 5939. Formerly FINE 4939.

**ARTH 4959 (1-3). Art History Honors Thesis.** May be elected during the final semester. Consists of a substantial, original written thesis providing a world art context. Requires faculty sponsorship. Does not guarantee a student will receive honors.

*NOTE: The graduate program in art history is under revision. Beginning in January 2004, a separate graduate curriculum will be implemented. Please consult with the Department of Art and Art History for current offerings.*

**ARTH 5019-3. Art of Ancient Egypt.** Same as ARTH 4019. Formerly FINE 5019.

**ARTH 5039-3. Byzantine Art.** Same as ARTH 4039. Formerly FINE 5039.

**ARTH 5069-3. Medieval Manuscripts.** Same as ARTH 4069. Formerly FINE 5031.

**ARTH 5119-3. Roman Sculpture.** Same as ARTH 4119 and CLAS 5119. Formerly FINE 5119.

**ARTH 5129-3. Aegean Art and Archaeology.** Same as ARTH 4129, CLAS 5129, and ANTH 5129. Formerly FINE 5129.

**ARTH 5139-3. Greek Vase Painting.** Same as ARTH 4139 and CLAS 5139. Formerly FINE 5139.

**ARTH 5149-3. Greek Cities and Sanctuaries.** Same as ARTH 4149 and CLAS 5149. Formerly FINE 5159.

**ARTH 5159-3. Hellenistic Art and Archaeology.** Art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.) to the conquest of Greece by the Romans (middle second century B.C.). Same as CLAS 5159. Formerly FINE 5159.

**ARTH 5169-3. Topics in Ancient and Classical Art and Archaeology.** Same as ARTH 4169 and CLAS 5169. Formerly FINE 5169.

**ARTH 5179-3. Periklean Athens.** Explores in detail the buildings, sculptures, pots, and foreign imports of Athens under the leadership of Perikles, considering material culture of individuals as much as civic programs. Emphasis is on ways in which the textual and archaeological evidence complement and/or contradict one another. Same as CLAS 5179. Formerly FINE 5179.

**ARTH 5189-3. Augustan Rome.** Explores the sculptures, paintings, and buildings constructed in Rome during the reign of the first emperor Augustus (27 B.C.–A.D. 14). Examines the monuments of Augustan Rome as both dependent on republican precedents and yet innovative with respect to designs and meanings. Same as CLAS 5189. Formerly FINE 5189

**ARTH 5199-3. Roman Architecture.** Same as ARTH 4199 and CLAS 5199. Formerly FINE 5199.

**ARTH 5279-3. Michelangelo (1475–1564).** Same as ARTH 4279. Formerly FINE 5279.

**ARTH 5309-3. Neoclassicism and Romanticism: 1760 to 1840.** Same as ARTH 4309. Formerly FINE 5309.

**ARTH 5319-3. European Art from 1830 to 1886.** Same as ARTH 4319. Formerly FINE 5319.

**ARTH 5329-3. Modern Art 1.** Same as ARTH 4329. Formerly FINE 5329.

**ARTH 5339-3. Modern Art 2.** Same as ARTH 4339. Formerly FINE 5339.

**ARTH 5359-3. Modern Sculpture 1870–1970.** Same as ARTH 4359. Formerly FINE 5359.

**ARTH 5409-3. Arts of Africa and Oceania.** Same as ARTH 4409. Formerly FINE 5409.

**ARTH 5429-3. Latin American Art since 1492.** Same as ARTH 4429. Formerly FINE 5429.

**ARTH 5439-3. Native North American Art.** Same as ARTH 4439. Formerly FINE 5439.

**ARTH 5449-3. Arts of India and Southeast Asia.** Same as ARTH 4449. Formerly FINE 5449.

**ARTH 5459-3. The Arts of Japan.** Same as ARTH 4459. Formerly FINE 5459.

**ARTH 5469-3. The Arts of China.** Same as ARTH 4469. Formerly FINE 5469.

**ARTH 5489-3. History of Japanese Prints and Their Impact on Modern Art.** Same as ARTH 4489. Formerly FINE 5489.

**ARTH 5509-3. 19th Century American Art.** Same as ARTH 4509. Formerly FINE 5509.

**ARTH 5519-3. 20th Century American Art.** Same as ARTH 4519. Formerly FINE 5519.

**ARTH 5529-3. American Art 1945–1970.** Same as ARTH 4529. Formerly FINE 5529.

**ARTH 5539-3. Contemporary Art.** Same as ARTH 4539. Formerly FINE 5539.

**ARTH 5549-3. Contemporary Public Art.** Prereq., grad standing. Same as ARTH 4549. Formerly FINE 5549.

**ARTH 5619-3. Quattrocento Art in Florence and Central Italy.** Same as ARTH 4619. Formerly FINE 5619.

**ARTH 5659-3. The Roman Baroque.** Same as ARTH 4659. Formerly FINE 5659.

**ARTH 5749-3. Italian Renaissance Art: Studies in the Exchange between Theory and Practice.** Same as ARTH 4749. Formerly FINE 5749.

**ARTH 5759-3. 17th Century Art and the Concept of the Baroque.** Same as ARTH 4759. Formerly FINE 5759.

**ARTH 5769-3. Gender Studies in Early Modern Visual Culture.** Same as ARTH/WMST 4769. Formerly FINE 5769.

**ARTH 5779-3. Multicultural Perspectives on New Mexican Santos.** Same as ARTH 4779. Formerly FINE 5779.

**ARTH 5909 (1-3). Graduate Independent Study—Art History.** May be repeated up to 9 total credit hours. Formerly FINE 5909.

**ARTH 5929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours. Same as ARTH 4929. Formerly FINE 5929.

**ARTH5939 ARTH 5939 (3-6). Art Museum Internship.** May be repeated up to 6 total credit hours. Same as ARTH 4939. Formerly FINE 5939.

**ARTH 6929-3. Seminar: Theories of Art History.** Provides a systematic critical overview of the development of art history as a discipline beginning with 18th century theories of aesthetics and ending with current interdisciplinary models of critical interpretation. Weekly readings, discussions, reports, and written papers constitute the format of this seminar in methodology. Topics vary from semester to semester. May be repeated up to 6 total credit hours. Required for MA (art history) candidates. Formerly FINE 6929.

**ARTH 6939-3. Graduate Seminar: Open Topics in Art History.** Subjects and topics vary. May be repeated up to 9 total credit hours. Prereq., graduate standing. Formerly FINE 6939.

**ARTH 6949 (1-3). Master's Candidate for Degree.** Formerly FINE 6949.

**ARTH 6959 (1-6). Master's Thesis (Art History).** Formerly FINE 6959.

## Arts and Sciences

### Writing

**ARSC 1080 (3-4). College Writing and Research.** Introduces academic and professional genres through the research and inquiry process. Students practice close reading, oral presentation, drafting, synthesis, analysis and research skills in discussion, writing workshops, and one-on-one conferences. Approved for arts and sciences core curriculum: written communication.

**ARSC 1081-1. SASC Coseminar: College Writing and Research.** One-credit seminar provides extended instruction in written composition for students enrolled in ARSC 1080. Graded assignments enrich students' understanding of genre, organization, research skills, and grammar. Coreq., ARSC 1080.

**ARSC 1150-3. Writing in Arts and Sciences.** Emphasizes the development of effective writing skills with instruction provided in expository and analytical writing. Reviews basic elements of grammar, syntax, and composition as needed. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**ARSC 3100-3. Multicultural Perspective and Academic Discourse.** Teaches students how to write academic papers related to race, class, gender, sexuality, and other areas of cultural identity. Students acquire expertise on issues through readings, guided discussion, and research and practice oral presenta-

tion skills, drafting, and workshopping of papers. Prereq., lower level writing course(s) or waiver. Approved for arts and sciences core curriculum: written communication.

## Minority Arts and Sciences Program (MASP)

**ARSC 1400-1. MASP Coseminar: CHEM 1 and 2.** Supplements and strengthens student experiences in chemistry. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1420-1. MASP Coseminar: Introduction to EPO Biology.** Designed to supplement and strengthen student experiences in EBIO 1210 and 1220. Allows particularly gifted students an opportunity to extend their understanding of the subject and possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1432-1. MASP Coseminar: Economics.** Designed to supplement and strengthen student experiences in microeconomics. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in social science.

**ARSC 1440-1. MASP Coseminar: Mathematics.** Offers an unusual and essential opportunity for students to receive small-group enrichment and reinforcement. Supplements and strengthens student experiences in mathematics, allowing particularly gifted students an opportunity to extend their understanding of the subject in a supportive environment, and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1460-1. MASP Coseminar: Introduction to MCD Biology.** Supplements and strengthens student experiences in MCDB 1150 and 2150. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1480-1. MASP Seminar: Exploration of Public Discourse through the Social Sciences.** Fosters an appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, and outside activities illustrate the interconnections between different bodies of knowledge. Emphasizes relationships between the humanities/social sciences and the real world. May be repeated up to 2 total credit hours.

**ARSC 1490-1. MASP Seminar: Activating the Humanities and Social Sciences.** Building on ARSC 1480, enhances students' knowledge and appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, workshopping papers and presentation, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis is on actively using knowledge of humanities and social sciences in a variety of ways. Prereq., ARSC 1480. May be repeated up to 2 total credit hours.

**ARSC 1492-1. MASP Coseminar: Research.** Building on ARSC 1490, this course seeks to enhance students' knowledge and appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, workshopping papers and presentations, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis is placed on actively using knowledge of humanities and social science in a variety of ways. May be repeated up to 2 total credit hours.

**ARSC 2400-1. MASP Coseminar: Organic Chemistry.** Supplements and strengthens student experiences in organic chemistry. Allows gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 2470-1. MASP Coseminar: Physics 1 and 2.** Supplements and strengthens student experiences in physics. Allows particularly gifted students an opportunity to extend their understanding of the subjects and to explore possible careers in science. May be repeated up to 2 total credit hours.

## Special Curricula

### ARSC 1200 (1-3) Topics in Arts and Sciences.

**ARSC 1300-2. American Indians in Higher Education: Leadership and Community Building 1.** Part 1 of an interdisciplinary course that examines the issues that arise for American Indian college students and the role of leadership development, community building, and career awareness in facilitating American Indian student retention.

**ARSC 1310-2. American Indians in Higher Education: Leadership and Community Building 2.** Part 2 of an interdisciplinary course that examines the issues that arise for American Indian college students and the role of leadership development, community building, and career awareness in facilitating American Indian student retention.

**ARSC 1500-1. Environmental Sciences Seminar.** May be repeated up to 2 total credit hours.

**ARSC 1600-1. The University of Colorado Experience.** Provides an effective transition to the university by giving students a solid base for developing scholarship, citizenship, decision making, and involvement in their university community. Topics include academic and campus resources, safety, health, and diversity.

**ARSC 1710-1. SASC Coseminar: Pre-Calculus Work Group.** This 1-credit seminar provides motivated pre-calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in pre-calculus courses due to time constraints. Mastery of material is emphasized. Prereq., proficiency in high school mathematics. Coreq., MATH 1001/1021.

**ARSC 1720-1. SASC Coseminar: Calculus Work Group.** This 1-credit seminar provides motivated calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in calculus courses due to time constraints. Mastery of material is emphasized. Prereq., proficiency in pre-calculus mathematics. Recommended prereq., A/B average in pre-calculus sequence. Coreq., MATH 1300.

**ARSC 2110-4. Physical Science of the Earth System.** Covers basic concepts of physics and chemistry, taught in the context of Earth and space science. Small class size and emphasis on student investigations, labs and field work, and active learning make this course particularly appropriate for future K-6 teachers. Prereq., two high school science courses (college prep level). Same as GEOL 2110. Approved for arts and sciences core curriculum: natural sciences.

**ARSC 2115-3. Life Science of Earth Systems.** Covers basic concepts in biology and scientific processes. This course is especially suited for future K-6 teachers. Characteristics of life, genetics, evolution, ecology and the human body are emphasized in a constructivist, student-centered, hands on format. Prereq., two high school science courses at college-prep level. Recommended prereq., ARSC 2110 or GEOL 2110. Same as MCDB 2115. Approved for arts and sciences core curriculum: natural science.

**ARSC 2274-3. Peer Counseling.** Overview of paraprofessional counseling. Introduces students to counseling theory and techniques. Students study the philosophy of a liberal arts education as well as policies and requirements of the College of Arts and Sciences.

**ARSC 3600 (2-4). Diversity Issues: Higher Education.** Uses Internet dialogue, computing, and media technology to improve communication and develop research and inquiry skills and critical thinking. Race, class, gender, and sexual orientation issues are addressed to foster understanding of university codes of inquiry and modes of interaction in scholarly communities.

**ARSC 3650-3. Diversity Issues in Graduate Education.** Guides students through research on diversity and retention issues in graduate education. Participants use Tinto's work on academic and social integration as a conceptual framework. Further, students investigate how specific institutions support diversity goals in their graduate programs. Prereq., admission to McNair program (minimum 2.50 GPA, three recommendation letters, personal statement, strong interest in graduate school).

**ARSC 3700 (3-5). McNair Seminar: Research Design.** Multidisciplinary course guiding critical thinking as students design a formal investigation. Includes compiling an annotated bibliography, composing a literature review, and presenting and writing a prospectus. Students revise the prospectus, creating a proposal for funding the research. Prereq., admission to McNair Program (junior standing, minimum GPA of 2.50, and strong interest in graduate school).

**ARSC 3935 (1-6). Internship.** May be repeated up to 6 total credit hours.

**ARSC 4000-3. Multimedia Applications in Foreign/Second Language Education.** Focuses on knowledge and skills in accessing, evaluating, and integrating technology-assisted, mediated material in the teaching and learning of foreign languages. Also focuses on hands-on design and production of instructional

software for foreign languages. Recommended prereq., a language-teaching methodology course. Same as ARSC 5000.

**ARSC 4040 (1-3). Arts and Sciences Special Topics.** Same as ARSC 5040.

**ARSC 4700 (1-5). The McNair Seminar: Research Practices and Procedures.** Within the range of scholarly modes, student researchers examine discipline-specific rationales for evidence and analysis. Lecturers distinguish popular concepts of investigation from scholarly research. Students learn to take great care describing and discussing methods, findings, interpretations, assertions, and conclusions. May be repeated up to 10 total credit hours. Prereq., admission to McNair Program (junior standing, meeting TRIO guidelines, strong interest in graduate school).

**ARSC 4909 (2-6). Senior Thesis for Individually Structured Major.**

## Graduate-Level Courses

**ARSC 5000-3. Multimedia Applications in Foreign/Second Language Education.** Same as ARSC 4000.

**ARSC 5040 (1-3). Arts and Sciences Special Topics.** Same as ARSC 4040.

**ARSC 5050-3. Graduate Seminar on Applied Behavior Science 1.** The first part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Prereq., completion of first year of graduate work in a social science department.

**ARSC 5060-3. Graduate Seminar on Applied Behavior Science 2.** The second part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Prereq., ARSC 5050.

## Asian Studies

**ASIA 1000-3. Introduction to South and Southeast Asian Civilizations.** Interdisciplinary survey course, emphasizing cultural developments in the Indian subcontinent that influenced Indonesia and mainland Southeast Asia. Foundation course required for the Asian studies major. Approved for arts and sciences core curriculum: cultural and gender diversity or historical context.

**ASIA 1010-3. Beginning Vietnamese.** Self-instructed introduction to modern Vietnamese language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lessons with a local tutor and are graded by visiting examiners.

**ASIA 1020-3. Beginning Vietnamese 2.** A self-instructed introduction to the modern Vietnamese language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lessons with a local tutor and are graded by visiting examiners. Prereq., ASIA 1010 with a grade of C- or better.

**ASIA 1410-3. Beginning Hindi.** Self-instructed introduction to modern Hindi language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lessons with a local tutor and are graded by visiting examiners.

**ASIA 1420-3. Beginning Hindi 2.** A self-instructed introduction to the modern Hindi language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lesson with a local tutor and are graded by visiting examiners. Prereq., ASIA 1410 with a grade of C- or better.

**ASIA 2010-3. Intermediate Vietnamese.** Self-instructed intermediate course of modern Vietnamese language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lessons with a local tutor and are graded by visiting examiners. Prereq., ASIA 1020 with a grade of C- or better. Meets MAPS requirement for foreign language.

**ASIA 2020-3. Intermediate Vietnamese 2.** Continuation of ASIA 2010. Self-instructed course emphasizes speaking, listening, and conversational fluency in intermediate Vietnamese, with a focus on culturally appropriate expression and practical knowledge.

**ASIA 2410-3. Intermediate Hindi.** A self-instructed intermediate course on the modern Hindi language, focusing on oral proficiency and culturally appropriate language use. Students work through programmed lessons with a local tutor and are graded by visiting examiners. Prereqs., ASIA 1410 and 1420 with a grade of C- or better. Meets MAPS requirement for foreign language.

**ASIA 2420-3. Intermediate Hindi 2.** Continuation of ASIA 2410. Self-instructed course emphasizes speaking, listening, and conversational fluency in intermediate Hindi, with a focus on culturally appropriate expression and practical knowledge.

**ASIA 4300-3. Open Topics: Readings in Asian Literature and Culture.** Examines selected texts on a particular topic. Taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASIA 4830-3. Senior Thesis in Asian Studies.** Studies an approved East Asian topic, following guidelines established by the program director. Undertaken either as an independent study with an Asian studies faculty member or as part of a seminar course approved by the Asian studies faculty representative in the student's disciplinary option.

## Astrophysical and Planetary Sciences

**ASTR 1010-4. Introductory Astronomy 1.** Introduces principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Earth, Sun, moon, planets, and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1110, but with additional recitation and lab experience. Also similar to ASTR 1030. Students may receive credit for only one of ASTR 1010, 1110, or 1030. Meets MAPS requirement for natural science: non-lab. Approved for arts and sciences core curriculum: natural science.

**ASTR 1020-3. Introductory Astronomy 2.** Introduces principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. Offers nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1120, but with sequence link to ASTR 1010. Also similar to ASTR 1040. Students may receive credit for only one of ASTR 1020, 1120, or 1040. Prereq., ASTR 1010 or 1110. Approved for arts and sciences core curriculum: natural science. Some offerings of ASTR 1020 may incorporate small group "Learning Teams." See course listings at [aps.colorado.edu](http://aps.colorado.edu) to identify these and their scheduling.

**ASTR 1030-4. Accelerated Introductory Astronomy 1.** Covers principles of modern astronomy summarizing our present knowledge about the Earth, Sun, moon, planets, and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Required in ASTR major/minor. Prereq. or coreq., Calculus I (MATH 1300 or APPM 1350). APPM 1350). Students may receive credit for only one of ASTR 1030, 1010, or 1110. Similar to ASTR 1010 and 1110 but taught at a higher intellectual level including a significant amount of quantitative analysis. Approved for arts and sciences core curriculum: natural science.

**ASTR 1040-4. Accelerated Introductory Astronomy 2.** Covers principles of modern astronomy summarizing our present knowledge about the sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. Offers opportunities to attend nighttime observing sessions at Sommers-Bausch Observatory. Some sessions are at the Fiske Planetarium. Required in ASTR major/minor. Prereq., ASTR 1030. Prereq. or coreq., Calculus I (MATH 1300 or APPM 1350). Students may receive credit for only one of ASTR 1020, 1040, or 1120. Similar to ASTR 1010 and 1020 but taught at a higher intellectual level including a significant amount of quantitative analysis. Approved for arts and sciences core curriculum: natural science.

**ASTR 1110-3. General Astronomy: The Solar System.** Examines principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Earth, Sun, moon, planets, and the origin of life. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1010, without lab and recitation. Also similar to ASTR 1030. ASTR 1110 and 1120 may be taken in either order. Students may receive credit for only one of ASTR 1110, 1010, or 1030. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**ASTR 1120-3. General Astronomy: Stars and Galaxies.** Examines principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Sun, stars, neutron stars, black holes, interstellar gas, galaxies, quasars, and the structure and origins of the universe. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1020, without sequence link to ASTR 1010.



Also similar to ASTR 1040. ASTR 1110 and 1120 can be taken in either order. Students may receive credit for only one of ASTR 1120, 1020, or 1040. Approved for arts and sciences core curriculum: natural science.

**ASTR 2000-3. Ancient Astronomies of the World.** Documents the numerous ways in which observational astronomy and cosmology have been features of ancient cultures. Includes naked eye astronomy, archaeoastronomy, ethnoastronomy, concepts of time, calendrics, cosmogony, and cosmology. Approved for arts and sciences core curriculum: natural science or cultural and gender diversity.

**ASTR 2010-3. Modern Cosmology—Origin and Structure of the Universe.** Introduces modern cosmology to nonscience majors. Covers the Big Bang; the age, size, and structure of the universe; and the origin of the elements and of stars, galaxies, the solar system, and life. Approved for arts and sciences core curriculum: natural science.

**ASTR 2020-3. Introduction to Space Astronomy.** Discusses reasons for making astronomical observations from space, scientific goals, practical requirements for placing instruments in space, politics of starting new programs, and selected missions. Prereq., ASTR 1010, 1020, 1110, or 1120. Approved for arts and sciences core curriculum: natural science.

**ASTR 2030-3. Black Holes.** Black holes are one of the most bizarre phenomena of nature. Students are introduced to the predicted properties of black holes, astronomical evidence for their existence and formation, and modern ideas about space, time, and gravity. Approved for the arts and sciences core curriculum: natural science.

**ASTR 2500-3. Gateway to Space.** Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry, and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry. Recommended prereqs., APPM 1360 or MATH 2300 and PHYS 1120 or ASTR 1140. Restricted to ASTR or PHYS majors. Same as ASEN 2500. Similar to ASEN 4500.

**ASTR 2840 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 3210-3. Intermediate Astronomy: Solar System.** Pursues topics in modern solar-system astronomy. Topics vary but often include nature and evolution of the Sun, life in the universe, origin and nature of the planets, and space science. Nonmathematical. Prereq., ASTR 1010, 1030, or 1110. Approved for arts and sciences core curriculum: natural science.

**ASTR 3220-3. Intermediate Astronomy: Stars and Galaxies.** Pursues topics in modern astronomy outside the solar system. Topics vary but often include stars, black holes, galaxies, quasars, and cosmology. Introduces nonmathematical (simple algebra only) but physical concepts. Prereq., ASTR 1020, 1040, or 1120. Approved for arts and sciences core curriculum: natural science.

**ASTR 3300-3. Extraterrestrial Life.** Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Prereq., one-year sequence in a physical science. Same as GEOL 3300.

**ASTR 3510-4. Observations and Instrumentation 1.** Lab course in astronomical observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, basic optical design and instrumentation, and statistical analysis of data, with emphasis on imaging applications. Some night observation sessions are required. Prereq. or coreq., Calculus 2 (MATH 2300 or APPM 1360), one year of college physics, and one year of college astronomy. Elective for APS major and minor.

**ASTR 3520-4. Observations and Instrumentation 2.** Lab course in observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, optical design and instrumentation, and statistical analysis, with emphasis on spectroscopy. Some night observing sessions are required. Prereq., ASTR 3510 or instructor consent. Elective for APS major and minor.

**ASTR 3720-3. Planets and Their Atmospheres.** Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor. Prereq., PHYS 1110–1120, and either MATH 1300–2300, or APPM 1350–1360, or instructor consent. Same as ATOC 3720.

**ASTR 3730-3. Astrophysics 1—Stellar and Interstellar.** ASTR 3730 and 3830 provide a year-long introduction to physical processes, observations, and current research methods in stellar, interstellar, galactic, and extra-galactic astrophysics, with astronomical applications of gravity, radiation processes, spectroscopy, gas dynamics, and plasma physics. Prereqs., PHYS 1110 and 1120 and calculus (MATH 1300 and 2300, or APPM 1350 and 1360). Elective for APS major and minor.

**ASTR 3740-3. Cosmology and Relativity.** Special and general relativity as applied to astrophysics, cosmological models, observational cosmology, experimental relativity, and the early universe. Prereqs., PHYS 1110 and 1120, and either MATH 1300 and 2300, or APPM 1350 and 1360). Elective for APS major and minor.

**ASTR 3750-3. Planets, Moons, and Rings.** Approaches the physics of planets, emphasizing their surfaces, satellites, and rings. Topics include formation and evolution of planetary surfaces, history of the terrestrial planets, and dynamics of planetary rings. Both ASTR 3720 and ASTR 3750 may be taken for credit in any order. Prereqs., PHYS 1110 and 1120, and calculus (MATH 1300 and 2300, or APPM 1350 and 1360). Elective for APS major and minor.

**ASTR 3830-3. Astrophysics 2—Galactic and Extragalactic.** ASTR 3730 and 3830 provide a year-long introduction to physical processes, observations, and current research methods in stellar, interstellar, galactic, and extragalactic astrophysics, with astronomical applications of gravity, radiation processes, spectroscopy, gas dynamics, and plasma physics. Prereqs., PHYS 1110 and 1120, calculus (MATH 1300 and 2300 or APPM 1350 and 1360), and ASTR 3730. Elective for APS major and minor.

**ASTR 4010-3. Senior Practicum I: The Practice and Conduct of Science.** Intensive seminar and practicum introduction to science philosophy, methodology, ethics, interaction with society, research preparation, proposal analysis, and writing and scientific publication. Entry course for “capstone experience” involving guided research and/or practicum work. Prereq. or coreq., ASTR 3730, 3830 or ASTR 3720, 3750. Restricted to juniors and seniors in APS. Required course for receiving honors in APS. Elective for APS major and minor. Approved for arts and sciences core curriculum: critical thinking.

**ASTR 4020-3. Senior Practicum II: Guided Research.** Guided, intensive research project giving APS majors a capstone experience. This course is a framework for guided practicum work at the observatory, the planetarium, the Space Grant College, an instrument/satellite laboratory, or with individual professors in the department. Prereq., ASTR 4010. Restricted to juniors and seniors in APS.

**ASTR 4800-3. Space Science: Practice and Policy.** Exposes students to current controversies in science that illustrate the scientific method and the interplay of observation, theory, and science policy. Students research and debate both sides of the issues, which include strategies and spin-offs of space exploration, funding of science, big vs. small science, and scientific heresy and fraud. Prereqs., ASTR 1110 and 1120, or equivalent, or PHYS 1110 and 1120, or PHYS 2010 and 2020. Approved for the arts and sciences core curriculum: critical thinking.

**ASTR 4840 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 5110-3. Internal Processes 1.** Explores thermal, mechanical, quantum, and radiative processes in gases and plasmas, emphasizing spectroscopy, atomic and molecular physics, statistical mechanics, and kinetic theory, with applications to astrophysics, planetary physics, and plasmas. Prereq., undergraduate physics.

**ASTR 5120-3. Internal Processes 2.** A second-semester continuation of ASTR 5110. Introduces graduate students in astrophysics and planetary sciences to radiative transfer in continuum and lines, fluid dynamics of compressible gases, flows in gravity, shock waves, and MHD, with application to stars, planets, and gas in space. Prereq., ASTR 5110.

**ASTR 5140-3. Astrophysical and Space Plasmas.** Teaches magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies. Prereq., graduate standing in APS or physics. Same as PHYS 5141.

**ASTR 5150-3. Introductory Plasma Physics.** Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear

fusion concepts, astrophysical applications, and experimental plasma physics (laboratory). Same as PHYS 5150.

**ASTR 5300-3. Introduction to Magnetospheres.** Introduces solar and stellar winds, and planetary and stellar magnetospheres. Acquaints students with the guiding center theory for particle motion, magnetospheric topology, convection, radiation belts, magnetic storms and substorms, and auroras.

**ASTR 5400-3. Introduction to Fluid Dynamics.** Covers equations of fluid motion relevant to planetary atmospheres and oceans, as well as stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers, and wave motions. Introduces instability theory, nonlinear equilibration, and computational methods in fluid dynamics. Same as ATOC 5400.

**ASTR 5410-3. Fluid Instabilities, Waves, and Turbulence.** Involves linear and nonlinear analyses of small-scale waves and instabilities in stratified fluids, with effects of rotation. Studies internal gravity and acoustic waves with terrestrial, planetary, and astrophysical applications. Also studies thermal and double-diffusive convection, homogeneous and stratified shear flow instabilities. Examines these topics from the onset of small amplitude disturbances to their nonlinear development and equilibration. Prereq., ASTR 5400 or ATOC 5060. Same as ATOC 5410.

**ASTR 5540-3. Mathematical Methods.** Presents an applied mathematics course designed to provide the necessary analytical and numerical background for courses in astrophysics, plasma physics, fluid dynamics, electromagnetism, and radiation transfer. Topics include integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Draws illustrative examples from the areas of physics listed above. Same as ATOC 5540.

**ASTR 5560-3. Radiative Processes in Planetary Atmospheres.** Applies radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect; and inversion methods and climate models. Prereqs. or coreqs., ATOC 5225 or ASTR 5110. Recommended prereq., ATOC 5235. Same as ATOC 5560.

**ASTR 5700-3. Stellar Structure and Evolution.** Examines basic stellar astronomy: stellar classifications, kinematics, populations and distributions, and H-R diagrams. Covers principles of stellar structure, including energy generation and energy transport by radiation and convection. Includes stellar evolution theory, including compact objects. Prereq., undergraduate physics.

**ASTR 5710-3. High-Energy Astrophysics.** Studies astrophysics of UV, x-ray, gamma-ray, and cosmic-ray sources, including fundamentals of radiative and particle processes, neutron stars, black holes, pulsars, quasars, supernovas and their remnants; stellar flares; accretion disks; binary x-ray sources; and other cosmic x-ray sources. Prereq., senior-level undergraduate physics.

**ASTR 5720-3. Galaxies.** Highlights the classification, structure, content, dynamics, and other observational properties of galaxies, active galaxies, and clusters of galaxies. Discusses Hubble's Law, the cosmic distance scale, and the intergalactic medium. Prereq., undergraduate physics.

**ASTR 5730-3. Stellar Atmospheres and Radiative Transfer.** Explores stellar atmospheres: basic stellar atmospheres, spectral line formation, interpretation of stellar spectra, and model atmospheres. Examines solar physics: the Sun as a star, solar cycle, chromospheric and coronal structure, energy balance, magnetic field, and solar wind. Prereqs., ASTR 5110 and undergraduate physics.

**ASTR 5740-3. Interstellar Astrophysics.** Highlights structure, dynamics, and ecology of the interstellar medium, stressing the physical mechanisms that govern the thermal, ionization, and dynamic state of the gas and dust; observations at all wavelengths; star formation; and relation to external galaxies. Prereq., ASTR 5110 or instructor consent.

**ASTR 5750-3. Observational Astronomy.** Surveys the tools of observational astronomy, emphasizing practical applications. Topics include telescopes, instruments, detectors, and techniques used from x-ray to radio wave lengths and error analysis and data reduction techniques. Gives hands-on experience with the Sommers-Bausch Observatory telescope, CCD, and image processing facility. Prereq., senior-level undergraduate physics or instructor consent.

**ASTR 5760-3. Astrophysical Instrumentation.** Covers the fundamentals underlying the design, construction, and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include Fourier transforms and their applications, optical design concepts, incoherent and coherent signal detection, electronics and applications, and signal acquisition and processing. Prereq., undergraduate physics.

**ASTR 5770-3. Cosmology.** Studies the smooth universe, including Friedmann-Robertson-Walker metric, Friedmann equations, cosmological parameters, inflation, primordial nucleosynthesis, recombination, and cosmic microwave background. Also studies the lumpy universe, including linear growth of fluctuations, power spectra of CMB and galaxies, dark matter, and large scale flows. Covers galaxy formation and intergalactic medium. Prereq., undergraduate physics, graduate standing, or instructor consent.

**ASTR 5800-3. Planetary Surfaces and Interiors.** Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors, and the integrated geologic histories of the terrestrial planets and satellites. Prereq., graduate standing in physical sciences or instructor consent. Same as GEOL 5800.

**ASTR 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Includes the origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres—past and future. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC 5810 and GEOL 5810.

**ASTR 5820-3. Origin and Evolution of Planetary Systems.** Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings, and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies. Prereq., graduate standing in physical sciences or instructor consent. Same as GEOL/ATOC 5820.

**ASTR 5830-3. Topics in Planetary Science.** Examines current topics in planetary science, based on recent discoveries, spacecraft observations, and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be taken twice for credit. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC 5830 and GEOL 5830.

**ASTR 5835-1. Seminar in Planetary Science.** May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent; undergraduate physics. Same as ATOC/GEOL 5835.

**ASTR 5920 (1-6). Reading and Research in Astrophysical and Planetary Sciences.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 6000-1. Seminar in Astrophysics.** Studies current research and research literature on an astrophysical topic. Students and faculty give presentations. Subjects vary each semester. May be repeated for a total of 4 credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent.

**ASTR 6610-3. Earth and Planetary Physics 1.** Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition, and state of the interior of the Earth. Same as GEOL 6610 and PHYS 6610.

**ASTR 6620-3. Earth and Planetary Physics 2.** Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth. Same as GEOL 6620 and PHYS 6620.

**ASTR 6630-3. Earth and Planetary Physics 3.** Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere. Same as GEOL 6630 and PHYS 6630.

**ASTR 6940 (1-3). Master's Degree Candidate.**

**ASTR 6950 (1-6). Master's Thesis.**

**ASTR 7160-3. Intermediate Plasma Physics.** Prereq., PHYS 5150 or instructor consent. Same as PHYS 7160.

**ASTR 7500 (1-3). Special Topics in Astrophysical and Planetary Sciences.** Acquaints students with current research in astrophysical and planetary sciences. (Topics vary each semester.) May be repeated up to 9 total credit hours.

**ASTR 7510 (1-3). Special Topics in Astrophysical and Planetary Science.** May be repeated up to 3 total credit hours.

**ASTR 7920 (1-6). Reading and Research in Astrophysical and Planetary Sciences.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Atmospheric and Oceanic Sciences

**ATOC 1050-3. Weather and the Atmosphere.** Introduces principles of modern meteorology for nonscience majors, with emphasis on scientific and human issues associated with severe weather events. Includes description, methods of prediction, and impacts of blizzards, hurricanes, thunderstorms, tornadoes, lightning, floods, and firestorms. Approved for arts and sciences core curriculum: natural science.

**ATOC 1060-3. Our Changing Environment: El Niño, Ozone, and Climate.** Discusses the Earth's climate for nonscience majors, focusing on the role of the atmosphere, oceans, and land surface. Describes the water cycle, atmospheric circulations, and ocean currents, and how they influence global climate, El Niño, and the ozone hole. Discusses human impacts from climate change. Prereq., ATOC 1050. Approved for arts and sciences core curriculum: natural science.

**ATOC 1070-1. Weather and the Atmosphere Laboratory.** Optional laboratory for ATOC 1050. Laboratory experiments illustrate fundamentals of meteorology. Covers collection, analysis, and discussion of data related to local weather. Uses computers for retrieval and interpretation of weather data from Colorado and across the U.S. Prereq. or coreq., ATOC 1050 or instructor consent. Approved for arts and sciences core curriculum: natural science.

**ATOC 3180-3. Aviation Meteorology.** Familiarizes students with a wide range of atmospheric behavior pertinent to air travel: rudiments of aerodynamics; aircraft stability and control; atmospheric circulation, vertical motion, turbulence, and wind shear; fronts, clouds, and storms. Prereq., ATOC 1050 or equivalent. Approved for arts and sciences core curriculum: natural science.

**ATOC 3300-3. Analysis of Climate and Weather Observations.** Discusses instruments, techniques, and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting, and climate change trends. Uses computers to access data sets and process data. Prereqs., ATOC 1050 or ATOC 3600/GEOG 3601, or GEOG 1001; and a statistics course. Same as GEOG 3301. Approved for arts and sciences core curriculum: natural science.

**ATOC 3500-3. Air Chemistry and Pollution.** Examines the composition of the atmosphere, and sources of gaseous and particulate pollutants: their chemistry, transport, and removal from the atmosphere. Applies general principles to acid rain, smog, and stratospheric ozone depletion. Prereqs., two semesters chemistry. Approved for arts and sciences core curriculum: natural science.

**ATOC 3600-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability, and global change. Includes forecasting climate and its application and human dimensions. Prereqs., one semester calculus or instructor consent. Same as GEOG 3601 and ENVS 3600. Approved for arts and sciences core curriculum: natural science.

**ATOC 3720-3. Planets and Their Atmospheres.** Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor. Prereq., PHYS 1110–1120, and either MATH 1300–2300, or APPM 1350–1360, or instructor consent. Same as ASTR 3720.

**ATOC 4215-3. Oceanography.** Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems. Prereq., senior standing. Same as ATOC 5215 and ASEN 4215.

**ATOC 4720-3. Introduction to Atmospheric Physics and Dynamics.** Introduces physical and dynamic processes in the atmosphere, including thermodynamics of dry and moist processes; equations of motion on rotating planets; descriptive meteorology and climate; anatomy of circulations at various scales; vorticity dynamics; and application to synoptic disturbances. Prereqs., one year of calculus and one year of physics with calculus.

**ATOC 4750-3. Desert Meteorology and Climate.** Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate, and the impact of desert climate on humans. Prereqs., calculus, physics, ATOC 1050 or equivalent.

**ATOC 4800-3. Policy Implications of Climate Controversies.** Examines controversial issues related to the environment, including climate change. Covers scientific theories and the intersection between science and governmental policy. Includes discussion, debate, and critical reading of textual materials. Students may not receive credit for both ATOC 4800 and ATOC 5000. Prereqs., ATOC 1060 or 3600. Approved for arts and sciences core curriculum: critical thinking.

**ATOC 4900 (1-3). Independent Study.** Prereq., instructor consent. May be repeated up to 6 total credit hours.

**ATOC 4950 (1-3). Honors Thesis.** Students work independently on a research topic under the guidance of a faculty member. A written thesis and an oral presentation of the work are required. Registration by arrangement and with consent of faculty mentor. Prereq., junior or senior standing, and minimum 3.00 GPA.

**ATOC 5000-3. Critical Issues in Climate and the Environment.** Discusses current issues such as ozone depletion, global warming, and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments, and critically evaluate these issues. Same as ENVS 5830. Students may not receive credit for both ATOC 4800 and 5000.

**ATOC 5060-3. Dynamics of the Atmosphere.** Examines large-scale motions in a stratified rotating atmosphere, and quasi-geostrophic flow, barotropic and baroclinic instabilities, cyclogenesis, global circulations, and boundary layer processes. Ageostrophic motions, including Kelvin waves, internal gravity waves, and the theory of frontogenesis are also considered. Prereqs., ATOC 5400 or equivalent. PAOS graduate core course.

**ATOC 5061-3. Dynamics of Oceans.** Explores theories of the large-scale, wind-driven, and thermohaline circulations in the oceans, and models of boundary currents, western intensification, ventilation, equatorial surface and undercurrents, ocean waves, and eddies. Prereqs., ATOC 5400 and 5060, or equivalent.

**ATOC 5151-3. Atmospheric Chemistry.** Reviews basis kinetics and photochemistry of atmospheric species and stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidation capacity of the atmosphere, and global climate change. Prereq., graduate standing or instructor consent. PAOS graduate core course. Same as CHEM 5151.

**ATOC 5215-3. Oceanography.** Same as ATOC 4215 and ASEN 5215.

**ATOC 5220-3. Nonlinear Dynamics.** Explores conservative systems: canonical perturbation theory, adiabatic invariants, surface of section, overlap criterion, orbit stability, quasilinear diffusion, renormalization analysis of transition to chaos, and bifurcation theory: center manifolds, normal forms, singularity theory. Dissipative systems: strange attractors, renormalization analysis of period doubling, intermittency. Prereq., PHYS 5210 or instructor consent. Same as PHYS 5220.

**ATOC 5235-3. Remote Sensing of Atmospheres and Oceans.** Examines fundamentals of radiative transfer; extinction and scattering-based passive remote sensing; emission-based passive remote sensing; principles of active remote sensing; multi-sensor and multi-wavelength approaches to satellite remote sensing; and future satellite systems and validation programs. PAOS graduate core course. Same as ASEN 5235.

**ATOC 5400-3. Introduction to Fluid Dynamics.** Covers equations of fluid motion relevant to planetary atmospheres and oceans, and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers, and wave motions. Introduces instability theory, nonlinear equilibration, and computational methods in fluid dynamics. Prereq., partial differential equations or equivalent. Same as ASTR 5400.

**ATOC 5410-3. Fluid Instabilities, Waves, and Turbulence.** Nonlinear waves and instabilities; wave-mean and wave-wave interactions, resonant triads; secondary instability and transition to turbulence; diagnosis, modeling, and parameterization of turbulent flows in geophysics and astrophysics. Prereq., ASTR 5120, ATOC 5060, or 5400. Same as ASTR 5410.

**ATOC 5540-3. Mathematical Methods.** Applied mathematics course; provides necessary analytical background for courses in plasma physics, fluid dynamics, electromagnetism, and radiative transfer. Covers integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Same as ASTR 5540.

**ATOC 5560-3. Radiative Processes in Planetary Atmospheres.** Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect, inversion methods and climate models. Recommended prereq., ATOC 5235. Same as ASTR 5560.

**ATOC 5600-3. Physics and Chemistry of Clouds and Aerosols.** Clouds and aerosols are ubiquitous in planetary atmospheres, where they impact climate, atmospheric chemistry, remote sensing, and weather. Applies basic microphysical, radiative, and chemical processes affecting particles to issues in current literature. PAOS graduate core course.

**ATOC 5720-3. Introduction to Atmospheric Physics and Dynamics.** Same as ATOC 4720.

**ATOC 5760-3. Astrophysical Instrumentation.** Covers the fundamentals underlying the design, construction, and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include: Fourier transforms and their applications; optical design concepts; incoherent and coherent signal detection; electronics and applications; signal acquisition and processing. Prereq., graduate standing.

**ATOC 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Also includes origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres past and future. Prereq., graduate standing in a physical science, or instructor consent. Same as ASTR/GEOL 5810.

**ATOC 5820-3. Origin and Evolution of Planetary Systems.** Reviews protoplanetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets and asteroids, planetary rings, and extrasolar planets. Applies celestial mechanics to the orbital evolution of solar system bodies. Prereq., graduate standing in a physical science, or instructor consent. Same as ASTR 5820 and GEOL 5820.

**ATOC 5830-3. Topics in Planetary Science.** Covers current topics in planetary science based on recent discoveries, spacecraft observations, or other developments. Focuses on a specific topic such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be repeated up to 6 total credit hours, provided the topics vary. Prereq., graduate standing in physical sciences, or instructor consent. Same as ASTR 5830 and GEOL 5830.

**ATOC 5835-1. Seminar in Planetary Science.** Studies current research on a topic in planetary science. Subjects may vary each semester. May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent. Same as ASTR 5835 and GEOL 5835.

**ATOC 5900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ATOC 5950-3. Seminar: Climatic Change.** Cross-disciplinary survey of evidence for and theories of climatic change. Prereq., instructor consent. Same as GEOG 5951.

**ATOC 6020-1. Seminar in Atmospheric and Oceanic Sciences.** Studies an area of current research in the atmospheric and oceanic sciences. Students read

selected papers from the literature. Students and faculty give presentations and participate in discussions. May be repeated for a total of 6 credit hours. Prereq., graduate standing and instructor consent.

**ATOC 6100-3. Predicting Weather and Climate.** Discusses background theory and procedures used in weather and climate prediction on a variety of space and time scales. Includes the forecasting of weather on time scales of days; error growth in numerical models; prediction of El Niño and monsoon variability; and prediction of the impact of anthropogenic influences on climate. Consists of lectures and a weekly laboratory. Prereq., ATOC 5060, 5061, or instructor consent.

**ATOC 6940 (1-3). Master's Degree Candidate.**

**ATOC 6950 (1-6). Master's Thesis.**

**ATOC 7500 (1-3). Special Topics in Atmospheric and Oceanic Sciences.** Acquaints students with current research in atmospheres, oceans, and climate. (Topics may vary each semester). May be repeated up to 9 total credit hours.

**ATOC 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Baker Residential Academic Program

**BAKR 1300-3. Ecosystems of Colorado.** Explores the structure, function, and origin of the major biological communities in Colorado. Students gain understanding of basic ecological principles, the evolutionary history of the region, and human impacts on biological communities. Approved for arts and sciences core curriculum: natural science.

**BAKR 1500-3. Colorado: History, Ecology, and Environment.** Studies the Colorado environment from multiple aspects of history and ecology. Presents historical events in their environmental context and examines lingering environmental consequences. Presents major habitats within Colorado and relates their historical and present uses. Lecture and field trips. Approved for arts and sciences core curriculum: United States context.

## Biological Sciences

*See Ecology and Evolutionary Biology; Molecular, Cellular, and Developmental Biology; and Integrative Physiology.*

## Central and East European Studies

**CEES 2002-3. Introduction to Central and East European Studies.** Examines major themes in the history of Russia and East-Central Europe since the early modern era, introduces the literature and arts of the region, and presents current political, social, and economic issues. Same as HIST 2002. Approved for arts and sciences core curriculum: historical context.

## Chemistry and Biochemistry

**CHEM 1011-3. Environmental Chemistry 1.** Lect. Introduces basic principles of chemistry with applications to current environmental issues including toxic chemicals, air and water pollution, energy sources and their environmental impact, and climate change resulting from the greenhouse effect. No credit given for CHEM 1011 if students already have credit in any chemistry course numbered 1051 or higher. Approved for arts and sciences core curriculum: natural science.

**CHEM 1021-4. Introductory Chemistry.** Lect., rec., and lab. For students with no high school chemistry or a very weak chemistry background. Remedies a deficiency in natural science MAPS requirements and prepares students for CHEM 1111. No credit is given for CHEM 1021 if students have credit for any other college-level chemistry course. Prereq., one year high school algebra or concurrent enrollment in MATH 1150 or MATH 1000, 1010, and 1020. Approved for arts and sciences core curriculum: natural science.

**CHEM 1031-4. Environmental Chemistry 2.** Lect., rec., and lab. Applications of chemical principles to current environmental issues including acid rain,

stratospheric ozone depletion, the Antarctic ozone hole, solar energy conversion and fuel cells, and the environmental consequences of nuclear war. Laboratory experience is included. No credit given for CHEM 1031 if students already have credit in any college-level chemistry course numbered 1071 or higher. Prereq., CHEM 1011 with a grade of C- or higher. Approved for arts and sciences core curriculum: natural science.

**CHEM 1051-4. Introduction to Chemistry.** Lect., rec., and lab. First course in principles of chemistry. CHEM 1051-1071 satisfies part of the natural science requirement of the College of Arts and Sciences. Prereq., one year high school algebra or math modules, MATH 1000, 1010, and 1020. Approved for arts and sciences core curriculum: natural science.

**CHEM 1071-4. Introduction to Organic and Biochemistry.** Lect., rec., and lab. Essential topics in organic and biochemistry. CHEM 1111 and 1071 completes the chemistry requirement for kinesiology students. Prereq., CHEM 1131 or 1151. CHEM 1071 does not replace CHEM 1131 or 1171 as a prereq. for CHEM 3311 or 3351. Approved for arts and sciences core curriculum: natural science.

**CHEM 1111-5. General Chemistry 1.** Lect., rec., lab. Introductory college-level chemistry course for students who have taken high school chemistry and whose academic plans require advanced work in chemistry or who wish to satisfy the natural science requirement at a more advanced level than CHEM 1051-1071. Prereqs., one year high school chemistry or minimum grade C- in CHEM 1001 or 1021; high school algebra. Not recommended for students with grades below B- in CHEM 1001 or 1021. Not open to engineering students except by special arrangement. Similar to CHEM 1151, CHEN 1211. Approved for arts and sciences core curriculum: natural science.

**CHEM 1131-5. General Chemistry 2.** Lect., rec., and lab. Continuation of CHEM 1111. For students who intend to take advanced chemistry courses. Subject areas include acids and bases, solubility and complex ion equilibria, transition metal chemistry, chemical kinetics, electrochemistry, and nuclear chemistry. Prereq., CHEM 1111 or equivalent, with a grade of C- or higher. Students may receive credit for only one of CHEM 1131 and 1171. Approved for arts and sciences core curriculum: natural science.

**CHEM 1151-5. Honors General Chemistry 1.** Lect., rec., and lab. Principles of chemistry and their applications are covered in a comprehensive manner (honors level) in this low-enrollment freshman course. Lectures include topics not covered in CHEM 1111–1131. The laboratory experience is more extensive; therefore, the CHEM 1151–1171 sequence is highly recommended for well-prepared students who intend to major in chemistry, chemical engineering, physics, molecular biology, or related areas. Prereqs., one year high school chemistry; four years of high school math and/or a high score on the SAT or ACT math exam and one year of high school physics. Similar to CHEM 1111 and CHEN 1211. Approved for arts and sciences core curriculum: natural science.

**CHEM 1171-5. Honors General Chemistry 2.** Lect., rec., and lab. Continuation of CHEM 1151. Students may receive credit for only one of CHEM 1131 and 1171. Prereq., CHEM 1151 with grade of C- or higher. Approved for arts and sciences core curriculum: natural science.

**CHEM 1221-2. Engineering General Chemistry Lab.** Coreq., CHEN 1211. One hour recitation in which concepts and problems are re-emphasized, homework is collected, and quizzes are given. Three hour lab in which students perform experiments designed to illustrate chemical concepts discussed in CHEN 1211. Also introduction to basic techniques in chemical measurements and synthesis. Prereq., one year high school chemistry or minimum grade of C- in CHEM 1001 or 1021; high school algebra. Coreq., CHEN 1211. Similar to CHEM 1111 and CHEM 1151.

**CHEM 3311-4. Organic Chemistry 1.** Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkanes, alkenes, alkynes, alkyl halides, and aromatic molecules; nomenclature of organic compounds; stereochemistry; reaction mechanisms and dynamics. Students may receive credit for only one of CHEM 3311 and 3351. Prereq., CHEM 1131 or 1171 or equivalent, with a grade of C- or higher (for engineering students only; CHEN 1211 or equivalent with a grade of C- or higher); coreq., CHEM 3321 or 3361.

**CHEM 3321-1. Laboratory in Organic Chemistry 1.** Lab. Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, and aromatic compounds. Stereochemical modeling and the identification of organic unknowns by spectroscopic and chemical methods are also introduced. Prereqs., CHEM 1131, 1171, CHEN 1211, or equivalent with a grade of C- or better; coreq., CHEM 3311 or 3351. For biochemistry and nonchemistry majors. Students may receive credit for only one of CHEM 3321 and 3361.

**CHEM 3331-4. Organic Chemistry 2.** Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkyl halides, alcohols, ethers, carboxylic acids, aldehydes, ketones, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; synthesis; and reaction techniques. Students may receive credit for only one of CHEM 3331 and 3371. Prereq., CHEM 3311 or 3351 and CHEM 3321 or 3361 with grades of C- or higher; prereq. or coreq., CHEM 3341 or 3381.

**CHEM 3341-1. Laboratory in Organic Chemistry 2.** Lab. For biochemistry and nonchemistry majors. Instruction in experimental techniques of modern organic chemistry emphasizing reactions involving alcohols, ketones, carboxylic acids, and their derivatives. Multistep syntheses are also introduced. Prereq., CHEM 3321 or 3361 with a grade of C- or higher; coreq., CHEM 3331 or 3371.

**CHEM 3351-4. Organic Chemistry 1 for Chemistry and Biochemistry Majors.** Lect. and rec. Topics include structure and reactions of alkanes, alkenes, alkynes, alcohols, ethers, aldehydes, ketones, and alkyl halides; nomenclature of organic compounds; stereochemistry; reaction mechanisms. Students may receive credit for only one of CHEM 3311 and 3351. Prereq., CHEM 1131 or 1171 with a grade of C- or higher; coreq., CHEM 3361 or 3321.

**CHEM 3361-2. Laboratory in Organic Chemistry 1 for Chemistry Majors.** Lab. Required course for chemistry majors. Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, alcohols, ketones, and alkyl halides. Explores stereochemical modeling and the identification of organic unknowns. Prereq., CHEM 1131, 1171, or equivalent with a grade of C- or higher; coreq., CHEM 3351 or 3311. Students may receive credit for only one of CHEM 3361 and 3321.

**CHEM 3371-4. Organic Chemistry 2 for Chemistry and Biochemistry Majors.** Lect. and rec. Topics include structure and reactions of carboxylic acids and derivatives, aromatic compounds, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; reaction mechanisms. Students may receive credit for only one of CHEM 3331 and 3371. Prereq., CHEM 3351 or 3311 and CHEM 3361 or 3321 with grades of C- or higher; prereq. or coreq., CHEM 3381 or 3341.

**CHEM 3381-2. Laboratory in Organic Chemistry 2 for Chemistry Majors.** Lab. Required course for chemistry majors. Instruction in experimental techniques of modern chemistry, emphasizing reactions involving alcohols, ketones, carboxylic acids, aromatic compounds, and their derivatives. Multistep syntheses are also introduced. Prereqs., CHEM 3321 or 3361 and CHEM 3341 with grades of C- or higher. Prereq. or coreq., CHEM 3331 or 3371.

**CHEM 4011-3. Modern Inorganic Chemistry.** Lect. Required course for chemistry majors. Introduces modern inorganic chemistry for undergraduates. Includes atomic structure, chemical periodicity, structure and bonding in molecules and crystals, reaction mechanisms, chemistry of selected main group and transition elements, and emphasis on catalyst, materials, bioinorganic, and organometallic systems. Prereq., CHEM 4411 or 4511.

**CHEM 4021-3. Inorganic Laboratory.** One lect. and two 3-hour labs per week. Instruction in experimental techniques of modern inorganic chemistry. Includes syntheses and spectroscopic characterizations of transition metal and main group compounds, experience in manipulation of air sensitive compounds, and techniques involving unusual conditions of pressure or temperature. Prereq., CHEM 4011.

**CHEM 4171-3. Instrumental Analysis.** Lect. Theory and practice of instrumental methods of chemical analysis including atomic and molecular spectroscopy, gas and liquid chromatography, mass spectrometry, and electrochemistry. Prereqs., CHEM 3331 or 3371.

**CHEM 4181-4. Instrumental Analysis Laboratory with Environmental Emphasis.** One lect. and six hours of lab per week. Instruction and experience in using instrumental methods of analysis to address problems in chemistry, biochemistry, industrial chemistry, and environmental chemistry. Prereq., CHEM 4171. Approved for arts and sciences core curriculum: critical thinking.

**CHEM 4411-3. Physical Chemistry with Biochemistry Applications 1.** Lect. Introduces thermodynamics and kinetics, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibria, solution chemistry, transport properties, multiple site binding phenomena, and the rates of chemical and biochemical reactions. Alternative to CHEM 4511. Designed for biochemistry and biology majors. Prereqs., CHEM 3311 or 3351, MATH 2400 or APPM 2350, and PHYS 1110 or 2010, or instructor

consent. Prereq. or coreq., PHYS 1120 or 2020. Same as CHEM 5411. Students may receive credit for only one of CHEM 4411, 4511, or 5411.

**CHEM 4431-3. Physical Chemistry with Biochemistry Applications 2.** Lect. Principles of physical chemistry (second semester) for students in the biological sciences. Topics include quantum mechanics, chemical bonds, principles of spectroscopy, statistical mechanics, and transport processes with application to biological systems. Mathematical background (integral and differential calculus including partial differentiation) required. Prereq., CHEM 4411 or 4511, and MATH 2400 or APPM 2350, and PHYS 1120 or 2020. Students may receive credit for only one of CHEM 4431, 4531, or 5431.

**CHEM 4511-3. Physical Chemistry 1.** Lect. Chemical thermodynamics and kinetics. Includes study of laws of thermodynamics, thermochemistry, entropy, free energy, chemical potential, chemical equilibria, and the rates and mechanisms of chemical reactions. Prereqs., CHEM 3311 or 3351, MATH 2400 or APPM 2350, and PHYS 1110, or instructor consent. Coreq., PHYS 1120. Students may receive credit for only one of CHEM 4511, 4411, or 5411.

**CHEM 4521-3. Physical Chemistry for Engineers.** Covers kinetic theory of gases; chemical equilibrium; electrochemistry; chemical kinetics; quantum mechanics and atomic structure; chemical bonding; spectroscopy; statistical mechanics; the solid state; the liquid state; and surface chemistry. Prereq., CHEN 1211 or CHEM 1111/1131.

**CHEM 4531-3. Physical Chemistry 2.** Lect. Introduces the quantum theory of atoms, molecules and chemical bonding, and statistical thermodynamics. Includes principles of quantum mechanics and their application to atomic structure, molecular spectroscopy, symmetry properties, and the determination of molecular structure. Also includes principles of statistical mechanics and their applications to properties of gases, liquids, and solids. Prereqs., CHEM 4511 or 4411 and PHYS 1120 or 2020. Students may receive credit for only one of CHEM 4531, 4431, or 5431.

**CHEM 4541-2. Physical Chemistry Laboratory for Engineers.** One lect. and one 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments are chosen to illustrate the principles of thermodynamics, chemical kinetics, quantum chemistry, and spectroscopy discussed in CHEM 4521. Prereq. or coreq., CHEM 4521 or 4531.

**CHEM 4561-3. Experimental Physical Chemistry.** One lect. and two 3-hour labs per week. Instruction in experimental techniques of modern physical chemistry, emphasizing experiments illustrating fundamental principles of chemical thermodynamics, quantum chemistry, statistical mechanics, and chemical kinetics. For chemistry majors. Prereq., CHEM 4411 or 4511 or equivalent course in thermodynamics. Prereq. or coreq., CHEM 4431 or 4531.

**CHEM 4581-1. Physical Chemistry Lab 1.** One 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments illustrate the fundamental principles of thermodynamics and chemical kinetics. Illustrates the material discussed in CHEM 4511. Prereq. or coreq., CHEM 4411 or CHEM 4511.

**CHEM 4591-2. Physical Chemistry Lab 2.** One lect. and one 3-hour laboratory every two weeks. A continuation of CHEM 4581, but may be taken concurrently with CHEM 4531 or CHEM 4431. Experiments illustrate the principles of quantum chemistry and spectroscopy discussed in CHEM 4531. Prereq., CHEM 4411 or 4511 and CHEM 4581. Prereq. or coreq., CHEM 4431 or 4531.

**CHEM 4611-3. Survey of Biochemistry.** One-semester survey of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome, and cellular signaling. For biology and engineering majors and others wanting a survey of biochemistry. Prereq., one year of organic chemistry or instructor consent.

**CHEM 4711-3. General Biochemistry 1.** Lect. Topics include structure, conformation, and properties of proteins, nucleic acids, carbohydrates, and membranes; enzyme mechanisms, kinetics, and regulation; intermediary metabolism; energetics and metabolic control; electron transport and oxidative phosphorylation. Prereq., CHEM 3331 or CHEM 3371. Same as CHEM 5711.

**CHEM 4731-3. General Biochemistry 2.** Lect. Continuation of CHEM 4711. Metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; biosynthesis and function of macromolecules including DNA, RNA, and proteins; biochemistry of subcellular systems; and special topics. Prereq., CHEM 4711. Same as CHEM 5731.

**CHEM 4761-4. Biochemistry Laboratory.** Two 5-hour periods per week. The first hour of each period is lecture, the remainder is laboratory. Introduction to modern biochemical techniques. Topics include enzymology, spectrophotometry, electrophoresis affinity chromatography, radioisotopes, recombinant DNA, and molecular cloning. Prereq., CHEM 4711. CHEM 4731 or MCDB 3500 highly recommended. Approved for arts and science core curriculum: critical thinking.

**CHEM 4901 (1-6). Independent Study in Chemistry and Biochemistry.** For undergraduate study. May be repeated up to 8 total credit hours. Prereq., instructor consent.

**CHEM 5011-3. Advanced Inorganic Chemistry 1.** Lect. Inorganic chemistry based on principles of bonding, structure, reaction mechanisms, and modern synthetic methods. Chemistry and general properties of representative and transition elements and their compounds. Prereqs., CHEM 4011 and 4531, or graduate standing.

**CHEM 5061-3. Advanced Inorganic Chemistry 2.** Lect. Studies modern coordination chemistry. Includes a description of bonding and properties of coordination compounds in terms of the ligand field and molecular orbital theories. Prereq., graduate standing.

**CHEM 5151-3. Atmospheric Chemistry.** Lect. Basic kinetics and photochemistry of atmospheric species. Stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidative capacity of the atmosphere, and global climate change. Prereq., graduate standing or instructor consent. Same as ATOC 5151.

**CHEM 5161-3. Analytical Spectroscopy.** Lect. Special topics in spectrochemical analysis, including atomic and molecular spectroscopy, laser analytical methods, electron spectroscopy, surface analytical methods, and their applications to environmental, atmospheric, and bioanalytical problems. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5171-3. Electroanalytical Chemistry.** Lect. Establishes a background for understanding electrochemical systems through a review of the relevant thermodynamic, kinetic, and electronic principles. Compares classical and modern electrochemical methods of analysis. Several special topics are discussed in depth. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5181-3. Mass Spectrometry and Chromatography.** Mass spectrometry, including instrumentation, ionization techniques, and interpretation of mass spectra. Analytical separation processes, with special reference to the theory and practice of liquid and gas chromatography. Combined techniques (e.g., GC-MS), and applications. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5311-3. Advanced Synthetic Organic Chemistry.** Lect. Surveys synthetic transformations emphasizing important functional group transformations and carbon-carbon, bond-forming reactions. Required of all organic chemistry graduate students. Prereq., one year of organic chemistry.

**CHEM 5321-3. Advanced Physical Organic Chemistry.** Lect. Modern concepts of physical organic chemistry and their use in interpreting data in terms of mechanisms of organic reactions and reactivities of organic compounds. Required of all organic chemistry graduate students. Prereqs., one year of organic chemistry and one year of physical chemistry.

**CHEM 5331 (2-3). Advanced Spectroscopic Techniques in Organic Chemistry.** Lect. Advanced spectroscopic techniques for structure and determination in organic chemistry. Emphasizes proton and carbon-13 NMR spectroscopy. Prereqs., one year of organic chemistry and one year of physical chemistry.

**CHEM 5411-3. Physical Chemistry with Biochemistry Applications 1.** Lect. Introduces thermodynamics and kinetics, emphasizing macromolecules and biochemical applications. Intended for biology graduate students. Not open to students in chemistry or other physical sciences. Prereqs., three semesters of calculus, one year of physics, and instructor consent or graduate standing. Same as CHEM 4411. Students may receive credit for only one of CHEM 5411, 4411, or 4511.

**CHEM 5431-3. Physical Chemistry with Biochemistry Applications 2.** Lect. Principles of physical chemistry (second semester) for graduate students in biology. Not open to students of chemistry or the physical sciences. Prereqs., graduate standing and CHEM 5411, or instructor consent. Same as CHEM 4431. Students may receive credit for only one of CHEM 5431, 4431, or 4531.

**CHEM 5531-3. Statistical Mechanics.** Lect. Fundamental concepts of quantum and classical statistical mechanics. Applications to properties of gases, liquids, solids, spin, and polymer systems. Reaction, fluctuation, nucleation, and relaxation phenomena. Prereq., undergraduate physical chemistry.

**CHEM 5541-3. Chemical Dynamics.** Lect. Discussion of mechanism and rate of chemical reactions from a fundamental point of view. Discusses nature of collision and develops concepts of cross section and rate constant. Theories of elementary bimolecular and decay processes are critically examined. Prereq., undergraduate physical chemistry.

**CHEM 5561-3. Methods of Molecular Biophysics.** Lect. Discusses techniques used to determine structure, function, and dynamics of macromolecules, including optical spectroscopy, magnetic resonance, diffraction, and scanning microscopy. Approved for credit toward molecular biophysics certificate. Prereq., one year physical chemistry or quantum mechanics with graduate standing or instructor consent.

**CHEM 5571-3. Surface Science.** Lect. Principles of surface science with emphasis on fundamental surface phenomena, surface techniques, and surface chemistry. Basic description of surfaces, adsorbate-surface interactions, surface kinetics, and methods of surface analysis. Surface science of interactions, surface kinetics, and methods of surface analysis. Surface science of heterogeneous catalysis, semiconductor processing, and environmental interfaces. Prereqs., undergraduate physical chemistry and graduate standing or instructor consent.

**CHEM 5581-3. Introductory Quantum Chemistry.** Lect. Basic principles and techniques of quantum mechanics with applications to questions of chemical interest. Quantum dynamics of atoms, molecules, and spin; electronic structure of atoms and molecules. Prereqs., two semesters of physical chemistry and graduate standing, or instructor consent.

**CHEM 5591-3. Advanced Molecular Spectroscopy.** Lect. Rotational, vibrational, and electronic spectra of molecules, and their interpretation in terms of the quantum theory of molecular structure. Prereqs., two semesters of physical chemistry and graduate standing, or instructor consent.

**CHEM 5661-3. Advances in Molecular Biophysics.** Discuss recent literature concerning biophysical studies of macromolecular structure and mechanism, including DNA, RNA, proteins, and their interactions. Approved for credit toward Molecular Biophysics Certificate. Prereqs., one year of physical chemistry or quantum mechanics, one year of biology, graduate standing, or instructor consent.

**CHEM 5711-3. General Biochemistry 1.** Lect. Same lectures as CHEM 4711. Course work includes library studies and preparation of special reports. Not open to undergraduates. Prereq., one year of organic chemistry and graduate standing.

**CHEM 5731-3. General Biochemistry 2.** Lect. Same lectures as CHEM 4731. Course work includes library studies and report preparations. Not open to undergraduates. Prereqs., CHEM 5711 and graduate standing, or instructor consent.

**CHEM 5771-5. Advanced General Biochemistry 1.** Lect. In-depth analysis of DNA structure and replication, RNA synthesis and processing, protein synthesis, enzyme function and mechanism, protein structure, protein dynamics, and physical chemistry of macromolecules. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Prereq., CHEM 4731 or equivalent, and graduate standing, or instructor consent.

**CHEM 5776-1. Scientific Ethics and Responsible Conduct in Research.** Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct, and development of professional values and ethical standards. Prereqs., CHEM 5771 or MCDB 5210 taken concurrently, and instructor consent. Same as MCDB 5776.

**CHEM 5781-5. Advanced General Biochemistry 2.** Lect. Detailed consideration of contemporary topics in biochemistry, including protein structure (primary, secondary, tertiary, and quaternary), methods of structure determination and prediction, protein folding (kinetics, thermodynamics, denaturation, and renaturation), and protein dynamics (internal motions and methods of analysis). Prereq., CHEM 5771 or instructor consent.

**CHEM 5801-3. Advanced Signal Transduction and Cell Cycle Regulation.** Lect. Advanced discussion of current research and literature in signal transduction, including ligands, receptors, and intracellular signaling pathways, as well as

control on transcription, chromatin structure, DNA replication, mitosis, and cell cycle progression. Recommended prereqs., CHEM 5771 and 5781, MCDB 5210 or MCDB 5220, and graduate standing.

**CHEM 5811-3. Advanced Methods in Protein Sequencing and Analysis.** Lect. Advanced discussion of current methods in protein sequencing, sequence analysis, and posttranslational modifications, emphasizing techniques of mass spectrometry, use of protein databases, sequence alignment and motifs, structure prediction, and modeling of signaling pathways. Prereq., instructor consent. Recommended prereqs., CHEM 5771, CHEM 5781, MCDB 5210, and graduate standing.

**CHEM 5821-1. Special Topics in Signaling and Cell Regulation.** Lect. Reviews and evaluates literature on subjects of current interest in signal transduction transcription, cell cycle progression, and cell regulation. Primarily for graduate level presentation of special topics by students, faculty, and research staff. May be repeated up to 5 total credit hours. Prereqs., graduate standing and instructor consent.

**CHEM 6001-1. Seminar: Inorganic Chemistry.** Student, faculty, and guest presentations and discussions of current research in inorganic chemistry and related topics (transition element and main group element compound properties, inorganic compound in biological, industrial, and materials applications). Required of all inorganic chemistry graduate students. Credit deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6021 (1-3). Special Topics in Inorganic Chemistry.** Lect. Subjects of current interest in inorganic chemistry. Primarily used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule. May be repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6101-1. Seminar: Analytical Chemistry.** Student, faculty, and guest presentations and discussions of current research in analytical chemistry. Required of all analytical chemistry graduate students. Credit deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6111 (1-3). Special Topics in Analytical Chemistry.** Lect. Subjects of current interest in analytical chemistry. Used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule. May be repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6301-1. Seminar in Organic Chemistry.** Discussions principally concerned with recent literature in organic chemistry. Required of all organic chemistry graduate students. Prereq., graduate standing or instructor consent.

**CHEM 6311 (1-3). Special Topics in Synthetic Organic Chemistry.** Lect. Selected topics in synthetic organic chemistry, encompassing both methods and/or total synthesis of complex molecules. Prereqs., CHEM 5311 and graduate standing, or instructor consent.

**CHEM 6321 (1-3). Special Topics in Physical Organic Chemistry.** Lect. Selected topics in physical organic chemistry, which may include photochemistry, carbene chemistry, free radical chemistry, molecular orbital methods, organic materials, or gas phase ion chemistry. Prereq., CHEM 5321 and graduate standing or instructor consent.

**CHEM 6401 (1-3). Seminar: Physical Chemistry.** Student, faculty, and guest presentations of current research in physical chemistry. Discussion of research topics related to the subject of weekly physical chemistry/chemical physics seminar and appropriate journal articles. Prereq., graduate standing or instructor consent.

**CHEM 6411 (1-3). Advanced Topics in Physical Chemistry.** Lect. May be repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6601-1. Biochemistry Seminar.** Required of all biochemistry graduate students. Credit is deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6711-3. Advanced Topics in Biochemistry.** Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; and protein chemistry. Presentations include faculty lectures and student reports. May be repeated up to 12 total credit

hours. Prereqs., one year of biochemistry courses, graduate standing, and instructor consent.

**CHEM 6731-3. Advanced Topics in Biochemistry.** Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; and protein chemistry. Presentations include faculty lectures and student reports. May be repeated up to 12 total credit hours. Prereqs., one year of biochemistry courses, graduate standing, and instructor consent.

**CHEM 6801-0. Departmental Research Seminar.** Lectures by visiting scientists and occasionally by staff members and graduate students on topics of current research. Meets once a week. Required for all graduate students in chemistry. Prereq., graduate standing or instructor consent.

**CHEM 6901 (1-6). Special Topics in Chemistry.** Prereq., graduate standing or instructor consent.

**CHEM 6941-3. Master's Candidate.**

**CHEM 6951 (1-6). Master's Thesis.**

**CHEM 7021-2. Seminar: Structural Inorganic Chemistry.** Current research in the area of structural inorganic chemistry. Concerns topics related to electronic and molecular structure of transition metal complexes. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7031-2. Seminar: Synthetic Chemistry of Transition Metal Compounds.** Involves study of organometallic and coordination compounds with special emphasis on methods of synthesis, characterization techniques, and reactivity studies. Studies are directed toward the synthesis and mechanistic understanding of homogeneous catalysts. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7041-1. Seminar: Bioinorganic and Organometallic Topics.** Synthetic bioinorganic and organometallic topics. Prereq., graduate standing or instructor consent.

**CHEM 7101-2. Seminar: Chromatography and Trace Analysis.** Student and faculty discussions and reports on research advances in chromatography, trace analysis, and environmental chemistry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7111-2. Seminar: Electrochemistry.** Student and faculty discussions and reports on research advances in electrochemistry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7121-2. Seminar: Analytical Spectroscopy and Kinetic Measurements.** Student and faculty discussions and reports on research advances in analytical spectroscopy and reaction rate measurements. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7141-1. Seminar: Spectroscopy at Dielectric Interfaces.** Focuses on current research results and relevant literature in the areas of Raman spectroscopy, interfacial reactions/interactions, fluorescence spectroscopy, and photoacoustic spectroscopy. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7161-1. Seminar: Heterogeneous Atmospheric Chemistry.** Topics in atmospheric chemistry emphasizing the structure and reactivity of atmospheric particulates. Presentations on current research and critical evaluations of recent literature. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7201-1. Seminar: Synthetic and Bioorganic Chemistry.** Seminar in organic and bioorganic chemistry, particularly the synthesis of complex organic molecules and their interactions with biopolymers. Included is the study of the synthesis and biological functions of complex carbohydrates and carbohydrate-containing organic molecules. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7211-1. Topics in Synthetic Methodology and Natural Product Synthesis.** Discussion of contemporary synthetic organic chemistry with a focus on new methodology and total synthesis of natural products.

**CHEM 7221-1. Seminar: Photochemistry and Free Radical Chemistry.** Current research in areas of organic free radical chemistry, photochemistry, and related topics are presented and discussed. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7231-1. Seminar: Reactive Intermediates.** Application of contemporary ideas of chemical physics to organic molecules. Special attention to structures and bonding in organic ions and radicals. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7241-1. Seminar: Synthetic Organic Chemistry.** Series of seminars on directed total synthesis. Emphasizes modern synthetic methodology and applications to total synthesis of natural products. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7271-1. Seminar: Picosecond Dynamics of Reactions.** Includes development and application of picosecond laser spectroscopy to organic and organometallic reactions. Emphasizes relationship between current theoretical developments and experiments. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7291-1. Seminar: Physical Organic Chemistry.** Modern experimental techniques and theoretical models in physical organic chemistry are discussed in relation to the development of new materials, such as molecular size tinkertoys to the development of novel photochemical systems and their spectroscopies. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7301-1. Seminar: Synthetic and Mechanistic Chemistry.** Discusses particularly the synthesis of complex organic molecules and the mechanism of reagents used in organic synthesis. Includes a study of transition metal mediated organic reactions. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7421-2. Seminar: Negative Ion Chemistry.** Chemistry of negative ions; experimental methods and designs; laser spectroscopy of ions; theoretical methods; reactive dynamics of ions in the gas phase. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7431-1. Seminar: Topics in Theoretical Chemical Physics.** Seminars presented on a variety of topics in theoretical chemical physics. Molecular collisions and unimolecular dynamics predominantly featured. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7441-2. Research Seminar: Theoretical Chemistry.** Studies theoretical description of molecular dynamics as related to rate processes. Focuses on chemical reactions in liquids, absorption-desorption on surfaces, nucleation reactions, and energy flow in molecules. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7461-1. Seminar: Gas Phase Ion Chemistry.** Studies gas phase ion chemistry relevant to thermochemical measurements and atmospheric, interstellar, and biomedical applications.

**CHEM 7481-2. Seminar: Molecular Spectroscopy and Photochemistry.** Discussion and presentation of current research in spectroscopy and photochemistry of organic as well as organometallic systems. Reviews state of the art techniques available for the theoretical and experimental characterization of excited states. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7491-1. Seminar: Molecular Vibrational Dynamics.** Topics pertaining to vibrational dynamics of small molecules are discussed, with particular emphasis upon IR laser spectroscopy, van der Waals' clusters, vibrationally induced dipole moments, and predissociation. Discussion of current research and recently published literature. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7501-1. Seminar: Theoretical Molecular Dynamics.** Variety of topics in theoretical chemical physics, emphasizing dynamics of molecules in dissipative environments or in radiation fields. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7511-1. Seminar: Reaction Dynamics in Condensed Phases.** Studies elementary steps in chemical reactions and their observation by ultrafast spectroscopy. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7521-1. Seminar: Atmospheric Kinetics and Photochemistry.** Discusses laboratory studies of degradation mechanisms. Applies these studies to atmospheric phenomena such as global warming and stratospheric ozone loss. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7531-1. Seminar: Surface Chemistry.** Topics in surface science with focus on materials processing and environmental interfaces. Emphasizes kinetic phenomena important in semiconductor fabrication and heterogeneous chem-



istry on environmental surfaces such as ice and silica. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7601-2. Seminar: Nucleic Acid Chemistry.** Topics in various aspects of current research; emphasizes student readings and presentations. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7611-1. Seminar: Structures and Dynamics of Biopolymers in Solution.** Discussion of experimental and theoretical approaches for probing structures and dynamics of proteins, peptides, and nucleic acids; and computations in molecular dynamics simulation, modeling, and geometry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7621-1. Seminar: Biochemistry and Molecular Biology of Signal Transduction.** Discusses and reviews the current literature and experimental results in signal transduction, cell cycle and tumor suppressor gene regulation. Emphasizes the understandings of molecular and biochemical mechanisms of the origin of human tumor cells. Prereq., graduate standing or instructor consent.

**CHEM 7651-2. Seminar: Environmental Biochemistry.** Topics in various aspects of current biochemical and environmental research. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7691-1. Seminar: Protein Dynamics and the Mechanism of Sensory Proteins.** Discusses recent results and current literature in the areas of the mechanism of sensory proteins, internal motions of proteins, and protein folding. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7701-1. Seminar: Enzyme Mechanisms and Kinetics.** Studies experimental approaches to understand the mechanisms of enzymic catalysis. Techniques include steady-state and pre-steady-state kinetics, isotope trapping and partitioning, inhibition by substrate analogues, and covalent modification of proteins. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7741-1. Seminar: Signal Transduction and Protein Phosphorylation.** Devoted to experimental methods for understanding mechanisms of signal transduction in mammalian cells through pathways involving regulation of protein phosphorylation. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7751-1. Seminar: Protein Structure and Folding.** Studies structure and folding of proteins and protein complexes using biophysical methods, including nuclear magnetic resonance (NMR), circular dichroism, and fluorescence spectroscopies. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7761-1. Seminar: Eukaryotic Transcriptional Regulation.** Studies the regulation of transcription by RNA Polymerase II from human promoters. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7771-1. Seminar: Structural Biology of Signal Transduction and Transcription.** Structural studies of protein complexes in signal transduction and transcriptional regulation using x-ray crystallography, other spectroscopic methods, and biochemical methods. Prereq., graduate standing or instructor consent.

**CHEM 7781-1. Seminar: Topics in Structural Biology.** Discussion of advances and developments in structural biology with emphasis on new methods for protein expression, purification and crystallization; and structure solution implementation. Prereq., graduate standing or instructor consent.

**CHEM 7791-1. Seminar: Topics in Ribonucleoprotein Assemblies.** Studies aspects of the biochemical and structural analysis of ribonucleic acid (RNA) and its interactions with proteins and assemblies into functional ribonucleoprotein (RNP) enzymes. Techniques focus on x-ray crystallography, spectroscopic methods, and biochemical probing. Prereq., graduate standing or instructor consent.

**CHEM 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Classics

### Literature, Culture, and Thought

**CLAS 1010-3. The Study of Words.** Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (pre-

fixes, bases, suffixes) and on the ways in which words have changed and developed semantically. No Greek or Latin required. Same as LING 1010.

**CLAS 1030-3. Introduction to Western Philosophy: Ancient.** Develops three related themes: the emergence in antiquity of a peculiarly scientific mode of thinking; the place of religious belief within this developing scientific world view and the force of ethical speculation within the culture and political climates of ancient Greece and Rome. No Greek or Latin required. Same as PHIL 1010. Approved for arts and sciences core curriculum: historical context.

**CLAS 1100-3. Greek Mythology.** Covers the Greek myths as documents of early human religious experience and imagination, the source of Greek culture, and part of the fabric of Western cultural tradition. Of particular interest to students of literature and the arts, psychology, anthropology, and history. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1110-3. Masterpieces of Greek Literature in Translation.** Surveys Greek authors whose works have most influenced Western thought: Homer, Aeschylus, Sophocles, Euripides, Aristophanes, and Plato. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1120-3. Masterpieces of Roman Literature in Translation.** Surveys ideas and culture of the Romans through a study of representative literature: comedy, tragedy, history, philosophy, oratory, the novel, lyric, epic, and didactic poetry. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1140-3. Roman Civilization.** Surveys the outstanding achievements of Roman culture and society as reflected in literature; philosophy and art; private and official religion; and legal and political thought. No Greek or Latin required. Approved for arts and sciences core curriculum: historical context.

**CLAS 2020-3. Science in the Ancient World.** Covers the development of scientific modes of thought, theory, and research from mythological origins (e.g., Hesiod's poetry) through pre-Socratic philosophers. Culminates in theories and research of Plato and Aristotle, including the Roman Empire. Students read original sources in translation. No Greek or Latin required. Approved for arts and sciences core curriculum: natural science.

**CLAS 2100-3. Women in Ancient Greece.** Examines evidence of art, archaeology, and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature, and daily life. No Greek or Latin required. Same as WMST 2100. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CLAS 2110-3. Women in Ancient Rome.** Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required. Same as WMST 2110. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CLAS 2610-3. Paganism to Christianity.** Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required. Same as PHIL 2610. Approved for arts and sciences core curriculum: ideals and values.

**CLAS 3820-3. Greek and Roman Antiquity in Music from 1600 to Present.** Explores the influence of Greek and Roman mythology and history on various genres of music since 1600. Explains the context and meaning of ancient themes and their use by composers from the Renaissance to the present. No Greek or Latin required. Recommended prereq., CLAS 1100. Same as HUMN 3820.

**CLAS 4040-3. Seminar in Classical Antiquity.** Examines an advanced topic in classical language, literature, history, philosophy, art, or culture. Combines the techniques of philology with a critical approach to the literary and material legacy of the past. No Greek or Latin required. Prereq., second year proficiency in Latin and/or Greek. Approved for arts and sciences core curriculum: critical thinking.

**CLAS 4110-3. Greek and Roman Epic.** Students read in English translation the major epics of Greco-Roman antiquity such as the *Iliad*, *Odyssey*, *Argonautica*, *Aeneid*, and *Metamorphoses*. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required. Same as CLAS 5110. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4120-3. Greek and Roman Tragedy.** Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides, and Seneca in English translation. No

Greek or Latin required. Same as CLAS 5120 and HUMN 4120. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4130-3. Greek and Roman Comedy.** Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required. Same as CLAS 5130 and HUMN 4130. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4840 (1-4). Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

**CLAS 5110-3. Greek and Roman Epic.** No Greek or Latin required. Same as CLAS 4110.

**CLAS 5120-3. Greek and Roman Tragedy.** Same as CLAS 4120.

**CLAS 5130-3. Greek and Roman Comedy.** Same as CLAS 4130.

**CLAS 5800-3. Philosophy of Plato.** No Greek or Latin required. Same as PHIL 5080.

**CLAS 5810-3. Philosophy of Aristotle.** No Greek or Latin required. Same as PHIL 5081.

**CLAS 5840 (1-3). Graduate Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

**CLAS 7840 (1-3). Graduate Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

## Ancient History

**CLAS 1051-3. The World of the Ancient Greeks.** Presents a survey of the emergence, the major accomplishments, the failures, and the decline of the ancient Greeks, from the Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000–30 B.C.). No Greek or Latin required. Same as HIST 1051. Approved for arts and sciences core curriculum: historical context.

**CLAS 1061-3. The Rise and Fall of Ancient Rome.** Presents a survey of the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. No Greek or Latin required. Same as HIST 1061. Approved for arts and sciences core curriculum: historical context.

**CLAS 2041-3. War and Society in Ancient Greece.** Studies Greek warfare in its cultural, social, and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required. Same as HIST 2041.

**CLAS 4021-3. Athens and Greek Democracy.** Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources. Same as CLAS 5021 and HIST 4021.

**CLAS 4031-3. Alexander the Great and the Rise of Macedonia.** Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great. Prereq., one of the following: CLAS 1509, 3039, 3113, 4051, 4139, 4149, CLAS/HIST 1051, 2041, 4021, or 4041. Same as CLAS 5031 and HIST 4031.

**CLAS 4041-3. Classical Greek Political Thought.** Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required. Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Same as CLAS 5041, HIST 4041, PHIL 4210, and PSCI 4094.

**CLAS 4061-3. The Twilight of Antiquity.** No Greek or Latin required. Same as HIST 4061.

**CLAS 4071-3. Seminar in Ancient Social History.** Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. Same as CLAS 5071 and HIST 4071.

**CLAS 4081-3. The Roman Republic.** Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. Same as CLAS 5081 and HIST 4081.

**CLAS 4091-3. The Roman Empire.** Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western

Mediterranean. Emphasizes life, letters, and personalities of the empire. No Greek or Latin required. Same as CLAS 5091 and HIST 4091.

**CLAS 4761-3. Roman Law.** Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required. Same as CLAS 5761 and HIST 4761.

**CLAS 5021-3. Athens and Greek Democracy.** Same as CLAS 4021 and HIST 4021.

**CLAS 5031-3. Alexander the Great and the Rise of Macedonia.** Same as CLAS 4031.

**CLAS 5041-3. Classical Greek Political Thought.** No Greek or Latin required. Same as CLAS 4041.

**CLAS 5071-3. Seminar in Ancient Social History.** Same as CLAS 4071.

**CLAS 5081-3. The Roman Republic.** No Greek or Latin required. Same as CLAS 4081.

**CLAS 5091-3. The Roman Empire.** No Greek or Latin required. Same as CLAS 4091.

**CLAS 5761-3. Roman Law.** No Greek or Latin required. Same as CLAS 4761 and HIST 5761.

**CLAS 6011-3. Readings in Ancient History.** No Greek or Latin required. Prereq., graduate standing. Same as HIST 6011.

## Classical Philology

**CLAS 4852 (1-3). Honors Thesis.**

**CLAS 6952 (1-6). Master's Thesis.**

**CLAS 7012-3. Graduate Seminar.** Topic specified in *Registration Handbook and Schedule of Courses*. May be repeated up to 9 total credit hours for different topics. Prereq., graduate standing (MA or PhD students only).

**CLAS 8992 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Greek

**CLAS 1013-4. Beginning Classical Greek 1.** For students with no previous knowledge of Greek. Introduces basic grammar and vocabulary.

**CLAS 1023-4. Beginning Classical Greek 2.** Completes the presentation of grammar and introduces reading of literature. Prereq., CLAS 1013 or equivalent.

**CLAS 3013-1. Readings in the Greek New Testament and Septuagint.** Readings in ancient (*koine*) Greek from the New Testament and the Septuagint. Students aim to achieve fluency in reading and to enrich their knowledge of key terms and ideas borrowed from the Greek past in the early Christian tradition. May be repeated up to 4 total credit hours. Prereq., CLAS 1013 and 1023.

**CLAS 3113-3. Intermediate Classical Greek 1.** Reading of selected prose texts of authors such as Plato, Xenophon, Lysias, and selections from the Greek New Testament. Incorporates review of grammar. May be repeated up to 6 total credit hours. Prereqs., CLAS 1013 and 1023 or equivalent. Meets MAPS requirement for foreign language.

**CLAS 3123-3. Intermediate Classical Greek 2.** Reading of a Greek tragedy with attention to literary form and context as well as advanced grammar and syntax. May be repeated for a total of 6 credit hours. Prereqs., CLAS 1013, 1023, and 3113, or equivalent.

**CLAS 4013-3. Topics in Greek Prose.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators). May be repeated up to 9 total credit hours for different topics. Same as CLAS 5013.

**CLAS 4023-3. Topics in Greek Poetry.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy). May be repeated up to 9 total credit hours for different topics. Same as CLAS 5023.

**CLAS 4093-3. Survey of Greek Literature.** Greek literary history from Homer to the Hellenistic age. Prereqs., CLAS 3113 and 3123, or equivalent. Same as CLAS 5093.

**CLAS 4843 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5013-3. Topics in Greek Prose.** Same as CLAS 4013.

**CLAS 5023-3. Topics in Greek Poetry.** Same as CLAS 4023.

**CLAS 5093-3. Survey of Greek Literature.** Same as CLAS 4093.

**CLAS 5803-3. Accelerated Classical Greek 1.** Beginning course for graduate students. Grammar survey; intensive reading. No previous knowledge of Greek required.

**CLAS 6003-3. Graduate Reading.** Author or topic specified in *Registration Handbook and Schedule of Courses*. May be repeated up to 9 total credit hours for different topics.

**CLAS 6843 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 7013-3. Graduate Seminar in Greek Literature.** May be repeated up to 7 total credit hours.

## Latin

**CLAS 1014-4. Beginning Latin 1.** Introduces basic grammar and vocabulary. For students with no previous knowledge of Latin.

**CLAS 1024-4. Beginning Latin 2.** Completes the presentation of grammar, incorporates review of fundamentals, and introduces reading of literature. For students with previous experience of Latin. Prereq., CLAS 1014 or equivalent.

**CLAS 2114-4. Intermediate Latin 1.** Readings from Caesar and/or Cicero, with review of grammar. Prereq., CLAS 1024, or equivalent. Meets MAPS requirement for foreign language.

**CLAS 2124-4. Intermediate Latin 2.** Selections from Virgil's *Aeneid* with attention to literary form and context as well as advanced grammar and syntax.

**CLAS 3014-3. Introduction to Latin Prose.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Cicero, Livy, Pliny). May be repeated up to 9 total credit hours for different topics.

**CLAS 3024-3. Introduction to Poetry.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Virgil, Ovid, Catullus, Horace). May be repeated up to 9 total credit hours for different topics.

**CLAS 4014-3. Topics in Latin Prose.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Roman historians, Roman epistolography, Cicero, Roman novel). May be repeated up to 9 total credit hours for different topics. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5014.

**CLAS 4024-3. Latin Prose Composition.** Reviews grammar and syntax. Introduces Latin prose style and composition. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5024.

**CLAS 4044-3. Topics in Latin Poetry.** Author or topic specified in *Registration Handbook and Schedule of Courses* (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire). May be repeated up to 9 total credit hours on different topics. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5044.

**CLAS 4094-3. Survey of Latin Literature.** Covers Latin literary history from the beginning to the early Empire. Students read select texts of major authors in poetry and prose. Prereq., CLAS 3014 and 3024, or equivalent. Same as CLAS 5094.

**CLAS 4824-3. Latin Teaching Methods: Open Topics.** Covers specialized topics in Latin pedagogy specified in the *Registration Handbook and Schedule of Courses*. Same as CLAS 5824.

**CLAS 4844 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5014-3. Topics in Latin Prose.** Same as CLAS 4014.

**CLAS 5024-3. Latin Prose Composition.** Same as CLAS 4024.

**CLAS 5044-3. Topics in Latin Poetry.** Same as CLAS 4044.

**CLAS 5094-3. Survey of Latin Literature.** Same as CLAS 4094.

**CLAS 5404-3. Special Project: Teaching.** Trains students to prepare classroom-ready materials which are then tested in the students' own classroom. Required of master's candidates (teaching of Latin option). Prereq., fulfillment of the remaining requirements for MA (teaching of Latin) or 27 hours of graduate work in classics.

**CLAS 5804-3. Accelerated Latin 1.** Beginning course for graduate students. Grammar survey, intensive reading. No previous knowledge of Latin required.

**CLAS 5814-3. Accelerated Latin 2.** Continuation of CLAS 5804. Reading of advanced texts: Caesar, Cicero, Ovid. Prereq., CLAS 5804. For graduate students.

**CLAS 5824-3. Latin Teaching Methods: Open Topics.** Same as CLAS 4824.

**CLAS 6004-3. Graduate Reading.** Author or topic specified in the *Registration Handbook and Schedule of Courses*. May be repeated up to 9 total credit hours for different topics.

**CLAS 6844 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 7014-3. Graduate Seminar in Latin Literature.** May be repeated up to 7 total credit hours.

## Honors

**CLAS 1115-3. Honors—Masterpieces of Greek Literature in Translation.** Students read about mythological heroes and historical individuals from Achilles to Socrates in Greek literature. Class discusses why the Greeks told stories the way they did and what those stories might have meant to them and might mean to us. Approved for arts and sciences core curriculum: literature and the arts.

## Art and Archaeology

**CLAS 1509-3. Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World.** Introduces the art and archaeology of ancient Egypt, the Near East, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture, and everyday trash to learn about ancient humanity. Same as ARTH 1509. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**CLAS 2009-3. Modern Issues, Ancient Times.** Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved, and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life. Same as ANTH 2009. Approved for arts and sciences core curriculum: historical context.

**CLAS 2019-3. Pompeii and the Cities of Vesuvius.** Introduces the towns and villas buried by the eruption of Mt. Vesuvius in A.D. 79. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations. Approved for arts and sciences core curriculum: historical context.

**CLAS 3039-3. Greek Art and Archaeology.** Covers prehistoric Aegean through the fourth century B.C., considering architecture, pottery, painting, sculpture, and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Same as ARTH 3039. Credit not granted for this course and CLAS 1009 or ARTS 1009. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 3049-3. Introduction to Roman Art and Architecture.** Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.) to Constantine (A.D. 306–307). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Same as ARTH 3049. Credit not granted for this course and CLAS 1019 or ARTS 1019. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4119-3. Roman Sculpture.** Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Same as CLAS 5119 and ARTH 4119.

**CLAS 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C. Emphasis is on palace states. Same as CLAS 5129, ARTH 4129, and ANTH 4129.

**CLAS 4139-3. Greek Vase Painting.** A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary, and written presentation. Same as CLAS 5139 and ARTH 4139.

**CLAS 4149-3. Greek Cities and Sanctuaries.** Examines Greek architecture in context, from the ninth century B.C. into the Hellenistic period, considering the use of space, both in religious and in civic settings, and using texts as well as

material culture. Emphasis is on developing analytical skills. Same as CLAS 5149 and ARTH 4149.

**CLAS 4169-3. Topics in Ancient and Classical Art and Archaeology.** In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary; they may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology. Same as CLAS 5169 and ARTH 4169.

**CLAS 4199-3. Roman Architecture.** Examines the designs, functions, and construction methods of ancient Roman towns, temples, baths, houses, and civic structures as well as utilitarian structures, including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation. Same as CLAS 5199 and ARTH 4199.

**CLAS 4849 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5119-3. Roman Sculpture.** Same as CLAS 4119 and ARTH 5119.

**CLAS 5129-3. Aegean Art and Archaeology.** Same as CLAS 4129, ARTH 5129, and ANTH 5129.

**CLAS 5139-3. Greek Vase Painting.** Same as CLAS 4139 and ARTH 5139.

**CLAS 5149-3. Greek Cities and Sanctuaries.** Same as CLAS 4149 and ARTH 5149.

**CLAS 5159-3. Hellenistic Art and Archaeology.** Art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.) to the conquest of Greece by the Romans (middle second century B.C.) Same as ARTH 5159.

**CLAS 5169-3. Topics in Ancient and Classical Art and Archaeology.** Same as CLAS 4169 and ARTH 5169.

**CLAS 5179-3. Periklean Athens.** Explores in detail the buildings, sculptures, pots, and foreign imports of Athens under the leadership of Perikles, considering material culture of individuals as much as civic programs. Emphasis is on ways in which the textual and archaeological evidence complement and/or contradict one another. Same as ARTH 5179.

**CLAS 5189-3. Augustan Rome.** Explores the sculptures, paintings, and buildings constructed in Rome during the reign of the first emperor Augustus (27 B.C.–A.D.14). Examines the monuments of Augustan Rome as both dependent on republican precedents and yet innovative with respect to designs and meanings. Same as ARTH 5189.

**CLAS 5199-3. Roman Architecture.** Same as CLAS 4199 and ARTH 5199.

**CLAS 6109-3. Topics in Critical Theory and Ancient Art and Archaeology.** Topics will vary and may focus on a particular approach to ancient material culture or on a particular time period or artifact category. Emphasis is placed on reading and using theory in considering the ancient world. May be repeated once for credit, provided the topics are different.

**CLAS 6119 (1-3). Graduate Independent Study in Classical Art and Archaeology.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**CLAS 7109-3. Graduate Seminar in Ancient and Classical Art and Archaeology.** Topics vary. Emphasis is on gaining expertise in using archaeological reports in tandem with (or contradiction to) textual sources, on reading and using critical theory, on improving analytical skills and discussion, and on honing discussion leadership abilities.

## Communication

**COMM 1210-3. Perspectives on Human Communication.** Surveys communication in a variety of contexts and applications. Topics include basic concepts and general models of communication, ethics, language and nonverbal communication, personal relationships, group decision making, organizational communication, and impact of technological developments on communication. Required for PRCM and COMM majors. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**COMM 1300-3. Public Speaking.** Covers theory and skills of speaking in various public settings. Examines fundamental principles from rhetorical and communication theory and applies them to oral presentations. Required for PRCM and COMM majors.

**COMM 1600-3. Interaction Skills.** Covers basic theories, concepts, and characteristics that underlie face-to-face interactions in interpersonal, small group, and

organizational settings. Activities stress the development of both task and relational skills in these settings. Required for PRCM and COMM majors.

**COMM 2360-3. Campaigns and Revolutions.** Introduces concepts in rhetoric and argumentation that are used to explain significant social and political changes in our society. The goal is to show how social actors use rhetoric to promote some social goals and hinder others. Recommended prereq., COMM 1300.

**COMM 2400-3. Communication and Society.** Examines how aspects of talk (e.g., turn-taking, speech acts, narratives, dialect, and stance indicators) link with identities (e.g., ethnic and racial, age, gender, work-related, and personal). Considers how communication is central to constructing who people are and examines social controversies related to talk and identities. Approved for arts and sciences core curriculum: contemporary societies.

**COMM 2500-3. Interpersonal Communication.** Focuses on basic processes in face-to-face interaction, including verbal and nonverbal messages, coordination in conversation, messages about self and others, and communication in personal relationships. Emphasizes theory and concepts rather than skills.

**COMM 2600-3. Organizational Communication.** Provides a communicatively based definition of formal organization and deals with individual-organizational relationships. Addresses topics such as organizational theory, organizational culture, power, technology, decision making, teamwork, leadership, diversity, gender, socialization, and ethics.

**COMM 3210-3. Human Communication Theory.** Acquaints students with general, thematic, and contextual theories of human communication. Gives attention to criteria for evaluating theories. Recommended prereq., COMM 1210.

**COMM 3250-3. Empirical Research Methods in Communication.** Introduces empirically oriented research methods in communication: critical review of the logic of social-scientific principles in communication and analysis of quantitative data. Recommended prereqs., COMM 1210 and 3210.

**COMM 3300-3. Rhetorical Foundations of Communication.** Provides the rhetorical foundations of communication through study of the humanistic traditions of rhetorical theory, with applications to social interaction and message analysis. Recommended prereqs., COMM 1300, 3310.

**COMM 3310-3. Principles and Practices of Argumentation.** Focuses on principles of argument, the process of critical decision making, and uses and limitations of logic and evidence. Contemporary issues (personal, social, political, or philosophical) are analyzed and debated. Prereq., COMM 1300. Students who have received credit for COMM 2310 will not receive credit for COMM 3310.

**COMM 3320-3. Persuasion in Society.** Explores how persuasion influences decision making, focusing on different definitions and models of persuasion, ethical perspectives on persuasion, qualitative and quantitative research on persuasion, and the tools of motivation, as well as how to create effective and ethical persuasive messages. Recommended prereqs., COMM 1210, 1300, or 2400.

**COMM 3360-3. Rhetorical Criticism.** Applies key concepts from rhetorical theory to the analysis of specific speeches, written texts, and social situations within the humanistic tradition. Students read a variety of types of criticism and are encouraged to develop their own strategies for critical analysis. Recommended prereqs., COMM 1300, 3300, and 3310.

**COMM 3410-3. Intercultural Communication.** Explores complex relationships between culture and communication processes from various conceptual perspectives, such as social psychological, interpretive, and critical. Considers the important role of context (e.g., social, historical, and cultural) in intercultural interactions. Recommended prereqs., COMM 1210, 2400, 2500, and 3210.

**COMM 3510-3. Family Communication.** Explores communication in families from various theoretical perspectives, such as social constructionism, systems theory, and dialectical theory. Communication patterns and processes created and sustained by family members are examined, including rules, roles, stories, rituals, myths, metaphors, themes, and cycles. Recommended prereqs., COMM 1210, 2400, 2500, and 3210.

**COMM 3610-3. Communication Technology and Society.** Presents theory, research, and exploration into computer-based technologies; studies implications for communication, interaction, and social relationships. Recommended prereq., COMM 1210.

**COMM 4000 (1-3). Special Topics.** Analyzes special interest areas of communication theory, research, and practice. Course format involves lecture, discussion, investigative analysis, and practical application. May be taken twice for credit on different topics. Restricted to COMM majors.

**COMM 4100-3. Seminar in Honors Thesis Writing and Research.** Provides the opportunity for students writing an honors thesis to develop their understanding of the research process and to improve their research and writing skills.

**COMM 4220-3. Senior Seminar: Functions of Communication.** Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices. May be taken twice for credit on different topics. Prereq., COMM 3210. Restricted to COMM majors. Same as COMM 5220. Approved for arts and sciences core curriculum: critical thinking.

**COMM 4300-3. Senior Seminar: Rhetoric.** Reviews current theory and research on topics such as rhetoric and publics, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns. May be taken twice for credit on different topics. Prereq., COMM 3300. Restricted to COMM majors. Same as COMM 5300. Approved for arts and sciences core curriculum: critical thinking.

**COMM 4400-3. Senior Seminar: Communication Codes.** Topical seminar on dialogic and nonverbal communication codes. Reviews current theory and research on topics such as relationship between verbal and nonverbal codes, discourse processes, and cultural differences in communication processes. May be repeated up to 6 total credit hours. Prereq., COMM 3210. Restricted to COMM majors. Approved for arts and sciences core curriculum: critical thinking.

**COMM 4510-3. Senior Seminar: Interpersonal Communication.** Reviews current theory and research on topics such as strategic interaction, relationship formation and maintenance, and identity and self-presentation. May be taken twice for credit on different topics. Prereq., COMM 2500. Restricted to COMM majors. Same as COMM 5510. Approved for arts and sciences core curriculum: critical thinking.

**COMM 4600-3. Senior Seminar: Organizational Communication.** Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations. May be repeated up to 6 total credit hours. Prereq., COMM 2600. Restricted to COMM majors. Same as COMM 5600. Approved for arts and sciences core critical thinking.

**COMM 4840 (1-6). Undergraduate Independent Study.** Note that the 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 33 credit hours required for the major. Recommended prereq., COMM 3250 or 3360. Restricted to COMM majors.

**COMM 4930 (1-6). Senior Internship.** Studies are pursued in communication-related work experience projects that generally require 45-75 hours on the job per credit hour and evidence (e.g., journal, paper, and employer evaluation) of significant learning. Prereqs., COMM major status, 72 hours of overall course work, 18 hours of communication course work completed, 2.50 overall GPA, and a faculty sponsor. For majors only. The 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 33 hours required for the major.

**COMM 4950 (1-6). Senior Thesis: Honors.** For exceptional communication majors who wish to graduate with department honors and receive credit for writing an honors thesis. Prereqs., COMM 4100, overall GPA of 3.35 or higher, and COMM GPA of 3.50 or higher.

**COMM 5210-3. Communication Theory.** Critical overview of leading theoretical traditions in communication studies. Gives attention to metatheoretical issues, including epistemological foundations, the structure of communication theory as a field, and reflexivity between communication theory and cultural practice. Prereq., graduate standing or instructor consent.

**COMM 5220-3. Seminar: Functions of Communication.** Same as COMM 4220.

**COMM 5300-3. Seminar: Rhetoric.** Same as COMM 4300.

**COMM 5310-3. Contemporary Rhetorical Criticism.** Advanced critical analysis of rhetorical texts in terms of how they shape issues and appeal for judgment, create identities for speakers and their audiences, and construct perceptions of time, space, and the human condition. Prereq., graduate standing or instructor consent.

**COMM 5510-3. Seminar: Interpersonal Communication.** Same as COMM 4510.

**COMM 5600-3. Seminar: Organizational Communication.** Same as COMM 4600.

**COMM 5610-3. Organizational Culture and Symbolism.** Focuses on relationship between ideological elements (e.g., norms, values, and beliefs) and symbolic practices (e.g., metaphor, ritual, and storytelling) of organizational culture. Analyzes topics from viewpoints of academic theory and managerial practice. Reviews interpretive methods of researching workplace culture and symbolism. Prereq., graduate standing or instructor consent.

**COMM 6010-1. Communication Research and Theory.** Provides an integrative overview of areas of study in the communication PhD program. Required for doctoral students in communication. Prereq., graduate standing or instructor consent.

**COMM 6020-3. Quantitative Research Methods.** Introduces students to the practice of quantitative research in communication: conceptualization and critique of research projects, coding, experimental and survey approaches, reliability and validity, and statistical reasoning and methods of analysis. Prereq., graduate standing or instructor consent.

**COMM 6030-3. Interpretive Research Methods.** Introduces students to a range of interpretive and critical approaches to inquiry. Focuses on philosophical issues undergirding research, as well as specifics of ethnographic observation, interviewing, and methods of textual analysis. Prereq., graduate standing or instructor consent.

**COMM 6100-3. Discourse Analysis.** Acquaints students with the main types of discourse analysis: conversation analysis, critical and pragmatic discourse approaches, and rhetorically informed discourse approaches. Teaches how to conduct discourse analysis, including transcribing, selecting excerpts, documenting inferences, and linking to scholarly controversies. Prereq., graduate standing or instructor consent.

**COMM 6200-3. Seminar: Selected Topics.** Facilitates understanding of current and past theory on a selected topic in communication and the ability to develop new theory on that topic. May be taken up to three times for credit on different topics. Prereq., graduate standing or instructor consent.

**COMM 6300-3. Advanced Readings in Organizational Communication.** Survey of traditional and contemporary readings in organizational communication. Treats theory, research, and application from a variety of perspectives. Prereq., graduate standing or instructor consent.

**COMM 6400-3. Advanced Readings in Interpersonal Communication.** Survey course of advanced readings in interpersonal communication. Focuses on historical and contemporary works, with emphasis on theory and research. Prereq., graduate standing or instructor consent.

**COMM 6500-3. Advanced Readings in Rhetoric.** Survey of classical and contemporary readings in rhetoric. Prereq., graduate standing or instructor consent.

**COMM 6600-3. Readings in Communication and Technology.** Survey of multidisciplinary research that examines various relationships between communication and technology. Students are encouraged to develop critical skills in perceiving assumptions and perspectives that motivate major theories in this area, and to examine how these have changed over time. Prereq., graduate standing or instructor consent.

**COMM 6710-3. Rhetorical Criticism.** Reviews current critical methods and issues related to rhetorical criticism, such as contemporary theory of rhetorical criticism, continental discourse theory, and critical theory. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent. Recommended prereqs., COMM 5310 and 6500.

**COMM 6720-3. Rhetorical Theory.** Reviews current theory and research on topics such as contemporary rhetorical theory, rhetoric and public life, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 6500.

**COMM 6730-3. Collaboration and Decision Making in Organizations.** Explores theory and research on communication processes associated with collaboration and decision making in contemporary organizations, particularly as they are influenced by participation programs, technology, and team structures. Prereq., graduate standing or instructor consent. Recommended prereqs., COMM 6010 and 6300.

**COMM 6740-3. Power and Control in Organizational Communication.** Reviews theory and research in organizational communication concerned with power and control. Focuses on symbolic practices of influence in the context of organiza-

tional structure and culture. Reviews interpretive and critical theories emphasizing relationships between power, discourse, identity, and institutions. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 6300.

**COMM 6750-3. Communication and Organizational Change.** Addresses the role of communication in cultural change efforts in organizations. Topics include the nature and function of organizational cultures, the role of leadership, ethical issues, and member involvement in change processes. Specific organizational cases are highlighted throughout. Prereq., graduate standing or instructor consent.

**COMM 6760-3. Institutions and Interaction.** Studies of interaction in selected institutional settings, such as business organizations, the justice system, the classroom, or the family. Topic varies. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**COMM 6770-3. Analysis of Human Interaction.** Educates students in one of a selected set of methodological specializations used in the study of human interaction. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**COMM 6780-3. Roles, Relationships, and Identities in Interaction.** Examines how social roles influence communication practices, the development of relationships, and the impact of relationships on identity. Considers these processes in contexts such as personal relationships and institutional settings. Topic varies. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**COMM 6790-3. Integrated Studies of Interaction.** Examines central questions in the study of interaction processes, taking multiple perspectives. Topics include issues of coordination, identity, and goals. Readings include seminal works in each area, as well as current theoretical and empirical pieces and critiques. Prereq., graduate standing or instructor consent.

**COMM 6840 (1-3). Master's Independent Study.** May be repeated up to 6 total credit hours.

**COMM 6940 (1-3). Master's Degree Candidate.**

**COMM 6950 (1-6). Master's Thesis.**

**COMM 8840 (1-6). Doctoral Independent Study.** May be repeated up to 7 total credit hours.

**COMM 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Comparative Literature and Humanities

### Humanities

**HUMN 1010-6. Introduction to Humanities 1.** Six meetings a week (three discussion classes and three lecture-demonstrations in art and music). Provides an analytical and comparative study of works in literature, music, and visual arts from Aegean to Baroque eras. Emphasizes structure, content, and style in specific examples. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**HUMN 1020-6. Introduction to Humanities 2.** Examines from Baroque to contemporary styles in literature, music, and visual arts. Emphasizes the cultural context in which art was created. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**HUMN 2000-3. Topics in Humanities.** Provides a transition from the introductory courses to the upper-division courses. Introduces the various technical and contentual methods and topics encountered in the department's comparative, interdisciplinary upper-division courses, including cultural studies, rhetoric, translation, hermeneutics, world/image studies, etc. Prereq., HUMN 1010 or 1020.

**HUMN 2133-3. The Dramatic Arts in Great Britain.** Examines drama from an interdisciplinary point of view. The basis of the course is six live performances, four in London and two in Stratford. These productions are examined in comparison to versions of the same or a similar narrative in art, music, and literature and in reference to physical locations in and around London. Offered abroad only. Prereq., instructor consent.

**HUMN 2145-3. African America in the Arts.** Introduces interrelationships in the arts of African Americans and the African American contribution to American culture as a whole. Similar to HUMN 3145. Approved for arts and sciences core curriculum: cultural and gender diversity or United States context.

**HUMN 3015-3. Jung, Film, and Literature.** The basic themes of C. G. Jung's archetypal psychology (shadow, anima/animus, character typology, and individuation) are studied and applied as tools of critical analysis to selected films and literary texts of the modern period. Prereqs., humanities major, or Farrand student and instructor consent. Same as FILM 3022.

**HUMN 3033-3. The Comic Sense.** Offers an interdisciplinary approach to comedy, examining art, music, literature, and film from different periods. Comic theory interlaced with the study of particular works.

**HUMN 3043-3. The Tragic Sense.** Studies some of the great tragic works of art, music, and literature from the Greeks to the 20th century. Tragic theory is invoked as an aid to interpretation.

**HUMN 3065-3. Feminist Theory/Women's Art.** Focuses on several key issues in feminist thought through the analysis of women's art (literature, film, visual art, performance) and theory. Approved for arts and sciences core curriculum: cultural and gender diversity, or literature and the arts.

**HUMN 3092-3. Studies in Humanities.** Students should check with the department for specific semester topics. May be repeated up to 12 total credit hours, provided the topics vary.

**HUMN 3093-3. Topics in Humanities.** Students should check with the department for specific semester offerings. May be repeated up to 12 total credit hours, provided the topics vary. Not available to freshmen.

**HUMN 3321-3. Culture and Literature of Ancient China.** Focuses on the religious, cultural, philosophical, and literary aspects of ancient Chinese civilization (1500 B.C.—A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051. Same as CHIN 3321.

**HUMN 3341-3. Modern Chinese Literature in Translation.** Surveys modern/contemporary Chinese literature in translation. Selected stories, novels, and poems are read and discussed in class. Short critical papers and final exam are required. Recommended prereq., EALC 1011 or CHIN 1051. Same as CHIN 3341.

**HUMN 3440-3. Literature and Medicine.** Offers readings and discussion of the works of Anton Chekhov, William Carlos Williams, Oliver Sacks, and other physician-writers to explore the physician-patient relationship, ethical problems in medicine, death and dying, and other topics in medicine. Taught by a physician from the CU School of Medicine. Approved for arts and sciences core curriculum: literature and the arts or ideals and values.

**HUMN 3505-3. The Enlightenment: Tolerance and Emancipation.** Examines the Enlightenment belief in reason and the common humanity of all individuals and cultures. Emphasizes arguments for and against freedom of religion, abolition of slavery, and emancipation of women in 18th-century European and American literature and thought. Same as GRMN 3505. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 3590-3. Modern Literature and the Bible: A Case Study in Intertextuality.** Alternating between close readings of biblical texts and works by such authors as Beckett, O'Connor, Dostoevsky, Garcia Marquez, as well as film, this class explores the complex interaction between modern literature and the Bible in respect to ideals, ideas, symbols. Prereq., HUMN 2000 or junior standing. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 3811-3. Classical Japanese Literature in Translation.** Surveys the major works and authors of classical Japanese literature, both poetry and prose, from the earliest historical records and literary anthologies through the Heian period (784–1185). Taught in English. Recommended prereq., JPNS 1051. Same as JPNS 3811.

**HUMN 3820-3. Greek and Roman Antiquity in Music, 1600 to Present.** Explores the influence of Greek and Roman mythology and history on various genres of music since 1600. Explains the context and meaning of ancient themes and their use by composers from the Renaissance to the present. Recommended prereq., CLAS 1100. Same as CLAS 3820.

**HUMN 3841-3. Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the late Meiji period and 20th century in their historical and cultural contexts. Attention is given to various

approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051. Same as JPNS 3841. Approved for arts and sciences core curriculum: critical thinking.

**HUMN 3930 (1-6). Humanities Internship.** Students gain academic credit and professional experience working in museums, galleries, arts administration, and publishing. They work 3–18 hours per week with their professional supervisor and meet regularly with a faculty advisor who determines the reading and writing requirements. Prereqs., junior standing and interview with faculty advisor.

**HUMN 3935 (1-3). Humanities Internship: Literature and Social Violence.** See HUMN 4835. Coreq., HUMN 4835.

**HUMN 4004-3. Film Theory.** Offers a philosophical attempt to define the nature of cinema. An intensive seminar, the course involves a great deal of reading in classic and contemporary film theory, and requires a working knowledge of silent film history. Prereqs., FILM 3051, and FILM or FMST major with senior standing. Same as FILM 4004. Approved for arts and sciences core curriculum: critical thinking.

**HUMN 4013-3. Narrative in the Arts.** Explores the nature of sacred and secular narrative in literature, film, and the visual arts. Prereq., HUMN 1010 or 1020.

**HUMN 4023-3. The Epic Tradition.** Comparative and interdisciplinary study of the figure of the hero and the concept of fate in the epic tradition and the modern novel. Explores literary, religious, philosophical, and ethical issues in works like *Gilgamesh*, *Iliad*, *Aeneid*, *Beowulf*, *Madame Bovary*, and *The Invisible Man*. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4042-3. Early Modernism.** Comparative, interdisciplinary period course examining some of the major artists and issues that informed the beginnings of modernism from the mid-19th to the early 20th century. Artists studied include Dostoevsky, Baudelaire, Nietzsche, Van Gogh, and Kafka. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4064-3. Primitivism in Art and Literature.** Explores cross-cultural encounters in the arts, focusing on the political and aesthetic implications of concepts of the “primitive,” especially in the context of Western colonialism. Includes works by Shakespeare, Montaigne, Defoe, Melville, Gauguin, Conrad, Picasso, Achebe, and Walker. Prereq., HUMN 1020 or instructor consent. Approved for arts and sciences core curriculum: cultural and gender diversity or literature and the arts.

**HUMN 4082-3. 19th Century Art and Literature.** Interdisciplinary study of English fiction and poetry together with related movements in visual arts. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4093-3. Studies in Humanities.** Students should check with the department for specific semester offerings. May be repeated up to 9 total credit hours. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4102-3. The Romantic Quest.** Interdisciplinary study of literature, art, and music from 1780 to 1830 in France, England, and Germany. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4120-3. Greek and Roman Tragedy.** Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides, and Seneca in English translation. No Greek or Latin required. Same as CLAS 4120. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4130-3. Greek and Roman Comedy.** Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required. Same as CLAS 4130. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4133-3. The Dramatic Arts.** Interdisciplinary course that examines and compares various forms of the dramatization of narrative: written texts, audiotapes, videotapes, film, and live performance. Compares different versions of the same narrative or theme, especially if different media are used and different time periods are involved. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4135-3. Art and Psychoanalysis.** Explores psychoanalytic theory as it relates to our understanding of literature, film, and other arts. After becoming familiar with some essential Freudian notions (repression, narcissism, ego/libido, dream work, etc.), students apply these ideas to works by several artists (e.g., Flaubert, James, Kafka, Hoffmann, and Hitchcock). Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4140-3. The Age of Dante: Readings from *The Divine Comedy*.** Focuses on close reading of Dante’s poetry with emphasis on the intellectual, religious,

political, and scientific background of the medieval world. Taught in English. Prereq., junior standing or instructor consent. Same as ITAL 4140. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4150-3. *The Decameron* and the Age of Realism.** Analyzes the rise of realism in 13th and 14th century Italian literature and parallel manifestations in the visual arts. Focuses on Boccaccio’s *Decameron* and contemporary realistic prose and poetry with emphasis on gender issues and medieval cultural diversity. Taught in English. Prereq., junior standing or instructor consent. Same as ITAL 4150. Approved for arts and science core curriculum: literature and the arts, or cultural and gender diversity.

**HUMN 4155-3. Philosophy, Art, and the Sublime.** Explores philosophies of art, theories of the sublime, and the relation between art and morality through philosophy, literature, and the visual arts. Includes works by Plato, Longinus, Burke, Rousseau, Kant, Mary Shelley, Melville, Friedrich, Turner, and Pollock. Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: critical thinking or ideals and values.

**HUMN 4160-3. Myth in the Arts.** Studies representative myths in the art, music, and literature of ancient and modern worlds. Prereqs., HUMN 1010 or 1020, CLAS 1100, or junior/senior standing.

**HUMN 4500-3. Reading the Orient: French Literature and Exoticism.** Examines representations of the non-Western world in French literature from the 19th century to the present. Taught in English for nonmajors, and may be used as a senior seminar (senior essay course) for majors. Same as FREN 4500. Approved for arts and sciences core curriculum: literature and the arts, or cultural and gender diversity.

**HUMN 4502-3. Nietzsche: Literature and Values.** Emphasis is placed on Nietzsche’s major writings spanning the years 1872–1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts, and ideas leading to the values of creativity. Same as GRMN 4502. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 4504-3. Goethe’s *Faust*.** Systematic study of the Faust motif in Western literature, with major emphasis on *Faust I* and *II* by Goethe and Thomas Mann’s *Dr. Faustus*. Same as GRMN 4504. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4555-3. The Arts of Interpretation.** Introduces various hermeneutical methodologies (literary/philosophical criticism, biblical exegesis, art history, etc.) with which to examine the question of interpretation. Methodologies are studied in close conjunction with particular works of art. Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: critical thinking.

**HUMN 4730-3. Italian Feminisms: Culture, Theory, and Narratives of Difference.** Studies Italian women writers, artists, and film makers of this century. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors. Same as ITAL 4730. Approved for arts and sciences core curriculum: cultural and gender diversity, or literature and the arts.

**HUMN 4811-3. 19th Century Russian Literature.** Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov. Same as RUSS 4811. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4821-3. 20th Century Russian Literature and Art.** Interdisciplinary course emphasizing the influence of art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the gradual cultural relaxation that culminated in perestroika and glasnost. Same as RUSS 4821. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4835-3. Literature and Social Violence.** Provides a theoretical understanding of heightened awareness arising from literary and sociological investigations of contemporary sources of social violence (gang culture, racism, domestic violence), combined with the concrete knowledge offered by an internship in a social service agency. Optional internship credit is available. Approved for arts and sciences core curriculum: contemporary societies.

**HUMN 4840 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**HUMN 4990-3. Senior Humanities Seminar.** In-depth interdisciplinary study of a selected topic in humanities. Prereqs., 6 hours of upper-division humanities, senior standing, and 3.00 GPA in humanities.

## Comparative Literature

**COML 5000-3. Proseminar.** Introduces basic issues in comparative literature and basic problems in literary history. Provides an overview of history and rationale of the discipline, traditional areas of research, and recent developments. Prereq., graduate standing or instructor consent.

**COML 5350-3. Studies in Prose Narrative.** Examines both short and long narrative prose fiction from a variety of periods and from diverse national literatures. Focuses on issues of defining genre and on the origins and significance of narrative prose within its cultural context. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5360-3. Studies in Drama.** Covers selected drama topics using a comparative approach. May be repeated once for credit. Prereq., graduate standing or instructor consent. Same as THTR 5041.

**COML 5370-3. Studies in Poetry.** Explores topics and problems in rhetoric and poetic practice from antiquity to the present day. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5410-3. Theory and Practice of Literary Translation.** After reviewing theories and practices of literary translation in their historical, linguistic, and cultural dimensions, students translate a substantial piece from a significant literary work in their chosen foreign language, and provide a detailed commentary on the process. Prereq., graduate standing or instructor consent and advanced knowledge of one ancient or modern language.

**COML 5610-3. Introduction to Literary Theory.** Covers major trends in 20th-century critical thinking. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5620-3. History of Literary Criticism.** Prereq., graduate standing or instructor consent.

**COML 5660-3. Themes, Motifs, and Characters.** May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5830-3. Topics in Literature and History.** May be repeated up to 6 total credit hours.

**COML 5840 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**COML 6040-3. Seminar: A Selected Topic.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**COML 6940 (1-3). Candidate for Degree.**

**COML 6950 (1-6). Master's Thesis.**

**COML 6970-3. Colloquium in Comparative Literature.** May be repeated up to 6 total credit hours.

**COML 7840 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**COML 8990 (1-10). Doctoral Dissertation.**

## East Asian Languages and Civilizations

**EALC 1011-4. Introduction to Traditional East Asian Civilizations.** An interdisciplinary introduction to the history, literature, and art of both China and Japan in classical and medieval times before major contact with the Western world. Approved for arts and sciences core curriculum: cultural and gender diversity.

**EALC 1021 (3-4). East Asian Civilizations: Modern Period.** An interdisciplinary introduction to the cultures of modern China and Japan. Politics, social relations, arts, literature, religion, and material culture are studied in terms of significant cultural themes in each national tradition. Covers the early modern period (17th century) through the present, emphasizing the nature of contemporary East Asian culture. Approved for arts and sciences core curriculum: cultural and gender diversity.

**EALC 4911-3. Practicum in Asian Languages 1.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speak-

ers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5911.

**EALC 4912-3. Practicum in Asian Languages 2.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5912.

**EALC 4913-3. Practicum in Asian Languages 3.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5913.

**EALC 4914-3. Practicum in Asian Languages 4.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5914.

**EALC 4930 (1-6). Internship.** Selected students are matched with supervised internships in business, public and private service organizations, and educational institutions. Internships focus on opportunities to apply language and cultural skills. Students meet regularly with instructor and supervisor, keep a journal, and submit a final paper. May be repeated up to 6 total credit hours. Prereq., JPNS 2120 or CHIN 2120. Recommended prereq., JPNS 3120 or CHIN 3120.

**EALC 5911-3. Practicum in Asian Languages 1.** Prereq., department approval. Same as EALC 4911.

**EALC 5912-3. Practicum in Asian Languages 2.** Prereq., department approval. Same as EALC 4912.

**EALC 5913-3. Practicum in Asian Languages 3.** Prereq., department approval. Same as EALC 4913.

**EALC 5914-3. Practicum in Asian Languages 4.** Prereq., department approval. Same as EALC 4914.

**EALC 5950-1. Perspectives on East Asian Languages.** Reads and discusses issues in contrastive linguistics, cultural differences, linguistic analysis, and methodological issues related to the teaching of English to speakers of East Asian languages. May be repeated up to 6 total credit hours.

## Arabic

**ARAB 1010-5. Beginning Arabic 1.** Beginning grammar and conversation. Must register through Continuing Education.

**ARAB 1020-5. Beginning Arabic 2.** Continuation of ARAB 1010. Must register through Continuing Education. Prereq., ARAB 1010.

**ARAB 2110-3. Intermediate Arabic 1.** Advanced grammar and conversation. Must register through Continuing Education. Meets MAPS requirement for foreign language. Prereq., ARAB 1020.

**ARAB 2120-3. Intermediate Arabic 2.** Continuation of ARAB 2110. Must register through Continuing Education. Prereq., ARAB 2110.

**ARAB 3840 (1-3). Independent Study.** Independent study in Arabic. Must register through Continuing Education.

**ARAB 3850 (1-3). Independent Study.** Independent Study in Arabic. Must register through Continuing Education.

## Chinese

**CHIN 1010-5. Beginning Chinese 1.** Introduces modern Chinese (Mandarin), emphasizing speaking as well as reading and writing. Students learn both traditional full-form characters and the simplified versions used in mainland China. Similar to CHIN 1150.

**CHIN 1020-5. Beginning Chinese 2.** Continuation of CHIN 1010. Prereq., CHIN 1010 or instructor consent. Similar to CHIN 1150.



**CHIN 1150-5. Intensive First-Year Chinese.** Intensive beginning course covers the same materials as CHIN 1010 and CHIN 1020. Prereqs., instructor consent and placement test. Restricted to students with Chinese language background. Not open to students with credit in CHIN 1010 or CHIN 1020.

**CHIN 2110-5. Intermediate Chinese 1.** Emphasizes reading, speaking, and writing modern Chinese, including continued study of both full-form and simplified characters. Introduces dictionaries and principles of character formation. Prereq., CHIN 1020 or instructor consent. Similar to CHIN 2150. Meets MAPS requirement: foreign language.

**CHIN 2120-5. Intermediate Chinese 2.** Continuation of CHIN 2110. Prereq., CHIN 2110 or instructor consent. Similar to CHIN 2150.

**CHIN 2150-5. Intensive Second-Year Chinese.** Intermediate course covers the same materials as CHIN 2110 and CHIN 2120. Prereqs., CHIN 1150 with a grade of C- or better, or placement test and instructor consent. Restricted to students with Chinese language background. Not open to students with credit in CHIN 2110 or CHIN 2120. Meets MAPS requirement for foreign language.

**CHIN 3110-5. Advanced Chinese 1.** Surveys a variety of authentic-language materials, including films, plays, newspaper articles, essays, and short stories. Extensive use of videotapes made from actual television programs, news broadcasts, commercials, and documentaries. Emphasizes proficiency-oriented approach to reading, writing, and oral communication. Prereq., CHIN 2120 or instructor consent.

**CHIN 3120-5. Advanced Chinese 2.** Continuation of CHIN 3110. Prereq., CHIN 3110 or instructor consent.

**CHIN 4110-3. Advanced Readings in Modern Chinese 1.** Surveys a wide variety of 20th-century written materials, including texts from literature, the social sciences, religion, and cultural history. Focuses on content and style with extensive discussion and frequent written assignments in Chinese. Conducted in Chinese. Prereq., CHIN 3120 or instructor consent.

**CHIN 4120-3. Advanced Readings in Modern Chinese 2.** Continuation of CHIN 4110. Prereq., CHIN 4110 or instructor consent.

**CHIN 4210-4. Introduction to Classical Chinese.** Introduces the classical language based on texts from the pre-Han and Han periods. Stresses precise knowledge of grammatical principles and exactitude in translation—the basis for all further work in classical Chinese. Prereq., CHIN 2120 or instructor consent.

**CHIN 4220-4. Readings in Classical Chinese.** Close reading of selected texts of ancient and medieval literature. Readings in both prose and poetry. Emphasizes a disciplined, philological approach to the texts, with proper attention to diction, tone, and nuance. Prereq., CHIN 4210, or instructor consent.

**CHIN 4300-3. Open Topics: Readings in Chinese Literature.** Studies selected texts on a particular topic taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., junior standing or instructor consent.

**CHIN 4750-3. Daoism.** A detailed examination of the history and current state of Daoism, China's indigenous organized religion. Focusing on its origins and development, ethical teachings, ritual activities, and world view. Topics created include the relationship of Daoism to popular religion, the practice of alchemy and self-cultivation, beliefs concerning death and the afterlife, and the structure of the Daoist pantheon. Prereq., RLST 3800 or instructor consent. Restricted to CHIN majors. Same as CHIN 5750 and RLST 4750.

**CHIN 4900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 5010-3. Sinological Methods.** Provides training in research methods for graduate work in Sinology. Regular exercises require students to use standard bibliographic sources and tools, such as *leishu*, *congshu*, specialized dictionaries, dynastic histories, geographical treatises, gazetteers, and private historiography. Prereq., CHIN 4220 or instructor consent.

**CHIN 5020-3. Methods of Teaching Chinese.** An overview of pedagogical theory and methods for the teaching of Chinese as a second language, including issues of presentation, interaction, and evaluation. Prereq., graduate standing or instructor consent.

**CHIN 5040-3. History of the Chinese Language.** An overview of the development of the Chinese language over the last 3,000 years, focusing on the diachronic changes in phonology and syntax, the evolution of the major dialect families, the standardization of the writing system, the creation of a common

literary language, and the development of a standard written vernacular. Prereq., CHIN 4210 or instructor consent.

**CHIN 5060-3. Topics in Chinese Linguistics.** Examines topics in Chinese dialectology, discourse analysis, historical linguistics, phonetics, and syntax (both synchronically and diachronically). Topics vary from year to year. May be repeated three times for credit. Prereq., CHIN 4120 or equivalent.

**CHIN 5110-3. History of Sinology.** Surveys the history of Sinology from its formation as a self-conscious scholarly discipline to today. Focuses on significant works and contributions of the field's greatest practitioners. Prereq., graduate standing or instructor consent.

**CHIN 5120-3. History of Literature through the Ninth Century.** Surveys, with readings in primary and secondary sources, major landmarks in various areas of ancient and medieval literature. Focuses on the classic and most influential works of the Zhou through Tang dynasties. Gives attention to matters of historical fact and actuality as well as to textual and interpretive history. Prereq., graduate standing or instructor consent.

**CHIN 5150-3. Theory and Practice of Literary Translation.** Covers strategies for handling a variety of texts and genres as well as professional standards and ethics. Prereq., graduate standing or instructor consent.

**CHIN 5210-3. Ancient Prose.** Studies selected pre-imperial and Han prose texts important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on works such as the *Lunyu*, *Mengzi*, *Zhuangzi*, *Huainanzi*, *Shiji*, *Hanshu*, and *Lunheng*. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5220-3. Ancient Poetry.** Studies selected pre-imperial and Han poetic works important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on the *Shi jing* and the *Chu ci*, as well as the *fu* and *shi* of Han writers. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5280-3. Topics in Ancient Literature.** Examines a specific problem or issue in ancient Chinese literature, e.g., early views of language's relationship to reality, or the commentary tradition and the emergence of allegorical and metaphysical approaches to interpreting texts. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5410-3. Medieval Prose.** Explores selected Six Dynasties and Tang prose works, emphasizing major writers and texts. Covers works written in both parallel prose and the *guwen* ("old-style") form. Individual writers include such figures as Wang Xizhi, Tao Qian, Li Hua, Han Yu, Liu Zongyuan, and Liu Yuxi. In addition, selected works from the anecdotal records are read. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5420-3. Medieval Poetry.** Studies selected works of Six Dynasties and Tang poetry. Studies major figures, prosodic and stylistic variations, and the culturally revealing relationship of poetry to the natural and supernatural world of medieval China. Focuses on poets such as Xie Lingyun, Tao Qian, Wang Wei, Li Bo, Du Fu, as well as important medieval anthologies of verse. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5430-3. Medieval Thought and Religion.** Studies selected works of Six Dynasties and Tang intellectual and religious inspiration, important in the development of the medieval Chinese world view and for their role in medieval Chinese literature. Focuses on fundamental texts of both literary and religious value from the Daoist and Buddhist canons, such as the *Huangting jing*, *Zhen gao*, *Miaofa lianhua jing*, and *Tan jing*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5480-3. Topics in Medieval Literature.** Examines a specific problem or issue in medieval literature, e.g., the role of encyclopedias and anthologies in literary training, or the place and forms of literary composition at the imperial court. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5610-3. Early Modern Prose.** Studies Song, Ming, and Qing prose texts selected for their inherent literary merit and for their significance in the Chinese literary tradition. Typically focuses on works by major authors such as Ouyang Xiu, Su Shi, and Yuan Hongdao. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5620-3. Early Modern Poetry.** Studies Song, Yuan, Ming and Qing poetry. Stresses major figures, stylistic variations, various poetry schools, new directions in *shi* verse, and the rise and development of *ci*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5630-3. Early Modern Fiction.** Explores selected vernacular and classical fiction of the Ming and Qing periods. Normally focuses on long novels such as *Xiyou ji*, *Sanguo yanyi*, *Shuihu zhuan*, *Jin Ping Mei*, as well as short stories by Feng Menglong and Ling Mengchu. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5680-3. Topics in Early Modern Literature.** Examines a specific problem or issue in early modern literature (e.g., the relationships among religion, folklore, and early fiction; the issue of genre and traditional fiction); the role of elite versus popular cultures in the composition of fiction; or the relationship of the state and censorship and the southern philosophical schools to the publication of fiction. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5750-3. Daoism.** Restricted to graduate students. Same as CHIN 4750 and RLST 5750.

**CHIN 5810-3. Modern Literature.** Examines selected texts in various genres of Chinese literature from the May Fourth period (beginning 1917) to the establishment of the People's Republic of China (1949). Focuses on major and influential works produced in this fertile period of experimentation with Western, modernist types of literature. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5820-3. Contemporary Literature.** Examines selected texts in various genres of Chinese literature from 1949 (the establishment of the People's Republic of China) to the present. Focuses on major works from the very different literary worlds of Taiwan and mainland China. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5880-3. Topics in 20th Century Literature.** Examines a specific problem or issue in 20th century literature, e.g., feminist fiction in China, modernism in fiction and poetry, or the role of literary criticism in modern literature. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 6900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 6940 (1-3). Master's Degree Candidate.**

**CHIN 6950 (1-6). Master's Thesis.**

### *Chinese Courses in English*

**CHIN 1051-3. Masterpieces of Chinese Literature in Translation.** Surveys Chinese thought and culture through careful reading and discussion of selected masterworks of Chinese literature in translation. Texts include significant works of poetry and fiction, and philosophical and historical writings from various eras. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 2301-3. Topics in Chinese Culture.** An introduction, for those with little or no background, to selected aspects of Chinese culture. Topic varies from year to year.

**CHIN 2441-3. Film and the Dynamics of Chinese Culture.** Through studying a group of Chinese films in light of modern Chinese history and literature, students examine a series of cultural dilemmas and issues in 20th century China and develop skills in analyzing literary and filmic texts. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 3311-3. The Dao and the World in Medieval China.** An interdisciplinary examination of Chinese culture from the third to the tenth centuries A.D., encompassing the intellectual and religious ferment of the Period of Division and the literary and artistic achievements of the glorious Tang dynasty. Studies personal aspects of the world inhabited and created by medieval Chinese civilization, particularly relations with Daoism, Buddhism, natural history, court politics, and celestial and imaginative realms. Taught in English. Recommended prereq., EALC 1011 or CHIN 1051.

**CHIN 3321-3. Culture and Literature of Ancient China.** Focuses on the religious, cultural, philosophical, and literary aspects of ancient Chinese civiliza-

tion (1500 B.C.—A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051. Same as HUMN 3321.

**CHIN 3331-3. Culture and Literature of Late Imperial China.** The late imperial period was marked by growth of great metropolitan areas, expanded urban entertainments, and an extensive popular culture. This course focuses on the literature and artifacts of this urban culture as well as the hegemonic culture of the state and of traditional social codes and their literary manifestations. Also considers growing contacts with the West and the transition to the modern period. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051.

**CHIN 3341-3. Modern Chinese Literature in Translation.** Surveys modern/contemporary Chinese literature in translation. Selected stories, novels, and poems are read and discussed in class. Short critical papers and final exam are required. Recommended prereq., EALC 1011 or CHIN 1051. Same as HUMN 3341.

**CHIN 3351-3. Reality and Dream in Traditional Chinese Fiction.** Explores how early Chinese fiction offers a means of synthesizing societal values, culture, and intellectual developments in pre-modern china. Special attention is given to the *Story of the Stone* (also known as *Dream of the Red Chamber*), the masterpiece novel of the Qing dynasty (1644–1911), as well as classical Chinese tales from the third to the tenth century and selected vernacular stories written in the Ming (1368–1644). Considers various approaches to literary analysis and interpretation. Taught in English. Prereq., junior standing or instructor consent. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 3361-3. Women and the Supernatural in Chinese Literature.** Explores the relationship between the worlds of women and the supernatural in Chinese literature, from ancient to modern times. Focuses on selected significant works of classical and vernacular fiction, religious texts, and poetry (read in translation). Studies the variety of ways in which the folklore of the feminine is shaped and recast in different verbal creations and in different periods. Taught in English. Prereq., junior standing or instructor consent.

**CHIN 3371-3. Topics in Chinese Film.** Offers in-depth, critical analysis to key issues in Chinese culture as represented in Chinese film. Focuses on various topics, such as specific directors, regions, representation of gender in Chinese film, historical periods, etc. Varies from year to year. Requires no knowledge of Chinese. May be repeated up to 6 total credit hours on different topics. Prereq., junior standing or instructor consent. Recommended prereq., CHIN 1051, 2441.

**CHIN 3441-3. Chinese Language and Society.** Deals with major linguistic characteristics of Chinese as a medium of communication. Discusses complex linguistic processing of social status and empathy relationships, for example, with reference to the structure of Chinese society and political system. Requires no knowledge of Chinese. Prereq., junior standing or instructor consent.

### Japanese

**JPNS 1010-5. Beginning Japanese 1.** Provides a thorough introduction to modern Japanese, emphasizing speaking, listening, reading, and writing in a cultural context.

**JPNS 1020-5. Beginning Japanese 2.** Continuation of JPNS 1010. Prereq., JPNS 1010.

**JPNS 2110-5. Intermediate Japanese 1.** Continued study of oral and written modern Japanese in a cultural context. Prereq., JPNS 1020 or equivalent. Meets MAPS requirement for foreign language.

**JPNS 2120-5. Intermediate Japanese 2.** Continuation of JPNS 2110. Prereq., JPNS 2110.

**JPNS 3110-5. Advanced Japanese 1.** Enhances student competence and performance in Japanese language in a holistic and integrative manner. Prereq., JPNS 2120.

**JPNS 3120-5. Advanced Japanese 2.** This is the second part of Advanced Japanese. Enhances student competence and performance in Japanese language in a holistic and integrative manner. Prereq., JPNS 3110.

**JPNS 4030-3. Japanese Syntax.** Deals with syntactic phenomena from five areas of Japanese grammar that cause the most difficulty for learners. Their characteristics are explored in forms and discursal functions that go beyond the explanations in basic, prescriptive grammars of Japanese. Prereq., JPNS 3120 or 4120, or instructor consent.

**JPNS 4070-3. Second Language Acquisition of Japanese.** Studies language acquisition theories and research on Japanese as a second language (JSL). Covers the issues in JSL from linguistic, cognitive, and sociolinguistic perspectives: orthography, grammar, phonology, and vocabulary in the contexts of teaching and learning JSL. Prereq., instructor consent. Same as JPNS 5070.

**JPNS 4110-3. Advanced Readings in Modern Japanese 1.** Surveys a variety of material written in modern Japanese, including texts from literature, the social sciences, religion, and cultural history. Emphasizes content and style. Texts and selections vary from year to year. May be taken for credit twice. Prereq., JPNS 3120.

**JPNS 4120-3. Advanced Readings in Modern Japanese 2.** Continuation of JPNS 4110. Texts and selections vary from year to year. May be taken for credit twice. Prereq., JPNS 4110.

**JPNS 4210-3. Contemporary Japanese 1: Current Issues.** Offers intensive review of Japanese language skills beyond the first eight semesters, and cultivates further proficiency. Readings will be selected from a wide range of contemporary writings that reflect and represent issues in Japanese as well as global communities. The course emphasizes all skills: reading, listening, writing, speaking, and translation. Instructional technology is extensively integrated into the curriculum. Prereq., JPNS 4120 or instructor consent.

**JPNS 4220-3. Contemporary Japanese 2: Current Issues.** Continues developing Japanese language skills beyond the first eight semesters. Cultivates further proficiency at an advanced and superior level. Readings are selected from a wide range of contemporary writings that reflect and represent issues in Japanese as well as global communities. Emphasizes all skills: reading, listening, writing, speaking, and translation. Instructional technology is extensively integrated into the curriculum. Prereq., JPNS 4210 or instructor consent.

**JPNS 4300-3. Open Topics: Readings in Japanese.** Examines selected texts on a particular topic taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**JPNS 4310-3. Classical Japanese 1.** Introduces reference tools for reading classical Japanese, and grammar, vocabulary, and use of scripts in premodern Japanese, focusing on the 10th century *Taketori Monogatari* and the 13th century *Hojoki*. Prereq., JPNS 3110. Recommended prereqs., JPNS 3120, 3811, 3821.

**JPNS 4320-3. Classical Japanese 2.** Continuation of JPNS 4310. Surveys changes in Japanese literary language from the Nara (eighth century) to Meiji (late 19th century) periods. Attention given to changes in grammar, vocabulary, and use of scripts in premodern Japanese. Introduces representative works of classical Japanese literature of all periods. Prereq., JPNS 4310.

**JPNS 4900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 4950-3. Honors Thesis.**

**JPNS 5010-3. Bibliography and Research Methods.** Introduces research materials on Japan in Japanese and Western languages, including bibliographic tools, style sheets, and library resources. Overview of secondary sources and publication outlets/methods of disseminating research. Prereq., graduate standing or instructor consent.

**JPNS 5020-3. Methods of Teaching Japanese.** Surveys pedagogical theory and methods for the teaching of Japanese as a second language, including issues of presentation, interaction, and evaluation. Prereq., graduate standing or instructor consent.

**JPNS 5040-3. History of the Japanese Language.** Studies the evolution of the Japanese language from its hypothetical origins to its contemporary form through distinct stages of development. Highlights Japanese linguistic scholarship in relation to historical reconstruction of the earlier forms of Japanese. Prereq., graduate standing or instructor consent.

**JPNS 5050-3. Japanese Sociolinguistics.** Surveys past achievements and current research concerns of Japanese sociolinguists in areas such as speech varieties, language behavior and attitude, and linguistic contact and change, as well as their guiding theories and central fieldwork methods. Prereq., graduate standing or instructor consent.

**JPNS 5060-3. Advanced Japanese Syntax.** Examines controversial syntactic topics that have inspired a variety of explanations. Alternative linguistic explanations are sought within the framework of an analytical investigation from the viewpoint of language dynamics. May be repeated up to 6 total credit hours. Prereqs., JPNS 4030 or instructor consent.

**JPNS 5070-3. Second Language Acquisition of Japanese.** Prereq., graduate standing or instructor consent. Same as JPNS 4070.

**JPNS 5150-3. Japanese Literary Translation.** Explores theories and practice of translation of literary texts as applied to Japanese–English translation; strategies for handling a variety of texts; and professional standards and ethics. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**JPNS 5170-3. Japanese for Sinologists.** An accelerated course in modern scholarly Japanese for students with a basic foundation in Japanese and an advanced knowledge of Chinese. Focus is on materials in Japanese that relate to Chinese civilization and includes an introduction to *kanbun*. Prereq., one year of modern Japanese, graduate-level command of Chinese, or instructor consent.

**JPNS 5210-3. Classical Prose Literature.** Examines selected prose works and authors from the Classical, or Heian, period (784–1185). Texts may include selections from diaries, tale literature, and *zuihitsu* such as *Izumi Shikibu Nikki*, *Genji Monogatari*, and *Makura no Soshi*. Texts and selections vary from year to year. May be taken for credit twice. Prereq., two semesters of classical Japanese language.

**JPNS 5220-3. Waka, Renga, and Haiku.** Studies the three most important poetic forms in Japanese literary history. Emphasizes the reading and analysis of selected texts and authors that best represent these genres. Readings include selections from the first eight imperial poetry anthologies (*hachidaishu*), famous *renga* sequences (Minase Sangin Hyakuin, for example), and the haiku of Basho. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5280 (1-3). Topics in Classical Japanese Literature.** Studies a specific problem or issue in classical (eighth through twelfth century) Japanese literature, e.g., the development of specifically Japanese theories of literature or the concept of genre in the Japanese tradition. Topics vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5310-3. Advanced Classical Japanese I.** Focuses on stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras. Prereq., JPNS 4310 or instructor consent.

**JPNS 5320-3. Advanced Classical Japanese II.** Advanced analysis of stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras, including *kanbun* and *hentaigana*; translation and explication of texts. Prereq., JPNS 5310 (formerly 5160), or instructor consent.

**JPNS 5410-3. Medieval Prose Literature.** Focuses on selected prose works and authors from the medieval, or Kamakura and Muromachi periods (1185–1600). Texts may include selections from a variety of war tales, histories, courtly fiction, diaries, memoirs, short prose narratives (*otogi-zoshi*), Noh plays, and Buddhist literature such as *Heike Monogatari*, *Towazugatari*, *Izayoi Nikki*, *Tsurezuregusa*, and *Shasekishu*. Texts and selections vary from year to year. May be taken for credit twice. Prereq., two semesters of classical Japanese language.

**JPNS 5420-3. Japanese Buddhism and Literature.** Studies selected works from the Japanese literary tradition in which Buddhism plays a significant thematic role. Focuses on texts such as the *Nihon Ryoiki*, Buddhist poetry (*Shakkyo-Ka*) from the imperial poetry anthologies, *Heike Monogatari*, *Hojoki*, the poetry of Saigyō and Bashō, and selected Noh plays. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5480 (1-3). Topics in Medieval Literature.** Focuses on a specific problem or issue in medieval literature, e.g., the spread of literary composition beyond the court. Topics vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5610-3. Japanese Dramatic Literature.** Examines major writers and texts of the no, kyogen, kabuki, and bunraku theaters, including the plays and critical writings of such authors as Kannami Kiyotsugu, Zeami Motokiyo, Konparu Zenchiku, and Chikamatsu Monzaemon. Texts and secondary readings vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5810-3. Modern Japanese Literature.** Studies selected texts in Japanese literature from the Meiji Restoration (1868) to the end of the Pacific War. Surveys various literary genres, emphasizing the development of the modern novel as an aspect of Japan's response to Western cultural forms. The unique cultural politics of each of the periods (Meiji, Taisho, and Showa) are illuminated through the filter of both canonical and more marginalized texts. Specific selections vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5820-3. Contemporary Japanese Literature.** Covers developments in Japanese prose fiction, from the end of the Pacific War in 1945 to the present. Late modern texts of writers such as Mishima Yukio, Kawabata Yasunari, Enchi Fumiko, and Tanizaki Jun'ichiro (generally taken to represent modern Japanese literature) are reread in the light of works by more recent writers (and critics) such as Oe Kenzaburo, Yoshimoto Takaaki, Murakami Haruki, and Yamada Eimi. May be repeated up to 6 total credit hours.

**JPNS 5830-3. Readings in Modern and Contemporary Japanese Thought and Culture.** Examines central issues in Japanese culture and society since the Meiji Restoration (1868) through selected readings of the works of major writers in the fields of literature, anthropology, feminism, political science, and religion, among others. Provides a broad context for cultural studies in modern and contemporary Japan by positioning the most important commentators within their historical and social situations. May be taken for credit twice.

**JPNS 5880 (1-3). Topics in Modern Literature and Culture.** Close study of a specific problem or issue in modern or contemporary literature or culture: e.g., transwar literary nationalism. May be repeated up to 6 total credit hours, provided the topics vary.

**JPNS 5900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 6900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 6940 (1-3). Japanese Master's Degree Candidate.**

**JPNS 6950 (1-6). Japanese Master's Thesis.**

### *Japanese Courses in English*

**JPNS 1051-3. Masterpieces of Japanese Literature in Translation.** Surveys Japanese thought and culture through careful reading and discussion of selected masterworks of Japanese literature in translation. Texts include significant works of poetry, fiction, drama, diaries, and essays, from ancient times to the present. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**JPNS 2441-3. Film and Japanese Culture.** Examines 20th century Japanese culture through its literature and film. Studies literary works and films by Ozu, Kurosawa, Mizoguchi, and contemporary animators, among others. Considers cultural issues raised in film in light of modern Japanese history and literature. Requires no knowledge of Japanese.

**JPNS 3441-3. Language and Japanese Society.** Deals with major linguistic characteristics of Japanese as a medium of communication. Discusses complex linguistic processing of social status and empathy relationships, for example, with reference to the structure of Japanese society from ancient to contemporary times. Requires no knowledge of Japanese. Recommended prereq., JPNS 2120.

**JPNS 3811-3. Classical Japanese Literature in Translation.** Surveys the major works and authors of classical Japanese literature, both poetry and prose, from the earliest historical records and literary anthologies through the Heian period (784–1185). Taught in English. Recommended prereq., JPNS 1051. Same as HUMN 3811.

**JPNS 3821-3. Medieval Japanese Literature in Translation.** Surveys the major works and authors of medieval Japanese (poetry, prose, and drama) from the Kamakura and Muromachi periods (1185–1600). Taught in English. Recommended prereq., JPNS 1051.

**JPNS 3831-3. Early Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the Tokugawa through Meiji periods in their historical and cultural contexts. Attention is given to various approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051.

**JPNS 3841-3. Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the late Meiji period and 20th century in their historical and cultural contexts. Attention is given to various approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051. Same as HUMN 3841. Approved for arts and sciences core curriculum: critical thinking.

## Korean

**KREN 1010-5. First-Year (Beginning) Korean 1.** Trains students in elementary conversational and writing skills and provides a grounding in the basic idiomatic and syntactical features of Korean, through lectures, drills, and language laboratory sessions based on set dialogues and readings.

**KREN 1011-3. Introduction to Korean Civilization.** Introduces the history of Korean culture within the context of political, social, and economic history. Covers the old Choson dynasty to present day Korea. Approved for arts and sciences core curriculum: cultural and gender diversity.

**KREN 1020-5. First-Year (Beginning) Korean 2.** Continuation of KREN 1010. Prereq., KREN 1010 or instructor consent.

**KREN 2110-5. Second-Year (Intermediate) Korean 1.** Extends the conversational and written skills acquired at the elementary level. Although emphasis remains on spoken Korean, readings are increased, elementary writing skills are introduced gradually, and some Sino Korean characters are taught. Prereq., KREN 1020 or instructor consent. Meets MAPS requirement for foreign language.

**KREN 2120-5. Second-Year (Intermediate) Korean 2.** Continuation of KREN 2110. Prereq., KREN 2110 or instructor consent.

**KREN 3110-5. Advanced Korean 1.** Promotes an advanced level of speaking, reading, and writing. Focuses on contemporary business Korean language as reflected in various Korean media such as newspapers, magazines, and television. The goal is to acquire Korean language skills at a level that allows students to conduct business activities. Prereq., KREN 2120 or instructor consent.

**KREN 3441-3. Religion and Culture in Korea.** Examines major religious traditions of Korea, such as mythology, indigenous practices, doctrinal and meditation Buddhism, and Early and Neo-Confucianism and Christianity, and new religions in modern times. Approved for arts and sciences core curriculum: cultural and gender diversity.

**KREN 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Ecology and Evolutionary Biology

*The Department of Ecology and Evolutionary Biology (formerly the Department of Environmental, Population, and Organismic Biology) offers two general biology sequences. EBIO 1210 and 1200 are lecture courses intended for EBIO and other science majors. A year of high school chemistry is presumed. Accompanying laboratories (EBIO 1230 and 1240) are also available. EBIO 1030 and 1040 are designed for nonscience majors; an accompanying lab (EBIO 1050) is available..*

*Students with scores of 4 or 5 on the AP biology test receive 8 hours of credit and are exempt from EBIO 1210–1240. Students who score in the 66th percentile or higher on the CLEP test in biology receive 6 hours of credit and are exempt from EBIO 1210 and 1220. MCDB 1150 and 1151 can substitute for EBIO 1210 and 1230. EBIO majors with transfer credit in biology from other institutions and/or advanced placement credits must consult the EBIO undergraduate advising and resource center for proper placement.*

*EPOB courses have been renumbered under EBIO and IPHY course numbers. Credit will not be granted for a course taken under its former number and its current number.*

**EBIO 1030-3. Biology: A Human Approach 1.** Lect. Studies the principles of biology and their implications. Central theme is humans and the environment, emphasizing ecology, natural resource conservation, and the interrelatedness of a growing human population. Recommended for nonscience majors. Meets MAPS requirement for natural science: non-lab. Formerly EPOB 1030. Approved for arts and sciences core curriculum: natural science.

**EBIO 1040-3. Biology: A Human Approach 2.** Lect. Continues EBIO 1030, focusing on the function of the human body, and maintenance of dynamic equilibrium in the internal environment in the face of a continually changing external environment. Discusses factors influencing these homeostatic conditions and how and why they change. Recommended for nonscience majors. Prereq., EBIO 1030. Formerly EPOB 1040. Approved for arts and sciences core curriculum: natural science.

**EBIO 1050-1. Biology: A Human Approach Laboratory.** One two-hour lab per week. Provides experiments and exercises relating to concepts presented in EBIO 1030 and 1040 Biology: A Human Approach 1 and 2. This course uses animals and/or animal tissues. Recommended for nonscience majors. When taken

with EBIO 1030, meets MAPS requirement for natural science: lab. Formerly EPOB 1050. Approved for arts and sciences core curriculum: natural science.

**EBIO 1210-3. General Biology 1.** Lect. Provides a concentrated introduction to molecular, cellular, genetic, and evolutionary biology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors. Credit not granted for this course and EPOB 2060, 2660, or KAPH 2060. Formerly EPOB 1210. Meets MAPS requirement for natural science. Approved for arts and sciences core curriculum: natural science.

**EBIO 1220-3. General Biology 2.** Provides a concentrated introduction to organisms, homeostasis, development, behavior, and ecology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors. Prereq., EBIO 1210 or equivalent. Credit not granted for this course and EPOB 2050 or 2650. Formerly EPOB 1220. Approved for arts and sciences core curriculum: natural science.

**EBIO 1230-1. General Biology Laboratory 1.** One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 1. Intended for science majors. Prereq. or coreq., EBIO 1210. Credit not granted for this course and EPOB 2060, 2660, or KAPH 2060. Formerly EPOB 1230. Meets MAPS requirement for natural science. Approved for arts and sciences core curriculum: natural science.

**EBIO 1240-1. General Biology Laboratory 2.** One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 2. Intended for science majors. Prereq. or coreq., EBIO 1220 or equivalent. Credit not granted for this course and EPOB 2050 or 2650. Formerly EPOB 1240. Approved for arts and sciences core curriculum: natural science.

**EBIO 1300 (1-3). Topics in Biological Sciences.** Covers special topics in biology for freshmen or nonmajors. Introduces scientific methods and principles in biology, as well as issues of current interest in biology. Does not count toward the major in EBIO. Formerly EPOB 1300.

**EBIO 1840 (1-6). Independent Study (Freshman).** May be repeated up to 6 total credit hours. Formerly EPOB 1840.

**EBIO 1950-3. Introduction to Scientific Writing.** Reviews writing skills with emphasis on those most important to scientific writing. Focuses on analysis and argument with attention to organization, data presentation, and style; essay and research paper writing; and reading comprehension. May not be used for credit toward the major in EBIO. Formerly EPOB 1950. Meets MAPS requirement for written communication. Approved for art and sciences core curriculum: written communication.

**EBIO 2010 (1-3). Environmental Issues and Biology.** Lect. Describes how the natural environment is currently stressed by a variety of human actions. Examines the nature of these environmental problems and their impact on living organisms, both human and nonhuman species. Prereq., EBIO 1210 or equivalent. Formerly EPOB 2010.

**EBIO 2040-4. Principles of Ecology.** Lect. and lab. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Laboratory emphasizes techniques of field biology and skills useful throughout EBIO fundamentals sequence. Uses animals and/or animal tissues. Prereqs., EBIO 1030, 1040 and 1050, or EBIO 1210, 1220, 1230, and 1240. Credit may not be granted for this course and EBIO 2650 or EPOB 1220, 1240, or 2650. Formerly EPOB 2050. Approved for arts and sciences core curriculum: natural science.

**EBIO 2070-4. Genetics: Molecules to Populations.** Lect. and rec. Covers principles of genetics and developmental biology at levels of molecules, cellular organelles, and individuals; asexual and sexual life cycles; and heredity. Recitations allow discussion of genetics problems and implications of genetic principles, and provide demonstrations and simulations of genetic processes. Intended for sophomore EBIO majors. Prereqs., EBIO 1210, 1220, 1230 and 1240 or EPOB 2050 and 2060. Credit may not be granted for this course and EBIO 2670. Formerly EPOB 2070. Approved for arts and sciences core curriculum: natural science.

**EBIO 2500-4. Introduction to Horticulture.** Lect. and lab. Covers the principles and techniques of plant science applied to cultivated plants. Emphasizes basic plant biology, aspects of the culture environment as variable, and the tools and technology used in culture, regulation, propagation, and protection. Includes a brief survey of the industries related to cultivated plants. Prereqs., EBIO 1210, 1220, 1230 and 1240, or EPOB 2050 and 2060. Formerly EPOB 2500.

**EBIO 2590-2. Plants and Society.** Acquaints students with the plants that are both essential and desirable to human survival, well-being, and quality of life. Topics include plants and world cultures, food plants, commercial products (beverages, extracts, herbs, and spices, etc.), cosmetics, textiles, wood products, medicinal plants, psychoactive plants, poisonous plants, plant used in horticulture and landscape architecture, wood products, musical instruments, etc. Formerly EPOB 2590.

**EBIO 2640-5. Honors Principles of Ecology.** Lect., lab, and rec. Honors section of first of 4-course fundamentals sequence for EBIO majors. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. The scope is global, but examples are often from local environment. Lab emphasizes techniques of field biology and skills useful throughout EBIO core. Assumes dedicated students are well-prepared for college-level science. Prereqs., EBIO 1210, 1220, 1230, and 1240; or 1030, 1040, and 1050. Credit may not be granted for this course and EBIO 2050. Formerly EPOB 2650. Approved for arts and sciences core curriculum: natural science.

**EBIO 2670-5. Honors Genetics: Molecules to Populations.** Lect., rec., and co-seminar. Honors section of third course of 4-course fundamentals sequence for EBIO majors. Covers principles of genetics and applies these concepts to developmental behavior, population genetics, genetic engineering and public health. Recitation emphasizes group discussion concerning the societal implications of genetic information. Honors co-seminar covers specific topics in more depth. Prereqs., EBIO 1210, 1220, 1230, and 1240. Credit may not be granted for this course and EBIO 2070. Formerly EPOB 2670. Approved for arts and sciences core curriculum: natural science.

**EBIO 2840 (1-6). Independent Study (Sophomore).** May be repeated up to 6 total credit hours. Formerly EPOB 2840.

**EBIO 3010 (1-2). Teaching Biology.** Provides an opportunity to assist in teaching of specific laboratory section in EBIO under direct faculty supervision. Students must make arrangements with the faculty member responsible for the course in which they plan to assist. May be repeated up to 4 total credit hours. Formerly EPOB 3010.

**EBIO 3040-3. Conservation Biology.** Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques. Prereq., EBIO 2050. Same as ENVS 3040. Formerly EPOB 3040.

**EBIO 3080-4. Evolutionary Biology.** Lect and rec. Emphasizes the fundamental evolutionary concepts that provide explanations for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection, speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and processes. Recitations allow students to explore specific topics in more depth and smaller groups. Prereq., EBIO 2070. Credit may not be granted for this course and EPOB 2080, 2680, or EBIO 3680. Approved for arts and sciences core curriculum: natural science.

**EBIO 3110-3. Population and Community Ecology.** Presents principles of ecology that relate to the niche, population growth, meta-populations, population interactions (within and between trophic levels), community structure and development, landscape ecology and species diversity. Prereq., EBIO 2050 or equivalent. Formerly EPOB 3110.

**EBIO 3150-3. Introduction to Tropical Conservation Biology.** Emphasizes practical aspects of conservation biology, especially as they pertain to the tropical regions of the world. This intensive 5-week course (first summer session) is held partly on the Boulder Campus (two weeks) and partly in Puerto Rico (three weeks). Prereqs., EBIO 1030, 1040, and 1050, or 1210, 1220, 1230 and 1240, or EPOB 2050 and 2060. Formerly EPOB 3150. Approved for arts and sciences core curriculum: natural science.

**EBIO 3170 (3-4). Arctic and Alpine Ecology.** Lect. and field trips. Focuses on the biology of arctic and alpine environments, limiting physical factors (such as geomorphology and climatic history), and human interaction with cold-stressed environments, especially the arctic. Prereqs., EBIO 1210 and 1220, or EPOB 2050 and 2060. Formerly EPOB 3170.

**EBIO 3175-1. Arctic and Alpine Ecology Lab.** Examines alpine ecosystems and treeline relative to global change. Weekend (one-day) field trips into the Rocky Mountains, visits to Denver Museum of Nature and Science, and to CU herbarium/plant lab for experiential learning connection to EBIO 3170. Coreq., EBIO 3170. Formerly EPOB 3175. Pass/fail only.

**EBIO 3180-3. Global Ecology.** Lect. Involves study of ecological principles and problems at the biosphere level. Presents a worldwide approach to populations, biotic resources, ecologic interactions, land use, deforestation, desertification, species extinctions, pollution, environmental quality, global change, and environmental ethics. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3180. Approved for arts and sciences core curriculum: natural science.

**EBIO 3190-3. Tropical Marine Ecology.** Lect. Examines the biology and ecology of marine ecosystems, emphasizing those occurring in tropical regions such as coral reefs. Studies how these ecosystems are changing and the future impact of human stress on the marine environment. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3190. Approved for arts and sciences core curriculum: natural science.

**EBIO 3220-3. Design in Biological Research.** An exploration of the design elements in biological research: scientific hypotheses and derived predictions; experiments vs. observational studies; lab vs. field studies; levels of measurement; independent and confounding variables; sampling techniques; statistical design models. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3220.

**EBIO 3240-4. Animal Behavior.** Lect. and rec. Topics include basic concepts and history, methods of study, ethical issues, neurobiology, behavior, the development of behavior, predator-prey relationships, communication, aggression and dominance, mating systems, cognitive ethology, and parental care. When possible, life-history strategies, the evolution of behavior, and behavioral ecology are stressed. Uses animals and animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3240.

**EBIO 3270-3. Ecosystem Ecology.** Integrates information from physics (e.g., energetics), chemistry (the behavior of basic elements), and biology (evolutionary traits of species, multiple photosynthetic pathways, etc.) to understand the structure and functioning of ecosystems. Provides the background and necessary information to understand controls on photosynthesis, decomposition, and nutrient cycling across diverse terrestrial and aquatic landscapes. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Formerly EPOB 3270.

**EBIO 3400-4. Microbiology.** Lect. and lab. Surveys distinguishing characteristics of microorganisms based on structural-functional relationships, taxonomy, growth, and physical-chemical agents of control including antibiotics, metabolism, and genetics. Introduces applied microbiology emphasizing infectious diseases, basic concepts of immunology, and microbial ecology. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3400.

**EBIO 3470-3. History of Biology.** Lect. Surveys major themes in the development of biological theory from ancient times to present, emphasizing complementary roles of observation, experiment, and technical innovation, and influence of general cultural environment on scientific advance. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3470.

**EBIO 3500-4. Plant Biodiversity and Evolution.** Lect. and lab. Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3500.

**EBIO 3510-4. Plant Anatomy and Development.** Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3510.

**EBIO 3520-4. Plant Systematics.** Lect. and lab. Studies the principles and techniques of modern systematics of organisms, illustrated with examples from the plant kingdom, usually the angiosperms. Framework of course is evolutionary and ecological, as well as taxonomic. Prereq., EBIO 1210, 1220, 1230, 1240, and 2070. Formerly EPOB 3520.

**EBIO 3530-4. Functional Plant Biology.** Lect. and lab. Explores mechanisms of plant functioning and how such functioning relates to the performance of the plant under different environmental conditions. Phenomena include water relations, growth and development, and metabolic processes including photosynthesis, respiration, and responses to stress. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent. Formerly EPOB 3530.

**EBIO 3630-3. Parasitology.** Lect. and lab. Surveys animal parasites, including life histories; emphasizes parasites of humans. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240 or EPOB 2050 and 2060. Formerly EPOB 3630.

**EBIO 3680-5. Honors Evolutionary Biology.** Lect., rec., and co-sem. Honors section of fourth 4-course fundamentals sequence for majors. Emphasizes the fundamental evolutionary concepts that provide explanations for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection, speciation, systematics, and macroevolutionary patterns and processes. In recitations, students explore selected topics in depth. Honors co-seminar covers more advanced topics. Prereqs., EBIO 1210, 1220, 1230, 1240, 2070, or 2670. Credit may not be granted for this course and EBIO 3080 or EPOB 2080 or 2680. Formerly EPOB 2680. Approved for arts and sciences core curriculum: natural science.

**EBIO 3770-4. Vertebrate Zoology.** Lect. and lab. Provides a broad overview of the biology of vertebrates: evolution and systematics, morphology, physiology, behavior, ecology, and biogeography. Laboratories focus on the diversity of vertebrates, including adaptations and diagnostic features of major groups. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent. Formerly EPOB 3770.

**EBIO 3840 (1-6). Independent Study (Junior).** May be repeated up to 6 total credit hours. Formerly EPOB 3840.

**EBIO 3850-4. Invertebrate Zoology.** Lect. and lab. Offers a broad study of the biology of the most diverse group of organisms on Earth. Areas include ecology, physiology, evolution and morphology of aquatic and terrestrial forms. This course uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EPOB 3850.

**EBIO 3870 (1-6). Independent Research (Junior).** May be repeated up to 6 total credit hours. Formerly EPOB 3870.

**EBIO 3930 (1-6). Internship.** Provides an academically supervised opportunity for upper-division students to work in public or private organizations. Projects are usually related to students' career goals. Each project has both academic and work components. May be repeated up to 6 total credit hours. Pass/fail only. Formerly EPOB 3930.

**EBIO 3940-3. Argument in Scientific Writing.** Emphasizes argumentative strategies used in scientific writing. Reviews essential writing skills to prepare students for academic and professional communication. Restricted to juniors and seniors. No biology credit for majors in EBIO. Formerly EPOB 3490. Approved for arts and sciences core curriculum: written communication.

**EBIO 4020-3. Stream Biology.** Offers a geological, physical, chemical, and biological study of flowing water with special reference to streams and rivers as ecosystems. A laboratory course is offered (see EBIO 4150). Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5020. Formerly EPOB 4020.

**EBIO 4030-3. Limnology.** Examines the ecology of inland waters, including a detailed consideration of physical, chemical, and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats, and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication, and management of freshwater ecosystems. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050. Same as EBIO 5030. Formerly EPOB 4030.

**EBIO 4060-3. Landscape Ecology.** Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5070. Formerly EPOB 4060.

**EBIO 4090-2. Coral Reef Ecology.** Includes one week of lectures in Boulder and one week of field studies on one of the most complex and beautiful ecosystems in the world, the Caribbean reefs at Cozumel, Mexico. Two week, fall-semester course beginning after Christmas. Prereqs., EBIO 2050 and SCUBA certification. Formerly EPOB 4090.

**EBIO 4100-3. Advanced Ecology.** Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics which have been taught include dynamics of mountain ecosystems, tundra ecology, ethnecology, population dynamics, tropical and insular biology, ecology of

fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5100. Formerly EPOB 4100.

**EBIO 4110-3. Advanced Ecology.** See EBIO 4100 for description. May use animals and/or animal tissues. May be repeated up to 9 total credit hours. Prereqs., EBIO 1210, 1220, 1230, 1240, and 1250 or EPOB 2050 and 2060. Same as EBIO 5110. Formerly EPOB 4110.

**EBIO 4120 (2-4). Advanced Ecology.** See EBIO 4100 for description. May use animals and/or animal tissues. Prereq., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5120. Formerly EPOB 4120.

**EBIO 4140-3. Plant Ecology.** Examines the relationships between plants and their physical and biological environments, encompassing physiology, competition, plant-soil and plant-animal interactions, population dynamics, diversity, and influence on ecosystem function. Prereqs., EBIO 1210, 1220, 1230, and 1240. Formerly EPOB 3140.

**EBIO 4150 (1-2). Techniques in Ecology.** Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geocology. May be repeated up to 7 total credit hours. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5150. Formerly EPOB 4150.

**EBIO 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere; and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as ENVS 4160 and GEOL 4160. Formerly EPOB 4160.

**EBIO 4175-3. The Scientific Basis for Ecosystem Management of Public Lands.** An advanced field ecology course emphasizing measurements, statistical procedures, and biotic data information management relevant to land management issues. Develops concepts of adaptive ecosystem management using ongoing field studies in public land in the Colorado Front Range. Prereqs., EBIO 3270 and 3500. Formerly EPOB 4175.

**EBIO 4180-3. Ecological Perspectives on Global Change.** Discusses evolutionary and recent geological history of modern environmental problems, using natural changes in climate, biotic diversity, drought, desertification, flood, forest destruction, etc., to show the range and frequency of such events as a perspective on modern reports. Prereq., minimum 14 hours of EBIO course work, including EBIO 2050. Formerly EPOB 4180. Approved for arts and sciences core curriculum: critical thinking.

**EBIO 4290-3. Molecular Systematics and Evolution.** Reviews principles and theoretical foundations of molecular evolution and molecular systematics. Emphasizes hypothesis testing and using various methods of analysis for interpreting molecular variation in nature. Prereq., EBIO 3080 or instructor consent. Same as EBIO 5290. Formerly EPOB 4290.

**EBIO 4350 (1-4). Biological Field Studies.** Stresses broad areas of biology and employs field approaches. Uses animals and/or animal tissues. May be repeated up to 4 total credit hours. Prereqs., EBIO 1210, 1220, 1230 and 1240, or EPOB 2050 and 2060. Same as EBIO 5350. Formerly EPOB 4350.

**EBIO 4410-4. Biometry.** Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Same as EBIO 5410. Formerly EPOB 4410.

**EBIO 4460 (1-5). Special Topics.** Familiarizes students with specialized areas of biology. May be repeated up to 9 total credit hours. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent. Same as EBIO 5460. Formerly EPOB 4460.

**EBIO 4570-3. Advanced Plant Physiology.** Evaluates critically various concepts underlying the functioning of plants, including current controversial topics. Emphasizes the responses of plants to various environmental factors. Prereq., EBIO 3530. Same as EBIO 5570. Formerly EPOB 4570. Approved for arts and sciences core curriculum: critical thinking.

**EBIO 4630 (2-6). Field Techniques in Environmental Science.** Applies field and laboratory methods for assessing the abiotic and biotic environment. Emphasizes field techniques in climatology, surveying soils, hydrology, geomorphology, plant and animal ecology, and environmental law. Evaluation by written module reports

and maps. This course may use animals and/or animal tissues. Prereqs., EBIO 2050 and instructor consent. Same as ENVS 4630. Formerly EPOB 4630.

**EBIO 4640 (2-4). Plant Field Studies.** Includes field-oriented courses offered at irregular intervals during the academic year or during summer sessions. May be repeated up to 7 total credit hours. Prereq., EBIO 2050. Formerly EPOB 4640.

**EBIO 4660-4. Insect Biology.** Lect. and lab. Introduction to evolution, ecology physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230 and 1240, or EPOB 2050 and 2060. Same as EBIO 5660. Formerly EPOB 4660.

**EBIO 4740-3. Biology of Amphibians and Reptiles.** Comparative morphology, taxonomy, ecology, behavior, and geographic distribution of amphibians and reptiles. This course uses animals and animal tissue. Prereqs., EBIO 1210, 1220, 1230 and 1240, or EPOB 2050 and 2060. Same as EBIO 5740 and PSYC 4740. Formerly EPOB 4740.

**EBIO 4750-4. Ornithology.** Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics, and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues. Prereq., EBIO 1210, 1220, 1230, 1240 and 2050, or EPOB 2050 and 2060. Same as EBIO 5750. Formerly EPOB 4750.

**EBIO 4760-4. Mammalogy.** Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology, and taxonomy of mammals; field and laboratory study of Coloradoan species. Uses animals and/or animal tissues. Prereq., EBIO 1210, 1220, 1230, 1240, and 2050, or EPOB 2050 and 2060. Same as EBIO 5760. Formerly EPOB 4760.

**EBIO 4800-3. Critical Thinking in Biology.** Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings. Different course sections on different topics may be repeated up to 6 total credit hours. Prereq., minimum of 14 hours of EBIO course work. Restricted to students with 75–180 predicted cumulative hours. Same as EBIO 5800. Formerly EPOB 4800. Approved for arts and sciences core curriculum: critical thinking.

**EBIO 4820-3. Scientific Honors Thesis Writing Seminar.** Provides advanced instruction in writing the scientific honors theses, emphasizing interpreting, analyzing, and arguing scientific data. Focuses on essential communication skills necessary for effective presentation of the thesis to a wide variety of audiences. Formerly EPOB 4820.

**EBIO 4840 (1-6). Independent Study (Senior).** May be repeated up to 6 total credit hours. Formerly EPOB 4840.

**EBIO 4860 (1-2). Critical Thinking in Biology—Lab.** Formerly EPOB 4860.

**EBIO 4870 (1-6). Independent Research (Senior).** May be repeated up to 6 total credit hours. Formerly EPOB 4870.

**EBIO 5000-1. EBIO Colloquia.** All first year EBIO graduate students are required to attend the EBIO Colloquia Series. Speakers from around the world and within the department cover topics in all areas of biology. May be repeated up to 2 total credit hours. Formerly EPOB 5000.

**EBIO 5020-3. Stream Biology.** Same as EBIO 4020. Formerly EPOB 5020.

**EBIO 5030-3. Limnology.** Same as EBIO 4030. Formerly EPOB 4030.

**EBIO 5060-3. Landscape Ecology.** Same as EBIO 4060. Formerly EPOB 5060.

**EBIO 5100-3. Advanced Ecology.** Same as EBIO 4100. Formerly EPOB 5100.

**EBIO 5110-3. Advanced Ecology.** Same as EBIO 4110. Formerly EPOB 5110.

**EBIO 5120 (2-4). Advanced Ecology.** Same as EBIO 4120. Formerly EPOB 5120.

**EBIO 5150 (1-2). Techniques in Ecology.** Same as EBIO 4150. Formerly EPOB 5150.

**EBIO 5240-3. Advanced Topics in Animal Behavior.** Covers special areas of ethology such as sociobiology, animal communication, cognitive ethology, human ethology, moral and ethical issues. Prereq., EBIO 3240. Formerly EPOB 5240.

**EBIO 5290-3. Molecular Systematics and Evolution.** Same as EBIO 4290. Formerly EPOB 5290.

**EBIO 5310-3. Ecology and Conservation.** Reviews current research activities in the various fields of environmental biology, including population, community,

behavioral, ecosystem, and landscape ecology, plus conservation biology and global change. Approved for graduate core curriculum in EBIO. Prereq., graduate standing. Formerly EPOB 5310.

**EBIO 5320-3. Current Topics in Evolutionary Biology.** Examines six major themes on contemporary evolutionary research: population genetics, natural selection and adaptation, molecular evolution, evolution and development, phylogenetic systematics, and macroevolution. Emphasizes recent primary literature and sophisticated mastery. Prereq., graduate standing in EBIO. Formerly EPOB 5320.

**EBIO 5350 (1-4). Biological Field Studies.** Same as EBIO 4350. Formerly EPOB 5350.

**EBIO 5410-4. Biometry.** Same as EBIO 4410. Formerly EPOB 5410.

**EBIO 5460 (1-5). Special Topics.** Same as EBIO 4460. Formerly EPOB 5460.

**EBIO 5570-3. Advanced Plant Physiology.** Same as EBIO 4570. Formerly EPOB 5570.

**EBIO 5660-4. Insect Biology.** Same as EBIO 4660. Formerly EPOB 5660.

**EBIO 5740-3. Biology of Amphibians and Reptiles.** Same as EBIO 4740 and PSYC 5740. Formerly EPOB 5740.

**EBIO 5750-4. Ornithology.** Same as EBIO 4750. Formerly EPOB 5750.

**EBIO 5760-4. Mammalogy.** Same as EBIO 4760. Formerly EPOB 5760.

**EBIO 5800-3. Critical Thinking in Biology.** Same as EBIO 4800. Formerly EPOB 5800.

**EBIO 5820 (2-3). Graduate Writing Seminar.** Enhances writing proficiency, using graduate writing projects to implement the course concepts. Offers understanding of conventions and strategies used in scientific writing to prepare students for academic and professional communication. Prereqs., graduate standing and basic proficiency in English as a written language. Formerly EPOB 5820.

**EBIO 5840 (1-6). Independent Study (Graduate).** Instructor consent required. May be repeated up to 6 total credit hours. Same as EBIO 7840. Formerly EPOB 5840.

**EBIO 6000-1. Seminar: Introduction to Biological Research.** Discusses areas of biological research represented in EBIO. Required of all first-year graduate students in EBIO. May be repeated up to 4 total credit hours. Formerly EPOB 6000.

**EBIO 6100 and 6120 (1-3). Seminar in Environmental Biology.** Instructor consent required. Restricted to graduate students. May be repeated up to 7 total credit hours. Formerly EPOB 6100 and 6120.

**EBIO 6200 and 6210 (1-3). Seminar in Population Biology.** May be repeated up to 7 total credit hours. Formerly EPOB 6200 and 6210.

**EBIO 6300 and 6330-3. Seminar in Organismic Biology.** May be repeated up to 7 total credit hours. Formerly EPOB 6300 and 6330.

**EBIO 6440-2. Remote Sensing Field Methods.** Explores theory and practical field measurements for validation of airborne and spaceborne spectral image acquisition. Emphasizes radiative scattering properties of soil, vegetation, cryosphere, and atmosphere. Characterization and calibration of instrumentation used to measure these properties. Prereq., GEOL/GEOG 4093/5093. Recommended prereq., GEOL 5240. Same as GEOG 6443 and GEOL 6440. Formerly EPOB 6440.

**EBIO 6840 (1-6). Independent Research in Environmental Biology.** May be repeated up to 6 total credit hours. Prereq., instructor consent. Same as EBIO 8840. Formerly EPOB 6840.

**EBIO 6940 (1-6). Master's Degree Candidate—Plan II.** Prereq., instructor consent. Formerly EPOB 6940.

**EBIO 6950 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours. Prereq., instructor consent. Formerly EPOB 6950.

**EBIO 7840 (1-6). Independent Study (Graduate).** Same as EBIO 5840. Formerly EPOB 7840.

**EBIO 8840 (1-6). Independent Research in Environmental Biology.** Same as EBIO 6840. Formerly EPOB 8840.

**EBIO 8990 (1-10). Doctoral Dissertation.** Prereq., instructor consent. Formerly EBIO 8990.

## Economics

### Theory and History of Economic Thought

**ECON 1000-4. Introduction to Economics.** Introduces an economic way of thinking, emphasizing its critical importance in cases where people want to make themselves as well off as possible, but can't have everything they want. Focuses on how economic thought affects all choices. Topics include scarcity, decision making, and markets. Students may not receive credit for ECON 1000 if they have received credit for ECON 2010 or 2020. Similar to ECON 2010 and 2020. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 2010-4. Principles of Microeconomics.** Examines basic concepts of microeconomics, or the behavior and the interactions of individuals, firms, and government. Topics include determining economic problems, how consumers and businesses make decisions, how markets work and how they fail, and how government actions affect markets. Students may not receive credit for ECON 2010 if they have received credit for ECON 1000. Similar to ECON 1000. Meets MAPS requirements for social sciences: general. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 2020-4. Principles of Macroeconomics.** Provides an overview of the economy, examining the flows of resources and outputs and the factors determining the levels of income and prices. Explores policy problems of inflation, unemployment, and economic growth. Prereq., ECON 2010. Students may not receive credit for ECON 2020 if they have received credit for ECON 1000. Similar to ECON 1000. Meets MAPS requirements for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 3070-3. Intermediate Microeconomic Theory.** Explores theory and application of models of consumer choice, firm and market organization, and general equilibrium. Extensions include intertemporal decisions, decisions under uncertainty, externalities, and strategic interaction. Prereqs., ECON 1000 or 2010; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 3080-3. Intermediate Macroeconomic Theory.** Introduces theories of aggregate economic activity including the determination of income, employment, and prices; economic growth; and fluctuations. Macroeconomic policies are explored in both closed and open economy models. ECON 3070 and 3080 may be taken in any order; there is no recommended sequence. Prereqs., ECON 1000 or 2020; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 4070-3. Topics in Microeconomics.** Studies utility maximization under uncertainty, risk, game theory, moral hazard, and adverse selection. Applications include insurance markets and the theory of contracts. Prereqs., ECON 3070 and 4808 or equivalent, or instructor consent.

**ECON 6070-3. Applied Microeconomic Theory.** Develops competence in techniques of applied micro theory for those going into policy and problem-solving jobs. Also useful to undergraduates considering graduate study in economics. Topics include estimating demand, cost, and production functions; operational models of production; processes from industry/agriculture; capital theory; and benefit-cost analysis. Prereqs., ECON 3070 and 4808.

**ECON 6080-3. Applied Macroeconomic Theory.** Develops competence in techniques of applied macro theory. Topics include theoretical and empirical work on consumption, investment, money demand and supply, and open economy macroeconomic models. Also covers different expectations models, the policy ineffectiveness proposition, and policy credibility. Prereqs., ECON 3080 and 4808.

**ECON 7010-3. Microeconomic Theory 1.** Analyzes recent and contemporary literature on fundamentals of economic theory. Considers value theory with particular emphasis on methodology, theory of demand, theory of the firm, game theory, theory of distribution, general equilibrium theory, and welfare economics. Prereqs., ECON 3070, 3080; 6808 or MATH 1300.

**ECON 7020-3. Macroeconomic Theory 1.** Discusses behavior of consumption, investment, employment, production, and interest rates in the context of dynamic optimization models. Also considers government, economic growth, and business cycles. Prereqs., ECON 3070 and 3080.

**ECON 7030-3. Microeconomic Theory 2.** Continuation of ECON 7010. Prereq., ECON 7010.



**ECON 7040-3. Macroeconomic Theory 2.** Presents the theoretical and empirical application of dynamic macro programming models. Topics include consumption, investment, labor, money, and credit theories. Covers the theory of economic fluctuations and business cycles employing dynamic general equilibrium models. Prereq., ECON 7020.

**ECON 7050-3. Advanced Economic and Econometric Theory.** Discusses advanced topics in game theory and linear regression. Prereqs., ECON 7010, 7030, 7818, 7828.

## Money and Banking

**ECON 4111-3. Money and Banking Systems.** Discusses money, financial institutions and the monetary-financial system in a modern economy. Prereqs., ECON 1000, or 2010 and 2020.

**ECON 6111-3. Survey in Monetary Economics.** Surveys the U.S. experience and international monetary relations. Gives attention to interest rates, international debt, history of U.S. monetary/debt crises, bank reform, and the evolution of monetary institutions. Prereqs., ECON 6070 and 6080.

## Public Economics

**ECON 4211-3. Economics of the Public Sector.** Focuses on taxation and public expenditures. Topics include economic rationale for government action, economic theory of government behavior, and effects of government policies on allocation of resources and distribution of income. Prereq., ECON 3070.

**ECON 6211-3. Public Economics.** Covers principles of taxation and public expenditures. Specific topics include the incidence of taxes, the allocative effect of taxes, public goods, externalities, voting, bureaucratic behavior, and cost-benefit analysis. Prereqs., ECON 6070 and 6080.

**ECON 8211-3. Public Economics: Fundamental Principles.** Presents the fundamental principles of public goods, externalities, public choice, excess burden, optimal taxation, and tax incidence. Prereq., ECON 6211 or 7010.

**ECON 8221-3. Public Economics: Topics in Public Expenditures and Taxation.** Explores advanced topics in public economics such as decentralization, state and local government, program analysis, taxation, international tax issues, political economy issues, and market failure. Prereqs., ECON 6211 or 7010, and 8211.

**ECON 8231-3. Local Public Economics.** Examines subnational governments and systems of governments, the effects of inter-governmental competition, appropriate tax and expenditure responsibilities, and variations in governing institutions. Covers congestible public goods, Tiebout mechanisms, and tax capitalization. Prereq., ECON 6211 or 7010.

## Urban and Regional Economics

**ECON 4292-3. Migration, Urbanization, and Development.** Examines historical and current patterns of national settlement system development. Focuses on quantitative analysis of problems associated with population growth and decline, urbanization, and economic structural change in more developed and less developed countries. Same as GEOG 4292.

**ECON 8252-3. Seminar: Urban and Regional Economics 1.** Covers basic theories in spatial location of economic activity and land use and the survey techniques developed to analyze, measure, and predict regional and urban structure and growth, such as economic base studies, regional social accounts, and input-output analysis. Prereq., ECON 6070 or 7010.

**ECON 8262-3. Topics in Urban and Regional Economics.** Investigates various theoretical topics in urban and regional economics, focusing on policy issues. Involves student research and presentations. Prereq., ECON 6070 or 7010.

## International Trade and Finance

**ECON 3403-3. International Economics and Policy.** Examines national and supra-national policies that affect the international economy, with attention to trade barriers, economic nationalism and regionalism, international political economy, exchange market intervention, and international transmission of economic perturbations. Prereqs., ECON 1000, or ECON 2010 and 2020. Restricted to nonmajors. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 4413-3. International Trade.** Focuses on theories of international trade and its impacts on economic welfare. Analyzes commercial policy, including

tariffs, non-tariff barriers, retaliation, regional integration, and factor migration. Prereq., ECON 3070.

**ECON 4423-3. International Finance.** Covers balance of payments; foreign exchange market, income, trade, and capital flows; asset markets adjustment mechanisms; stabilization policies in an open economy; and problems of international monetary systems. Prereq., ECON 3080.

**ECON 4433-3. Economics of the Pacific Area.** Analyzes economic interrelationships in the Pacific area, emphasizing the United States, Japan, China, and Asian nations. Discusses aspects of economic conflict, growth and commercial policy. Prereq., ECON 3403, 4413, or 4423.

**ECON 6413-3. International Trade.** Discusses theories of international trade and its impacts on economic welfare. Analyzes commercial policy, including tariffs, non-tariff barriers, retaliation, regional integration, and factor migration. Prereqs., ECON 6070 and 6080.

**ECON 6423-3. International Monetary Economics.** Covers balance of payments; foreign exchange market, income, trade, and capital flows; asset market adjustment mechanisms; stabilization policies in an open economy; and problems of international monetary systems. Prereqs., ECON 6070 and 6080.

**ECON 6433-3. Computational Economic Equilibrium Analysis.** Provides graduate students in economics with the mathematical and computing knowledge required for building and analyzing large-scale numerical equilibrium models. Topics include applications in public finance, trade, and environmental economics. Prereq., ECON 6070 or 7010 or equivalent.

**ECON 8323-3. Continuities and Changes in Modern World Economy.** Introduces globalization and democratization from an interdisciplinary perspective. Examines major changes to the global political economy and explores implications for local, national, regional, and international political and economic processes. Same as PSCI 7223.

**ECON 8333-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Same as PSCI 7333.

**ECON 8413-3. Seminar: International Trade Theory.** Covers theories of comparative advantage, including the classical, factor-proportions, fixed-factor, and noncompetitive markets models. Examines trade policy including trade barriers, market distortions, strategic policy, regional integration, political economy, and factor migration. Prereq., ECON 6413 or 7010.

**ECON 8423-3. Seminar: International Finance.** Highlights foreign exchange markets, past and current international monetary mechanisms, and processes of adjustment. Examines the role of international financial markets for the behavior of consumption, investment, saving, and production. Also considers international transmission of business cycles. Prereq., ECON 6423 or 7020.

**ECON 8433-3. Seminar: Topics in Money and International Economics.** Explores advanced work in various aspects of international economics, such as empirical trade analysis, public choice, and interactions between real and monetary phenomena in the world economy. Prereq., ECON 6413, 6423, 8413, or 8423.

## Economic History and Economic Development

**ECON 4514-3. Economic History of Europe.** Covers evolution of modern economic growth and development in Europe, emphasizing institutional change. Prereqs., ECON 1000, or 2010 and 2020. Approved for arts and sciences core curriculum: historical context.

**ECON 4524-3. Economic History of the United States.** Evolution of modern economic growth and development in the U.S. from colonial times to the present emphasizing institutional change. Prereq., ECON 3070. Approved for arts and sciences core curriculum: United States context.

**ECON 4774-3. Economic Reform in Developing Countries.** Explores competing paradigms of economic development, emphasizing the confrontation between the structuralist/dirigiste paradigm and the neoclassical public choice paradigm. Analyzes economic reforms under way in developing countries, including stabilization policy and structural adjustment. Also explores political reforms, including the pluralist revolution and the design of a constitutional framework in developing societies. Prereqs., ECON 1000, or ECON 2010 and 2020.

**ECON 4784-3. Economic Development.** Explores empirical, theoretical, and policy issues in economic development. Examines topics with reference to the developing countries: income distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade, and finance. Prereqs., ECON 1000, or 2010 and 2020.

**ECON 6774-3. Economic Reform in Developing Countries.** Covers stabilization policy and structural adjustment. Specific topics include orthodox stabilization policies (fiscal, monetary, and exchange rate policies); heterodox stabilization policies (price, wage, and interest controls); trade liberalization; financial liberalization; privatization and deregulation. Prereqs., ECON 6070 and 6080.

**ECON 8534-3. Economic History of North America.** Examines North America's past from the perspective of economics. Topics include growth and welfare in the colonial period; staple products, agricultural development, and the emerging industrialism in the antebellum period; transformation of the North American economy to 1914; the interwar years and the Great Depression; and economic integration since 1945. Prereqs., ECON 6070 and 6080, or ECON 7010.

**ECON 8764-3. History of Economic Development.** Covers in historical perspective the causes of economic development including why some areas develop faster than others and why development occurs more rapidly in some eras than others. Prereqs., ECON 6070 and 6080, or ECON 7010. Same as HIST 7214.

**ECON 8774-3. Seminar in Transition Economies.** Focuses on the problems encountered in countries evolving from planned to market economies. Emphasizes applications of new and traditional models of economic growth and analysis of problems unique to formerly planned economies. Prereq., ECON 6774 or 7010.

**ECON 8784-3. Economic Development.** Explores empirical, theoretical, and policy issues in economic development. Examines political economy, income distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade and finance, stabilization policy, and structural adjustment. Prereqs., ECON 6774 or 7010.

## Natural Resources and Environmental Economics

**ECON 3535-3. Natural Resource Economics.** Integrates economic analysis with life science aspects of natural resource systems to develop social policies for use of natural resources. Studies economists' approaches to resources policy analysis and applies them to energy, forestry, fisheries, mineral, and water systems. Prereq., ECON 1000 or 2010. For nonmajors. Students may not receive credit for both ECON 3535 and 4535. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 3545-3. Environmental Economics.** Highlights causes of excessive environmental pollution and tools for controlling it through economic analysis, values of preservation, and distribution of costs and benefits from environmental protection programs. Prereq., ECON 1000 or 2010. Open to nonmajors only. Students will not receive credit for both ECON 3545 and 4545. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 4535-3. Natural Resource Economics.** Analysis of problems associated with socially optimal use of renewable and nonrenewable natural resources over time. Problems of common property resources, irreversible forms of development, and preservation of natural areas. Prereq., ECON 3070. Students will not receive credit for both ECON 3535 and 4535.

**ECON 4545-3. Environmental Economics.** Examines the effects of economic growth on the environment; application of economic theory of external diseconomies, cost-benefit analysis, program budgeting, and welfare economics to problems of the physical environment. Prereq., ECON 3070. Students will not receive credit for both ECON 3545 and 4545.

**ECON 6535-3. Resources and Environment.** Studies the economics of resource and environmental problems. Topics include benefit-cost analysis, microeconomic foundations of optimal static and intertemporal usage of both renewable and nonrenewable natural resources, and philosophical issues. Prereqs., ECON 6070 and 6080.

**ECON 6555-3. Water Resources Development and Management: Technology, Economics, Institutions.** Offers a multidisciplinary exploration of the engineering, economic, and institutional principles involved in water system development and management. Provides a background in basic hydrology, economics, water law, and institutions. Prereq., ECON 3070 or equivalent. Same as CVEN 5393.

**ECON 8535-3. Environmental Economics I.** Considers the allocation of society's scarce environmental resources and government attempts to achieve more efficient and equitable allocations. It is a course in applied welfare economics with an emphasis on market failure and valuation. Prereq., ECON 6535 and 6808; or ECON 7010.

**ECON 8545-3. Environmental Economics II.** Provides advanced study of recent advances in environmental economics and explores opportunities for new research. Topics vary with interests of instructor and students. Prereqs., ECON 6535 and 6808, or ECON 7010; and ECON 8535.

**ECON 8555-3. Water Resources Development and Management.** Offers a research seminar in joint hydrologic-economic modeling and systems analysis. Addresses problems of joint water quantity-water quality management and joint surface-ground water management. Prereq., ECON 6555.

## Labor and Human Resources

**ECON 4616-3. Labor Economics.** Examines the influence of markets, unions, and government on labor allocation and remuneration. Analyzes human capital, discrimination, mobility and migration, productivity, unemployment, and inflation. Compares outcomes under competition with those in a world marked by shared market power and bargaining. Prereq., ECON 3070.

**ECON 4626-3. The Economics of Inequality and Discrimination.** Examines the unique insights available through economic analysis regarding the causes, mechanisms, and consequences of inequality and discrimination. Examines the extent of inequality, the varieties and extents of discrimination, and explores the economic models that suggest explanations. Prereq., ECON 3070. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ECON 8666-3. Economic Demography.** Investigates economic determinants and consequences of demographic behavior in developing and developed countries. Issues include fertility and female labor supply interactions, the demographic transition, the effect of population growth on income distribution, family investments in children, and intergenerational mobility. Prereqs., ECON 3070 and 3080.

**ECON 8676-3. Seminar: Labor Economics 1.** Focuses on the demand side of labor markets. Topics include standard static and dynamic models of labor demand, labor market discrimination, composition of compensation, labor hierarchies within enterprises, unionization, efficient contracts, and macroeconomics of labor markets. Prereq., ECON 6070 or 7010.

**ECON 8686-3. Seminar: Labor Economics 2.** Focuses on special topics in labor economics: dynamic theories of labor supply, employment, and unemployment; labor supply in a household framework; and labor market activity and income distribution. Explores both theoretical models and empirical tests in each area. Prereq., ECON 6070 or 7010.

## Industrial Organization

**ECON 4697-3. Industrial Organization and Regulation.** Explores neoclassical theory of the firm, the determinants of industrial structure, and the purposes and institutions of public policy to control or maintain a competitive environment. Prereq., ECON 3070. Approved for arts and sciences core curriculum: United States context.

**ECON 8747-3. Industrial Organization Theory.** Highlights economics of regulation of industry and markets, industry studies, and the application of lab methods to industrial organization. Prereq., ECON 7010.

**ECON 8757-3. Industrial Organization and Public Policy.** Addresses the theory of interaction of firms within markets and industries, emphasizing importance of the number, relative size of firms, market institution, firm strategies, and nature of consumer demand. Examines neoclassical and game theoretic models, empirical industry studies, and laboratory tests of theoretical models and policies. Prereq., ECON 7010.

## Quantitative Economics

**ECON 1078-3. Mathematical Tools for Economists 1.** Teaches mathematical skills and logical thinking for use in economics. Topics include algebra, graphs, functions, and probability. The class includes many "real world" examples and some illustrative computer assignments. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**ECON 1088-3. Mathematical Tools for Economists 2.** Continuation of ECON 1078. Teaches mathematical skills for use in economics. Topics include derivatives,

optimization, and integration. These skills are used on “real world” problems, and illustrated with computer assignments. Prereq., ECON 1078 or instructor consent. Similar to MATH 1080, 1081, 1090, 1100, 1300, 1310, and APPM 1350.

**ECON 3818-4. Introduction to Statistics with Computer Applications.** Introduces statistical methods and their applications in quantitative economic analysis. Prereqs., ECON 1000, or 2010 and 2020; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 4808-3. Introduction to Mathematical Economics.** Introduces the use of mathematics in economics. Topics include vectors and matrices, differential calculus, and optimization theory, with economic applications. Prereqs., ECON 1000, or 2010 and 2020; and ECON 1078 and 1088 or equivalent.

**ECON 4818-3. Introduction to Econometrics.** Provides undergraduate economics majors with an introduction to econometric theory and practice. Develops the multiple regression model and problems encountered in its application in lecture and individual applied projects. Prereq., ECON 3818.

**ECON 4838-3. Microcomputer Applications in Economics.** Addresses innovative uses of personal computers in economic analysis and model building techniques. Acquaints students with economic models through individualized, computer-generated exercises. Topics include input-output analysis, linear programming, nonlinear approximation, and simulation. Prereqs., ECON 1088 or MATH 1300, and ECON 3070.

**ECON 6808-3. Introduction to Quantitative Economics.** Topics include multi-variable optimization problems with and without constraints, simple difference and differential equations, stability, introduction to linear and nonlinear programming, and calculus of variations. Prereq., ECON 4808.

**ECON 6818-3. Econometric Methods and Application.** Offers a master’s-level introduction to econometric theory and practice. Develops the multiple regression model and problems encountered in its application in lecture and individual applied projects. Prereq., ECON 3818 or equivalent.

**ECON 6828-3. Applied Time Series Analysis (Box-Jenkins) and Forecasting.** Introduces first-year graduate students to time series approach of model building and forecasting. Basic topics are autoregressive integrated moving average models, nonstationarity and co-integration, vector autoregressions, and the evaluation of forecasts from such models. Emphasizes applied computer assignments. Prereqs., ECON 3818 and 4808, or equivalent.

**ECON 7818-3. Mathematical Statistics for Economists.** Applies statistical inference to economic research. Principle topics are probability and mathematical statistics, classical regression and least squares estimation, problems of regression, and extensions to models of qualitative choice, dynamic models, and systems of equations.

**ECON 7828-3. Econometrics.** Continuation of ECON 7818. Topics include maximum likelihood estimation, problems of regression, extensions of the linear regression model, and simultaneous equations estimation. Prereq., ECON 7818.

**ECON 8818-3. Seminar: Mathematical Economics—Dynamics.** Offers a mathematical exposition of contemporary macro- and microdynamics. Focuses on neoclassical and nonlinear models. Topics include efficient and optimal growth, growth and fluctuations, and stabilization and control policies. Prereq., ECON 6808.

**ECON 8828-3. Seminar: Econometrics 1.** First semester of two-semester sequence in econometrics for PhD students. Studies least squares and generalized least squares estimation of linear econometric models. Asymptotic (large sample) theory of inference. Some topics in the estimation of microdata. Prereq., ECON 7818.

**ECON 8838-3. Seminar: Econometrics 2.** Teaches the advanced level of econometrics theory. Topics include asymptotic theory, maximum likelihood estimation, limited dependent variables analysis and other frontier areas of econometrics such as the method of moment estimation, semiparametric and nonparametric estimation procedure. Prereq., ECON 7828.

## Independent Study and Other Courses

**ECON 4309-3. Economics Honors Seminar 1.** For information consult the department’s director of honors. Open only to qualified seniors. Approved for arts and sciences core curriculum: critical thinking.

**ECON 4339-3. Economics Honors Seminar 2.** For information consult the department’s director of honors. This course does not count toward major requirements. Prereq., ECON 4309. Open only to qualified seniors.

**ECON 4909 (3). Independent Study.** May be repeated up to 6 total credit hours, but only 3 credit hours count for economics major. Prereqs., ECON 1000 or 1010 and 2020; completion of at least 12 hours of ECON classes and instructor and department consent required. Offered only to students with a GPA of 3.00 or better.

**ECON 4939 (2-6). Internship/Seminar.** Offers students the opportunity to integrate theoretical concepts of economics with practical experience in economics-related institutions. The theoretical portion arises from seminars and readings, the practical from activities in organizations related to the economics field. A maximum of 3 credit hours counts toward major requirements. Prereqs., ECON 3070 and 3080; junior or senior major standing; and instructor consent.

**ECON 4999-3. Economics in Action: A Capstone Course.** Students read current periodicals, picking out topics in which economics plays a role in understanding events. Background reading is assigned on topics chosen. May not be taken more than once for credit. Prereqs., ECON 3070 and 3080, and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**ECON 6209-3. Research Methods in Economics.** Trains graduate students in scientific methodology and research in economics. Culminates in a research project that normally leads directly to thesis work. Prereqs., ECON 6070, 6080, 6808, and 6818.

**ECON 6909 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., instructor and department consent.

**ECON 6949 (1-3). Master’s Candidate.**

**ECON 6959 (1-6). Master’s Thesis.**

**ECON 8209-3. Economics Research Methods Workshop 1.** Assists students starting their doctoral thesis by discussing methodology and evaluation of economic research. Presents and discusses student research proposals. Prereqs., two ECON courses at the 8000 level.

**ECON 8219-3. Economics Research Methods Workshop 2.** Continuation of ECON 8209. Assists students starting their doctoral thesis by discussing relevant economic research. Presents and discusses research papers. Prereq., ECON 8209.

**ECON 8909 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., instructor and department consent.

**ECON 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## English

### General Literature and Language

**ENGL 1010-3. Critical Analysis 2: Prose.** Basic skills course designed to equip students to handle the English major. Emphasizes critical writing and the acquisition of basic techniques and vocabulary of literary criticism through close attention to varieties of prose language. Required only for students who declared the major prior to summer 1999. Restricted to English majors. Students may not receive credit for both ENGL 1010 and 2000.

**ENGL 1200-3. Introduction to Fiction.** Emphasizes reading and analysis of short stories and novels.

**ENGL 1260-3. Introduction to Women’s Literature.** Introduces literature by women in England and America. Covers both poetry and fiction and varying historical periods. Acquaints students with the contribution of women writers to the English literary tradition and investigates the nature of this contribution. Same as WMST 1260. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ENGL 1300-3. Introduction to Drama.** Offers reading and analysis of plays.

**ENGL 1500-3. Masterpieces of British Literature.** Introduces students to a range of major works of British literature, including at least one play by Shakespeare, a pre-20th century English novel, and works by Chaucer and/or Milton. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 1600-3. Masterpieces of American Literature.** Enhances student understanding of the American literary and artistic heritage through an intensive study of a few centrally significant texts, emphasizing works written before the 20th century. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 1800-3. American Ethnic Literatures.** Introduces significant fiction by ethnic Americans. Explores both the literary and the cultural elements that distinguish work by these writers. Emphasizes materials from Native American, African American, and Chicano traditions. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ENGL 1840 (1-3). Independent Study, Lower-Division.** Creative writing. May be repeated up to 8 total credit hours.

**ENGL 1850 (1-3). Independent Study, Lower-Division.** Literature/language. May be repeated up to 8 total credit hours.

**ENGL 2000-3. Literary Analysis.** Provides a basic skills course designed to equip students to handle the English major. Emphasizes critical writing and the acquisition of basic techniques and vocabulary of literary criticism through close attention to poetic and prose language. Required for students who declared the major summer 1999 and thereafter. Restricted to English majors only. Students may not receive credit for both ENGL 1010 and 2000.

**ENGL 2010-3. Introduction to Literary Theory.** Introduces students to a wide range of critical theories that English majors need to know. Covers major movements in modern literary/critical theory, from Matthew Arnold through new criticism to contemporary postmodern frameworks. Required for all English majors. Restricted to English majors only.

**ENGL 3000-3. Shakespeare for Nonmajors.** Introduces students to Shakespeare's major works: the histories, comedies, and tragedies. May include the nondramatic poetry as well. Prereq., sophomore standing. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 3060-3. Modern and Contemporary Literature.** Close study of significant 20th century poetry, drama, and prose works. Readings range from 1920s to the present. Prereq., sophomore standing. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 3930 (1-3). Internship.** Provides academically supervised opportunity for upper-division students to work in public or private organizations on projects related to students' career goals and to relate classroom theory to practice. May be repeated up to 6 total credit hours. Prereq., junior standing and instructor consent.

**ENGL 3940 (1-3). Service Learning Practicum.** Under faculty supervision, students participate in a service project correlated with the academic subject. May be repeated up to 6 total credit hours.

**ENGL 4100-3. The English Language.** Outlines history of the language, including a brief survey of sound changes affecting modern English, history of grammatical forms, and the vocabulary. Assumes elementary knowledge of English grammar. Prereq., junior standing.

**ENGL 4200-3. Contemplation/Poetry/Self.** Focuses on contemplative practices across several spiritual traditions: ecstatic poetry, poetry that describes mystical status, and historic and contemporary ideas of self as articulated in Eastern and Western philosophy, psychology, and literature. Prereq., senior standing. Same as WMST 4200.

**ENGL 4250-3. Modern Novel.** Close study of masterpieces by such novelists as Proust, Joyce, Woolf, Lawrence, Mann, Kafka, and Faulkner. Prereq., junior standing.

**ENGL 4260-3. Contemporary Novel.** Studies major novelists and developments in the genre, emphasizing novels written since 1945. Prereq., junior standing.

**ENGL 4360-3. Modern Drama.** Explores continental, British, and American drama since Ibsen. Prereq., junior standing.

**ENGL 4460-3. Modern Poetry.** Selects works of British and American poets from 1900 to the present. Prereq., junior standing.

**ENGL 4820-3. Honors Seminar.** Prepares prospective honors students to write honors theses. Focuses on sharpening the skills needed to write a successful thesis, including research techniques and the ability to evaluate and respond to secondary materials. May not be repeated. Prereq., instructor consent. Restricted to junior and senior English majors.

**ENGL 4830-3. Honors Thesis.**

**ENGL 4840 (1-3). Independent Study, Upper-Division.** Creative writing. May be repeated up to 8 total credit hours.

**ENGL 4850 (1-3). Independent Study, Upper-Division.** Literature/language. May be repeated up to 8 total credit hours.

## Undergraduate Writing

**ENGL 1001-3. Freshman Writing Seminar.** Provides training and practice in writing. Focuses on the writing process, the fundamentals of composition, and the structure of argument. Provides numerous and varied assignments with opportunity for revision. Prereqs., College of Arts and Sciences freshman or sophomore standing. Not open to business or engineering majors. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: lower-division written communication.

**ENGL 1191-3. Introduction to Creative Writing.** Introduces techniques of fiction and poetry. Student work is scrutinized by the instructor and discussed in a workshop atmosphere by other students. May not be taken concurrently with ENGL 2021 or 2051. May not be repeated. Not open to graduate students.

**ENGL 2021-3. Introductory Poetry Workshop.** Introductory course in poetry writing. May be repeated up to 9 total credit hours. Prereq., completion of ENGL 1191 with a minimum grade of B-, or equivalent transfer course work.

**ENGL 2051-3. Introductory Fiction Workshop.** Introductory course in fiction writing. May be repeated up to 9 total credit hours. Prereq., ENGL 1191 with a minimum grade of B-, or equivalent transfer course work.

**ENGL 3021-3. Intermediate Poetry Workshop.** Intermediate course in poetry writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (five to seven poems).

**ENGL 3051-3. Intermediate Fiction Workshop.** Intermediate course in fiction writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent, based on submission of manuscript (one short story).

**ENGL 3081-3. Intermediate Nonfiction Workshop.** Discussion and practical criticism of student work and discussion of relevant works of literary nonfiction. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript.

**ENGL 3151-3. Advanced Composition: Style.**

**ENGL 4021-3. Advanced Poetry Workshop.** Advanced course in poetry writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (five to seven poems).

**ENGL 4051-3. Advanced Fiction Workshop.** Advanced course in fiction writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (one short story).

**ENGL 4071-3. Scriptwriting Workshop.** Designed to give students practical criticism of their script writing and technical format requirements. Either stage plays or screenplays are studied, as announced. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript.

**ENGL 4081-3. Playwriting.** May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript.

## Backgrounds to Literature in English

**ENGL 2222-3. Foundations of British and American Literature.** Studies major texts of medieval and Renaissance writers who fundamentally influenced the course of English writing. Ordinarily deals with Chaucer, Shakespeare, and Milton, though other classical, medieval, and Renaissance authors may be substituted.

**ENGL 2502-3. British Literary History 1.** Provides a chronological study of great figures and forces in English literature from *Beowulf* to 1660. Students may not receive credit for both ENGL 2502 and 3503.

**ENGL 2512-3. British Literary History 2.** Provides a chronological study of great figures and forces in English literature from 1660 to the present. Students may not receive credit for both ENGL 2512 and 3513.

**ENGL 2602-3. Introduction to Western European Literature 1.** Close study of literary classics of Western civilization: the *Odyssey* or *Iliad*, Greek drama, and several books of the Bible.

**ENGL 2612-3. Introduction to Western European Literature 2.** Close study of literary classics of Western civilization: major Roman and medieval texts.

**ENGL 3302-3. Backgrounds of English and American Literature.** Studies literary, philosophic, and religious traditions of the Greco-Roman and Judeo-Christian worlds, with close analysis of major texts in translation. Compares ancient and modern texts where feasible. Prereq., sophomore standing. Restricted to English and humanities majors.

**ENGL 3312-3. The Bible as Literature.** Surveys literary achievements of the Judeo-Christian tradition as represented by the Bible. Prereq., sophomore standing.

## British Literature to 1660

**ENGL 3543-3. Chaucer: *Troilus and the Early Poems.*** Close reading of Chaucer's work before *The Canterbury Tales*, with special emphasis on *Troilus and Criseyde* and its sources. Prereq., sophomore standing.

**ENGL 3553-3. Chaucer: *The Canterbury Tales.*** Short introduction to Middle English precedes study of the poetry. Prereq., sophomore standing. Restricted to English and humanities majors only.

**ENGL 3563-3. Shakespeare 1.** Shakespeare's works through 1600. Prereq., junior standing. Restricted to English, humanities, and theatre majors only.

**ENGL 3573-3. Shakespeare 2.** Shakespeare's works after 1600. Prereq., junior standing. Restricted to English, humanities, and theatre majors only.

**ENGL 3583-3. Milton.** Milton's poetry and selected prose. Prereq., sophomore standing. Restricted to English and humanities majors only.

**ENGL 4113-3. History and Culture of Medieval England.** Explores the major historical, literary, and cultural developments in England from the Anglo-Saxon period through the 15th century. Prereq., junior standing. Approved for arts and sciences core curriculum: historical context.

**ENGL 4503-3. Medieval Literature 1.** Intensive study of the major literary works of the Middle Ages in Europe. Prereq., junior standing.

**ENGL 4513-3. Medieval Literature 2.** Intensive study of the major literary works of the Middle Ages in Britain. Prereq., junior standing.

**ENGL 4523-3. The Renaissance in England: 1500–1600.** Selected prose and non-dramatic poetry from Skelton and More through Shakespeare and his contemporaries. Prereq., junior standing.

**ENGL 4533-3. The Renaissance in England: 1600–1700.** Selected prose and poetry by Donne, Jonson, Bacon, and their successors. Prereq., junior standing.

**ENGL 4583-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors and seniors. Same as HIST 4134 and THTR 4091.

**ENGL 4673-3. Anglo-Saxon Language and Literature.** Introduction to Anglo-Saxon (old English) language and literature. Emphasis on rapidly acquiring a reading knowledge of the language. Prose readings are followed by highlights of the shorter poetry ("Wanderer," "Seafarer," "Battle of Maldon," etc.) Prereq., junior standing.

**ENGL 4683-3. *Beowulf.*** Students read and analyze *Beowulf* in the original language, with some attention to additional background readings. Prereq., junior standing.

## British Literature after 1660

**ENGL 3164-3. History and Literature of Georgian England.** Provides an interdisciplinary study of England in one of its most vibrant cultural and historical periods. Topics include politics, religion, family life, and the ways contemporary authors understood their world. Prereq., sophomore standing. Same as HIST 4164. Approved for arts and sciences core curriculum: historical context.

**ENGL 4204-3. Development of the English Novel 1.** From the beginnings to 1830. Prereq., junior standing.

**ENGL 4214-3. Development of the English Novel 2.** Continuation of ENGL 4204. Prereq., junior standing.

**ENGL 4224-3. Modern British and Irish Novel.** Studies major figures and trends in the 20th century. Prereq., junior standing.

**ENGL 4544-3. The Age of Satire: 1660–1740.** Dryden, Defoe, Swift, Pope, Addison, Steele, and their contemporaries. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4554-3. The Age of Sense and Sensibility: 1740–1800.** Gray, Johnson, Goldsmith, Boswell, Cowper, Burns, Blake, and their contemporaries. Prereq., junior standing.

**ENGL 4564-3. The Early Romantics.** Major emphasis on Blake, Coleridge, and Wordsworth. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4574-3. The Later Romantics.** Major emphasis on Keats, Shelley, and Byron. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4604-3. The Early Victorians.** Main currents of Victorian thought in prose and poetry, 1830–1860. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4614-3. The Later Victorians.** Continuation of ENGL 4604, covering 1860–1900. Prereq., junior standing. Restricted to English and humanities majors only.

## American Literature

**ENGL 3655-3. American Literature to 1860.** Chronological survey of the literature from Bradford to Whitman. Restricted to English, humanities, and film studies majors only. Prereq., sophomore standing. May not receive credit for both ENGL 3654 and 3655.

**ENGL 3665-3. American Literature after 1860.** Chronological survey of the literature from Whitman to Faulkner. Continuation of ENGL 3655. Restricted to English, humanities, and film studies majors only. Prereq., sophomore standing. Similar to ENGL 3664.

**ENGL 4235-3. American Novel 1.** From the beginnings to 1900. Prereq., junior standing.

**ENGL 4245-3. American Novel 2.** From 1900 to the present. Prereq., junior standing.

**ENGL 4655-3. Studies in American Literature to 1900.** Extensive study of particular periods and movements in American literature. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4665-3. Studies in American Literature after 1900.** Extensive study of particular periods and movements in American literature. Prereq., junior standing. Restricted to English and humanities majors only.

## Advanced Theory, Genre Studies, and Popular Culture

**ENGL 3116-3. Topics in Advanced Theory.** Studies special topics in theory; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours different topics. Prereq., sophomore standing.

**ENGL 3226-3. Folklore 1.** Emphasizes formal study of folk traditions (including tales, songs, games, customs, beliefs, and crafts) within a theoretical framework, using examples from several cultures. Prereq., sophomore standing.

**ENGL 3246-3. Topics in Popular Culture.** Studies special topics in popular culture; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics. Prereq., sophomore standing.

**ENGL 3796-3. Queer Theory.** Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, and gay literature. Examines relationships among aesthetic, cultural, and political agendas, and literary and visual texts of the 20th century. Prereq., sophomore standing. Same as LGBT 3796.

**ENGL 3856-3. Topics in Genre Studies.** Studies special topics in genre studies; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics. Prereq., sophomore standing.

**ENGL 4006-3. Literature and Psychology.** Critically applies basic concepts of psychology to world literature. Prereq., junior standing.

**ENGL 4016-3. Literature and Psychopathology.** Studies major psychological disorders as they are given dramatic and descriptive treatment by literary artists in poems, plays, short stories, and novels. Emphasis is primarily descriptive; some attention is paid to contemporary views of etiology. Prereq., junior standing.

**ENGL 4286-3. Folklore 2.** Upper-division studies of folk groups, events, texts, and contexts as they reflect traditional knowing—folk perceptions and teachings about the structure and purpose of the universe. Prereq., ENGL 3226 and junior standing.

## Multicultural and Gender Studies

**ENGL 2707-3. Introduction to Lesbian, Bisexual, and Gay Literature.** Offers students at sophomore and junior levels an introduction to some of the forms,

concerns, and genres of contemporary lesbian, bisexual, and gay writing in English. Prereq., sophomore standing. Same as LGBT 2707.

**ENGL 2717-3. Native American Literature.** Surveys traditional and contemporary North American Native American literature, from traditional oral forms to contemporary genre literature of novels, short stories, and poetry. Same as AIST 2712.

**ENGL 2727-3. Survey of African American Literature 1.** Chronological study of African American literature from the 17th century to the Harlem Renaissance. Same as BLST 2722.

**ENGL 2737-3. Survey of African American Literature 2.** Chronological study of African American literature from the Depression writers to the present. Same as BLST 2732.

**ENGL 2747-3. Survey of Chicano Literature.** Introduces Chicano literary studies, focusing on narrative works by major Chicano/a writers. Examines a diverse range of Chicano/a writing as it addresses recurring issues and themes, including language, race and class oppression, questions of identity, and gender relations. Same as CHST 2742.

**ENGL 2757-3. Survey of Asian American Literature.** Surveys the narrative literature of major Asian American writers of Chinese, Japanese, Korean, Filipino, Asian Indian, and Southeast Asian descent. Explores such themes as immigration, generational and cultural difference, stereotypes, and cultural identity, emphasizing a critical analysis framed by socio-historical contexts. Same as AAST 2752. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 2767-3. Survey of Post-Colonial Literature.** Surveys the development of literatures in English in former British colonies. Topics include the spread and adaptation of English language literary forms in Asia, Africa, the Caribbean, and the far new world (Australia and New Zealand). Students learn the causes of the dispersion and the motivations for the clearly different uses of English literary forms in the ex-colonies. Same as ETHN 2762.

**ENGL 3217-3. Topics in Gender Studies.** Studies special topics in gender studies; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours for different topics. Prereq., sophomore standing.

**ENGL 3237-4. Prison Writing and Literacy.** This course combines a seminar on the history and theory of literature by prisoners (from Socrates to Sir Thomas More to Leonard Peltier) with service work in adult literacy. GED preparation, and life skills programs in several Denver-area correctional facilities. Prereqs., ENGL 2000, 2010.

**ENGL 3267-3. Women Writers.** Introduces literature by British and American women. Prereq., sophomore standing. Same as WMST 3267.

**ENGL 3377-3. Topics in Multicultural Literature.** Studies special topics in multicultural literature; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours for different topics. Prereq., sophomore standing.

**ENGL 3677-3. Jewish-American Fiction and Old World Backgrounds.** Explores cross-cultural transitions, influences, and ethnicity in the social and literary history of Europe and America through Jewish experience, expressed in the works of such writers as Heine, Sholom Aleichem, Peretz, Babel, Singer, Malamud, Roth, and Woody Allen. Prereq., sophomore standing. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ENGL 4277-3. Topics in Women's Literature.** Focuses on areas of research interest in the study of women's literature, such as selected themes or critical issues. Students are expected to contribute original research to the topic under consideration. Prereq., junior standing. Same as WMST 4277.

**ENGL 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of homosexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as LGBT/WMST 4287.

**ENGL 4697-3. Contemporary African American Literature 1.** Advanced in-depth study of the works of prominent African American novelists and poets. Prereq., junior standing. Same as BLST 4692.

## Critical Studies in English

**ENGL 4038-3. Critical Thinking in English Studies.** Concerned with developments in the study of literature that have significantly influenced our conception of the theoretical bases for study and expanded our understanding of appropriate subject matter. May not be repeated. Prereq., junior standing. Restricted to English and humanities majors only. Approved for arts and sciences core curriculum: critical thinking.

**ENGL 4728-3. Seminar: Topics in English.** Studies such topics as heroism in 18th-century literature, eros and violence, South African women writers, politics and religion in 16th century literature, and American humor. Topics vary with instructor. May not be repeated. Prereq., junior standing.

## Graduate Courses

**ENGL 5009-3. Critical Analysis: Introduction to Medieval and Renaissance Studies.** Exercises in the close reading and interpretation of poetic, prose, and dramatic writing before 1700. Introduces students to conventional and technical vocabularies and to problems of grammar, vocabulary, and interpretation. Samples from the full range of periods are studied, with attention to historical conventions. May not be repeated for credit. Prereq., graduate standing in English.

**ENGL 5019-3. Survey of Contemporary Literary Theory.** An introduction to the range and variety of critical and theoretical thought informing contemporary literary studies. Introduces methodologies such as new criticism, structuralism and poststructuralism, psychoanalysis, reader-response criticism, gender studies, Marxist criticism, multicultural and postcolonial theory, and postmodernism.

**ENGL 5029, 5039, and 5049-3. Literature of the British Isles: Pre-1790.** Studies special topics in medieval, Renaissance, or 18th century literature. Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5059, 5069, and 5079-3. Literature of the British Isles: 1790–1900.** Studies special topics in romantic or Victorian literature. Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5109, 5119, and 5129-3. Literature of the United States: Pre-1900.** Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5139, 5149, and 5159-3. 20th Century Anglophone Literature.** Studies special topics in modern and contemporary literature in English from around the world. Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5169, 5179, and 5189-3. Multicultural Literature.** Studies special topics that deal with some aspect(s) of multiculturalism and/or postcolonialism in the Anglophone tradition, e.g., African-American, Hispanic, or native American literatures; African, Caribbean, Jewish American, Anglo Irish, or Anglo Indian literatures. May include some attention to theories of ethnicity and minority discourse. Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5229-3. Poetry Workshop.** Designed to give students time and impetus to generate poetry and discussion of it in an atmosphere at once supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5239-3. Fiction Workshop.** Designed to give students time and impetus to generate fiction and discussion of it in an atmosphere at once supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5259-3. Nonfiction Workshop.** Designed to give students time and impetus to generate nonfiction and discussion of it in an atmosphere at once supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5269-3. Publishing Workshop.** Provides practical experience in the editorial, design, and business procedures of desktop publishing. May be repeated up to 6 total credit hours.

**ENGL 5279-3. Studies in Poetry.** Addresses modern poetry written since World War II. May be repeated up to 6 total credit hours.

**ENGL 5289-3. Scriptwriting Workshop.** Designed to give time and impetus to scriptwriting in terms of both imaginative and technical aspects. Either stage plays or screenplays are studied, as announced. Admission to graduate creative writing program students and by application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5299-3. Studies in Fiction.** Addresses modern fiction, mainly American, written since World War II.

**ENGL 5309-3. Playwriting.**

**ENGL 5529, 5549, and 5559-3. Studies in Special Topics.** Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5669 and 5679-3. Readings in Literature.** Topics vary each semester. May be repeated up to 9 total credit hours.

**ENGL 5849 (1-6). Independent Study (Graduate Level 1).** Independent investigation of topics of specific interest to individual students. Students wishing to enroll in independent study must petition the Director of Graduate Studies prior to the beginning of the semester. May be repeated up to 6 total credit hours.

**ENGL 6949 (1-3). Master's Degree Candidate.**

**ENGL 6959 (1-6). Master's Thesis.**

**ENGL 7109-3. Advanced Literary Studies.** Intensive study of specialized topics in English, American, and continental literature. (Topic for a given semester is specified in the *Registration Handbook and Schedule of Courses*.)

**ENGL 7489-3. Advanced Literary Theory.**

**ENGL 7849 (1-3). Independent Study (Graduate Level 2).** May be repeated up to 7 total credit hours.

**ENGL 7859-1. Introduction to PhD Research and Professional Development.** Skills course designed to equip midlevel or advanced graduate students with rudiments of practical research skills and techniques (bibliography, history of the book, codicology, manuscripts, databases, World Wide Web, and Internet) and orientation to possible future in the profession. Recommended prereq., critical analysis and literary theory.

**ENGL 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Environmental, Population, and Organismic Biology

*See Ecology and Evolutionary Biology.*

### Environmental Studies

**ENVS 1000-4. Introduction to Environmental Studies.** Surveys environmental studies, examining ecological, socioeconomic, political, aesthetic, and technological factors that influence the quality of life on Earth. Required for ENVS majors. Approved for arts and sciences core curriculum: natural science.

**ENVS 2840 (1-6). Independent Study.** Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum. May be repeated up to 8 total credit hours. Prereq., ENVS 1000.

**ENVS 3001-3. The Campus and the Biosphere.** Introduces students to green design, industrial ecology, and life cycle analysis. Students use basic techniques of environmental auditing to analyze the CU-Boulder campus. Prereq., any two-semester science sequence. Restricted to junior and senior ENVS majors.

**ENVS 3003-3. Race, Class, and Pollution Politics.** Examines communities affected by major toxic contamination threats in the U.S., evaluating race and class factors in levels of governmental and private sector responses and actions. Examines investigative research methods at case study sites to provide skills necessary for assessment of any environmental threat for protective action. Restricted to junior and senior ENVS or ETHN majors. Same as ETHN 3003.

**ENVS 3020-3. Advanced Writing in Environmental Studies.** Offers training in critical thinking and analytical writing skills appropriate to upper-division classes. Writing assignments integrate the subject matter of different topical areas. Restricted to junior and senior ENVS majors. Approved for arts and sciences core curriculum: written communication.

**ENVS 3040-3. Conservation Biology.** Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques. Prereq., EBIO 2050. Same as EBIO 3040.

**ENVS 3070-3. Energy and the Environment.** Examines contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Includes some basic physical concepts and principles that often constrain choices. No background in physics is required. Same as PHYS 3070. Approved for arts and sciences core curriculum: natural science.

**ENVS 3520-3. Environmental Issues in Geosciences.** Addresses current environmental problems that need an understanding of geology. Topics include energy resources, climate modification, hydrology, waste disposal, and mining resources. Uses specific examples to illustrate restrictions imposed by nature and man on solutions to these problems. Prereq., a two-course sequence in any natural science. Same as GEOL 3520. Approved for arts and sciences core curriculum: natural science.

**ENVS 3600-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system, including the hydrological cycle and its role in climate, climate stability, and global change. Covers forecasting climate, its applications, and human dimensions. Prereq., one semester of calculus and physics. Same as ATOC 3600 and GEOG 3601. Approved for arts and sciences core curriculum: natural science.

**ENVS 3930 (1-3). Internship.** Relates classroom theory to practice. Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to students' career goals. May be repeated up to 6 total credit hours.

**ENVS 4100 (1-3). Topics in Environmental Policy.** Covers a variety of topics not currently offered in the curriculum; offered depending on instructor availability and student demand. May be repeated up to 9 total credit hours, provided the topics vary. Restricted to junior and senior ENVS majors.

**ENVS 4120-3. Topics in Environmental Sciences.** Covers a variety of topics not currently offered in the curriculum; offered depending on instructor availability and student demand. May be repeated up to 6 total credit hours, provided the topics vary. Restricted to junior and senior ENVS majors.

**ENVS 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere, and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as GEOL and EBIO 4160

**ENVS 4201-3. Biometeorology.** Introduces this interdisciplinary science, studying the interactions between atmospheric processes and living organisms (plants, animals, and humans). Discusses how organisms adapt to a changing environment. Uses a practical, problem-solving approach to explore these interactions. Prereq., GEOG 1001. Same as GEOG 4201.

**ENVS 4630 (2-6). Field Techniques in Environmental Science.** Field and laboratory methods for assessing the abiotic and biotic environment. Emphasizes field techniques in climatology, surveying soils, hydrology, geomorphology, plant and animal ecology, and environmental law. Evaluation by written module reports and maps. This course may use animals and/or animal tissues. Prereqs., EBIO 2050 and instructor consent. Same as EBIO 4630.

**ENVS 4800-3. Critical Thinking in Environmental Studies.** Examines a specific environmental topic in depth, synthesizing information from complex and controversial issues. Different course sections present different topics. May be repeated up to 6 total credit hours. Restricted to students with junior or senior status in environmental studies. Approved for arts and sciences core curriculum: critical thinking.

**ENVS 4840 (1-6). Independent Study.** May be repeated up to 8 total credit hours. Prereq., ENVS 1000.

**ENVS 4990-3. Senior Thesis.** Supervised project involving original research. Open only to environmental studies majors with at least a 3.30 GPA. Thesis

proposal must be accepted by honors chairman. May be repeated up to 6 total credit hours.

**ENVS 5000-3. Policy, Science, and the Environment.** Introduction to methodologies of the policy sciences with emphasis on applications to environmental issues; role of science in decision making; professional roles and responsibilities as a policy analyst.

**ENVS 5001-3. Environmental Philosophy.** A survey of the major philosophical issues in environmental studies, comprising key issues in environmental ethics, in environmental political philosophy, and in the philosophy of biology and ecology.

**ENVS 5007-3. Foundations of Environmental Sociology.** Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters. Same as SOCY 5007.

**ENVS 5100 (1-3). Special Topics in Environmental Studies.** A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand. May be repeated up to 6 total credit hours, provided the topics vary. Prereq., admission to ENVS graduate program or instructor consent.

**ENVS 5710-3. Introduction to the Policy Sciences.** Provides an introduction to the policy sciences as a distinctive tradition within the policy field. Emphasizes the use of conceptual tools to improve analysis of complex problems. Teaches problem-solving framework that students apply to an issue of their choice. Same as PSCI 5016.

**ENVS 5720-3. The Problem Orientation.** Teaches basic problem-solving framework for policy analysis. Emphasizes applications to develop policy recommendations for issues selected by students. Includes group projects. Same as PSCI 5026.

**ENVS 5730-3. Introduction to Policy Sciences: The Decision Process** Provides policy sciences frameworks for analyzing policy processes and designing political strategies to influence those processes in the direction of the preferred alternative. Emphasizes applications to problems selected by students for term projects. Same as PSCI 5036.

**ENVS 5740-3. Context-Sensitive Research Methods.** Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies, and textual analyses. Same as PSCI 5116.

**ENVS 5810-3. Climate, Water Resources, and Environmental Sustainability.** Assesses impacts of climate variability and regional growth on western U.S. water resources, and examines successes and failures of different management strategies, as well as ways that science is used and misused in support of water management. Prereq., instructor consent. Same as ENVS 7810.

**ENVS 5820-3. Renewable Energy Policy.** Examines three interrelated aspects of renewables: technology, policy, and politics. Technology includes resource, science, and engineering aspects of renewables. Policy includes various policy levers (e.g., R&D, renewable portfolio standards, green tags) that can be used to influence renewables. Politics refers to the political setting of renewables: how they are perceived by decision-makers, who supports and opposes which policies and why, and how renewables wind their way through the political process. Prereq., instructor consent. Same as ENVS 7820.

**ENVS 5830-3. Critical Issues in Climate and the Environment.** Discusses current issues such as ozone depletion, global warming, and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments, and critically evaluate these issues. Same as ATOC 5000. Students may not receive credit for both ENVS 5830 and ATOC 4800.

**ENVS 5909 (1-3). Independent Study.** Only 3 hours of independent study can be used towards degree requirements. Prereq., department and instructor consent.

**ENVS 5930-2. Internship.** Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to the students' research and career goals, and to relate classroom theory to practice.

**ENVS 6950 (1-6). Master's Thesis.**

**ENVS 7810-3. Climate, Water Resources, and Environmental Stability.** Same as ENVS 5810.

**ENVS 7820-3. Renewable Energy Policy.** Same as ENVS 5820.

**ENVS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Ethnic Studies

**ETHN 1013-3. Ethnic Notions.** Introduces first-year students to the study of contemporary issues in American society through the eyes of culturally diverse groups (Chicano/as, Afroamericans, Asians, and Native Americans) as expressed in film, the ethnic press, music, TV programming, and other cultural representations produced by members of these groups.

**ETHN 1015-3. United States Race and Ethnic Relations.** An examination of race and minority problems in U.S. society, including the psychological, social, and cultural sources of prejudice and discrimination. Same as SOCY 1015. Approved for arts and sciences core curriculum: United States context.

**ETHN 2000-3. Foundations of Ethnic Studies.** A comprehensive, comparative introduction to ethnic studies. Applies analytic perspectives, especially racial formation theory, to the experiences of the four principle peoples of color in the United States: American Indian, Afroamerican, Chicano/Latino, and Asian American.

**ETHN 2762-3. Survey of Post-Colonial Literature.** Surveys the development of literatures in English in former British colonies. Topics include the spread and adaptation of English language literary forms in Asia, Africa, the Caribbean, and the far new world (Australia and New Zealand). Students learn the causes of the dispersion and the motivations for the clearly different uses of English literary forms in the ex-colonies. Same as ENGL 2767.

**ETHN 3000-3. Race, Class, and Gender.** Examines the uses of race, sex, and class as instruments of domination in Western society.

**ETHN 3003-3. Race, Class, and Pollution Politics.** Examines communities affected by major toxic contamination threats in the United States, evaluating race and class factors in levels of governmental and private sector responses and actions. Investigative research methods used at case study sites provide skills necessary for assessment of any environmental threat for protective action. Same as ENVS 3003.

**ETHN 3010-3. Special Topics in Ethnic Studies.** Examines a topic, theme, or issue in ethnic studies. May be repeated up to 6 total credit hours.

**ETHN 3013-3. Racist Ideology in American Life.** Explores the origins and evolution of racism as a political and religious force in American life, beginning with Puritan ideology in colonial New England, proceeding through the era of Manifest Destiny, and ending in the present day. Special attention is paid to the history of organizations such as the Ku Klux Klan, and emergence of Christian identity doctrine. Prereq., junior or senior standing, or instructor consent.

**ETHN 3100-3. Selected Topics in Ethnic Studies.** Intensive examination of a particular topic, theme, issue, or problem in ethnic studies as chosen by the instructor. May be repeated up to 6 total credit hours on different topics.

**ETHN 3300-3. Elements of Religion.** Explores universal components of religion as inferred from primitive and civilized religions of the world. Same as ANTH 3300.

**ETHN 3500-3. Research Methods in Ethnic Studies.** Preparation for empirical inquiry in ethnic studies. Emphasizes philosophy of science concerns and skill acquisition. Students submit a rigorous, executable research design for the investigation of a specific problem, topic, or issue germane to ethnic studies. Prereq., ETHN 2000 and at least sophomore standing. Restricted to ETHN majors.

**ETHN 3670-3. Immigrant Women in the Global Economy.** Critical examination of immigrant women's participation in the global economy. Focuses on the relationship between larger social forces and the role of women in migration and the labor force. Emphasis on Latinas and Asian immigrant women. Prereq., junior or senior standing or instructor consent. Same as WMST 3670, CHST 3670, AAST 3671. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ETHN 3675-3. Fight the Power: People of Color and Social Movement Struggles.** People of color the world over are struggling for sovereignty, independ-



ence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles. Prereq., junior/senior standing or instructor consent. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ETHN 3703-3. Culture, Racism, and Alienation in America.** Examines African-American experiences, focusing on the post-civil rights era. Discusses psychosocial dynamics, issues of racism, attitudes and cultural changes in relation to contemporary and future experiences.

**ETHN 3840 (1-3). Undergraduate Independent Study.** Consult the Department of Ethnic Studies for information.

**ETHN 4510-3. Research Practicum in Ethnic Studies.** Research apprenticeship with emphasis on skill development. Students execute in library, field, or laboratory the research design developed in ETHN 3500. Prereq., ETHN 3500, and junior or senior standing. Restricted to ETHN majors.

**ETHN 4520-3. Applied Cultural Anthropology.** Analyzes problems of cultural change due to contacts between people of different cultures. Same as ANTH 4510.

**ETHN 4950-3. Senior Seminar in Ethnic Studies.** Independent project summarizing the work done in ethnic studies. A public presentation of the work executed is required. Additionally, two copies, one archival and one circulatory, of the final project is placed in the department library for use by future students as example or reference. Prereq., ETHN 4510. Restricted to juniors and seniors.

**ETHN 4960-3. Honors Thesis I.** Supervised project involving original research in the emerging field of ethnic studies. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. Prereqs., honors standing in the Department of Ethnic Studies, ETHN 4510, and senior standing. Restricted to ETHN majors.

**ETHN 4970-3. Honors Thesis II.** Prereqs., honors standing in the Department of Ethnic Studies, ETHN 4510, and senior standing. Restricted to ETHN majors.

## Afroamerican Studies

**BLST 1150-3. Regional Cultures of Africa.** Explores a small number of cultures in a specific subregion of Africa from an integrated holistic viewpoint, emphasizing material adaptations, social patterns, ideas, and values and aesthetic achievements. Same as ANTH 1150. Approved for arts and sciences core curriculum: cultural and gender diversity.

**BLST 2000-3. Introduction to Black Studies.** Overview of black studies as a field of investigation, its origins, and history. Approved for arts and sciences core curriculum: cultural and gender diversity.

**BLST 2015-3. History of the Black Experience 1: From Slavery to Freedom.** First of two courses detailing the black experience in what became the United States. Focuses on people, events, processes, and the several contexts within which these items have meaning. Begins with a recapitulation of the African experience and concludes with the official ending of Reconstruction in 1877. Approved for arts and sciences core curriculum: United States context.

**BLST 2016-3. History of the Black Experience 2: Climbing Jacob's Ladder.** Second of a year-long course detailing the black experience in the United States. Focuses on people, events, processes, and the several contexts within which these items have meaning. Begins with the end of Reconstruction in 1877 and continues to the present day. Recommended prereq., BLST 2015. Approved for arts and sciences core curriculum: United States context.

**BLST 2200-3. Contemporary Black Protest Movements.** Examines selected case studies of black collective behavior in a historical context. Emphasizes an in-depth investigation of the continuing black struggle for social/democratic rights. Approved for arts and sciences core curriculum: cultural and gender diversity or contemporary societies.

**BLST 2210-3. Black Social and Political Thought.** General introductory course designed to acquaint students with historical and contemporary thinking, writings, and speeches of black people. Approved for arts and sciences core curriculum: cultural and gender diversity or contemporary societies.

**BLST 2400-2. African Dance.** Explores the technique, style, and rhythms of various African, Caribbean, and dance forms of the Americas. Music, history, anthropology, and folklore help to enhance the dance and provide a cultural experience. May be repeated up to 6 total credit hours within a term. Same as DNCE 2500.

**BLST 2437-3. Afroamerican History.** Surveys Afroamerican history. Studies, interprets, and analyzes major problems, issues, and trends affecting Afroamericans from about 1600 to the present. Same as HIST 2437. Approved for arts and sciences core curriculum: United States context or cultural and gender diversity.

**BLST 2722-3. Survey of African American Literature 1.** Chronological study of African American literature from the 17th century to the Harlem Renaissance. Same as ENGL 2727.

**BLST 2732-3. Survey of African American Literature 2.** Chronological study of African American literature from the Depression writers to the present. Same as ENGL 2737.

**BLST 3020-3. Selected Topics in Black Studies.** Intensive examination of a particular topic, theme, issue, or problem concerning the black presence, as chosen by the instructor. Sample offerings could include the black family institution, the civil rights movement, and Martin Luther King Jr. May be repeated up to 6 total credit hours on different topics.

**BLST 3023-3. Afroamerican Family in U.S. Society.** Systematically analyzes patterns of family life for Afroamericans as socio-cultural phenomena within the context of U.S. society. Prereq., ETHN 1015/SOCY 1015 or ETHN 2000/BLST 2000. Same as SOCY 3023. Approved for arts and sciences core curriculum: United States context or cultural and gender diversity.

**BLST 3101-3. Black Politics.** Discusses elitism and black powerlessness; black interest groups; base, structure, and functions of black political organizations; goals and political styles of black politicians; community control; trends (radicalism and separatism vs. accommodation); and future of black politics in the United States. Same as PSCI 3101. Approved for arts and sciences core curriculum: contemporary societies or cultural and gender diversity.

**BLST 3103-3. Black Educational History.** Examines the history of the education of African Americans from early American history until current times. Covers primary, secondary, and higher education. Topics include education of blacks before 1800, education of blacks during the period of American slavery, and factors affecting today's education gains. Also covers current research being conducted in higher education. Prereq., junior or senior standing.

**BLST 3125-3. Black Religious Life in America.** Emphasizes the four principal periods in the growth and expansion of the black church: African traditional religion to the end of the American Civil War; development stage; traditional stage; and contemporary period. Same as RLST 3125. Approved for arts and sciences core curriculum: contemporary societies or ideals and values.

**BLST 3505-3. Historical and Contemporary Issues of Black Women.** Explores the social, economic, political, historical, and cultural role of African American women from an interdisciplinary perspective. Special emphasis is placed on African American women's rich oral and literary tradition. Prereq., WMST 2000 or BLST 2000. Same as WMST 3505.

**BLST 3840 (1-3). Undergraduate Independent Study.** May be repeated up to 7 total credit hours.

**BLST 4235-3. The Life and Thought of Martin Luther King Jr.** An intensive exploration and examination of the life and thought of the Rev. Dr. Martin Luther King Jr. Special emphasis on the stages of his life and their corresponding productions. Prereq., junior standing. Recommended prereq., BLST 2016, 3125.

**BLST 4650-3. Contemporary Issues in Afroamerican Studies.** Variable topic that allows intensive coverage of a subject, theme, or issue in Afroamerican studies. May be repeated up to 6 total credit hours on different topics. Prereq., junior or senior standing.

**BLST 4670-3. The Sixties: Critical Black Views.** A review of the ideas, events, persons, organizations oriented to the quest for black social justice in the decade of the sixties. Restricted to juniors and seniors. Approved for arts and sciences core curriculum: critical thinking.

**BLST 4692-3. Contemporary African-American Literature 1.** Advanced study of works of prominent African-American novelists and poets of the traditional school, e.g., Wright, Gaines, Ellison, and Morrison. Works are studied in terms of their literary, intellectual, and political values. Restricted to those with junior or senior standing. Same as ENGL 4697.

**BLST 4840 (1-3). Independent Study.** Prereq., instructor consent. May be repeated up to 7 total credit hours.

## American Indian Studies

**AIST 1125-3. Exploring a Non-Western Culture: Hopi and Navajo, Cultures in Conflict.** Studies the evolution of Hopi and Navajo cultures and cultural interrelationships from the protohistoric through the contemporary period, using an integrated, holistic, and humanistic viewpoint. Principal goal is to instill an appreciation of non-Western cultural diversity in material adaptations, social patterns, ideas and values, and aesthetic achievements, thus recognizing a range of cultural solutions to common human problems. Same as ANTH 1120. Approved for arts and sciences core curriculum: cultural and gender diversity.

**AIST 2000-3. Introduction to American Indian Studies: Precontact Native America.** Explores the attainments of various American Indian civilizations in the period immediately prior to first contact with Europeans. Examines agriculture, architecture, governance and social organization, medicine, mathematics, and population. Approved for the arts and sciences core curriculum: cultural and gender diversity.

**AIST 2015-3. Topical Issues in Native North America.** Explores a series of issues including disposition of population, land and resource holdings, water rights, education, religious freedom, military obligations, the sociopolitical role of women, self-governance, and legal standing as these pertain to modern American Indian life. Approved for arts and sciences core curriculum: cultural and gender diversity or United States context.

**AIST 2201-3. American Indians in Film.** Examines images of American Indians in films. Films are analyzed and critiqued within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon audiences.

**AIST 2700-3. American Indian Religious Traditions.** Introduces religions of the peoples indigenous to the Americas. Concerns include ritual, mythology, and symbolism occurring throughout these cultures in such areas as art, architecture, cosmology, shamanism, sustenance modes, trade, and history. Same as RLST 2700. Approved for arts and sciences core curriculum: ideals and values or cultural and gender diversity.

**AIST 2712-3. Native American Literature.** Surveys traditional and contemporary North American Native American literature, from traditional oral forms to contemporary genre literature to novel, short story, and poetry. Same as ENGL 2717.

**AIST 3020-3. Special Topics in American Indian Studies.** Examines a particular topic, theme, issue, or problem in American Indian Studies. May be repeated up to 6 total credit hours on different topics.

**AIST 3135-3. North American Indians: Traditional Cultures.** Comprehensive survey of native cultures of America north of Mexico, including a review of their natural environments, prehistory, languages, and major institutions for the various culture areas. Same as ANTH 3130.

**AIST 3210-3. American Indian Women.** Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of indigenous women in mainstream culture. Emphasizes the role of American Indian women: their persistence, creativity, and activism, especially in maintaining indigenous traditions. Prereq., WMST 2000, 2600, or ETHN 2000. Restricted to sophomores, juniors, and seniors. Same as WMST 3210. Approved for arts and sciences core curriculum: cultural and gender diversity.

**AIST 3400-3. Indian/Government Conflicts.** Deals with historical events involving conflicts between the U.S. government and American Indians. Examples include the role of the FBI in the Pine Ridge Sioux Reservation (1972–76) or the 1864 massacre of the Cheyenne and Arapaho Indians in Colorado territory. Additional courses may relate to tribal governments. May be repeated up to 6 total credit hours on different topics.

**AIST 3840 (1-3). Undergraduate Independent Study.** Consult the Department of Ethnic Studies for information. May be repeated up to 7 total credit hours.

**AIST 4565-3. North American Indian Acculturation.** Comprehensive survey of changes in the native cultures of America north of Mexico caused by occupation of the continent of Old World populations, including a review of processes of contact, environmental changes, changes in major institutions, the nature of federal/state administration, the reservation system, and contemporary developments. Same as ANTH 4560. Approved for arts and sciences core curriculum: cultural and gender diversity or contemporary societies.

## American Studies

**AMST 2000-3. Themes in American Culture 1.** Enables students to explore various themes in pre-1865 American culture. Examines these themes, which vary each year, in their social context. Approved for arts and sciences core curriculum: United States context.

**AMST 2010-3. Themes in American Culture 2.** Enables students to explore various themes in post-1865 American culture. Examines these themes, which vary each year, in their social context. Approved for arts and sciences core curriculum: United States context.

**AMST 2060-3. Topics in American Studies.** Critically examines American identity and experiences, past and present, focusing on ethnicity, gender, popular culture, and political culture.

**AMST 3509-3. American Art.** Surveys American art and material culture from the pre-Colonial era to the present day. Considers cultural and artistic interaction, ethnic expressions, patronage, European and non-Western influences, and the struggle to develop a uniquely American artistic identity. Prereqs., ARTH 1300 and 1400. Same as ARTH 3509. Approved for arts and sciences core curriculum: United States context.

**AMST 3900-3. Asian American Women: Historical and Contemporary Issues.** Drawing from work produced by and about Asian American women, this course examines historical and contemporary issues including representation of Asian American women, identity politics, feminism, coalition building, and activism for social change. Prereq., WMST 2000 or 2600 or AMST 2000 or ETHN 1015. Same as WMST 3900, AAST 3900. Approved for arts and sciences core curriculum: United States context.

**AMST 3950-3. Methods in American Studies.** Through structured discussions, selected readings, and written assignments, students develop an understanding of how American studies scholars evaluate various complex issues. The emphasis is on critical analysis, identification of concepts, and interpretation of theoretical arguments in American studies. Recommended prereq., AMST 2000 or 2010. Approved for arts and sciences core curriculum: critical thinking.

**AMST 4321-3. Media Institutions and Economics.** Introduces the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations, and the contemporary issues surrounding them. Same as JOUR 4321.

**AMST 4346-3. 20th Century American Intellectual History.** Addresses the impacts of political, social, and economic developments on ideas about democracy, science, race, gender, faith, the supposed mission of America, and the role of intellectuals in society. Same as HIST 4346.

**AMST 4500-3. American Autobiography.** Investigates the genre of autobiography as practiced in British North America and the U.S. from the 17th century to the present. Autobiography cuts across the usual disciplinary categories and provides insight into cultural values and expression. Prereq., AMST 2000, 2010, or instructor consent. Approved for arts and sciences core curriculum: United States context.

**AMST 4832-3. Studies in American Music.** Offers intensified work in folk, popular, and art music of the United States. May be repeated up to 12 total credit hours. Same as MUSC 4832.

**AMST 4840 (1-3). Independent Study.** May be repeated up to 6 total credit hours within a term.

**AMST 4950-3. Seminar in American Studies.** May be repeated up to 6 total credit hours. Prereq., AMST 2000 or 2010.

**AMST 4960-3. Seminar in American Studies.** May be repeated up to 6 total credit hours. Prereq., AMST 2000 or 2010.

**AMST 4999 (1-3). Senior Honors Thesis.** Open to qualified AMST majors only after successful completion of the research phase.

## Asian American Studies

**AAST 1015-3. Introduction to Asian American Studies.** Examines the various factors that define minority groups and their positions in American society using Asian Americans as a case study. Emphasizes the perspectives and methodologies of the discipline of ethnic studies. Restricted to freshmen and sophomores. Approved for arts and sciences core curriculum: contemporary societies or cultural and gender diversity.

**AAST 2210-3. The Japanese American Experience.** Surveys the Japanese American experience, emphasizing post-WWII developments. Gives attention to intragroup diversity having to do with generation, ethnicity, ecology, and gender. Recommended prereq., AAST 1015. Approved for arts and sciences core curriculum: cultural and gender diversity.

**AAST 2717-3. Introduction to Asian American History.** Introductory-level survey of the social history of Asians in America from the 19th century to the present. Primary focus is on delineating and explaining changes that Asian Americans, one of the most visible ethnic groups in our society, have undergone since their arrival in the United States. Same as HIST 2717. Approved for arts and sciences core curriculum: United States context.

**AAST 2752-3. Survey of Asian American Literature.** Surveys the narrative literature of major Asian American writers of Chinese, Japanese, Korean, Filipino, Asian Indian, and Southeast Asian descent. Explores such themes as immigration, generational and cultural difference, stereotypes, and cultural identity, emphasizing a critical analysis framed by socio-historical contexts. Same as ENGL 2757. Approved for arts and sciences core curriculum: literature and the arts.

**AAST 3013-3. Asian/Pacific American Communities.** Covers the concepts, methods, and theories commonly used in community research, as well as substantive information on selected Asian/Pacific American communities. Emphasizes the ethical/political dimensions of community studies. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**AAST 3420-3. Selected Topics in Asian American Studies.** Intensive examination of a topic or issue affecting Asian Americans, such as the Japanese American internment during World War II, or Asian American social movements or community organizations. May be repeated up to 6 total credit hours on different topics.

**AAST 3670-3. Japanese American Internment: Critical Thinking in Sociocultural Diversity.** Offers an historical overview of the Japanese American experience in the United States. Introduces and explores fundamental issues inherent in the study of human beings from the perspective of cultural social difference. Prereqs., junior or senior standing, and one of the following: AAST 1015, 1717, ETHN 2000, CHST 1015, BLST 2000, AIST 2015, or instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**AAST 3671-3. Immigrant Women in the Global Economy.** Critical examination of immigrant women's participation in the global economy. Focuses on the relationship between the larger social forces and the role of women in migration and the labor force. Emphasis on Latinas and Asian immigrant women. Prereq., instructor consent. Restricted to juniors and seniors. Same as WMST 3670, ETHN 3670, CHST 3670. Approved for arts and sciences core curriculum: cultural and gender diversity.

**AAST 3840 (1-3). Undergraduate Independent Study.** Independent study course work is available. Consult the Department of Ethnic Studies for information. May be repeated up to 7 total credit hours.

**AAST 3900-3. Asian American Women: Historical and Contemporary Issues.** Drawing from work produced by and about Asian American women, examines historical and contemporary issues including representation of Asian American women, identity politics, feminism, coalition building, and activism for social change. Prereq., WMST 2000 or 2600, AMST 2000, or ETHN 1015. Same as WMST 3900, AMST 3900. Approved for arts and sciences core curriculum: United States context.

## Chicano Studies

**CHST 1015-3. Introduction to Chicano Studies.** Introduces basic vocabulary, concepts, and topics relating to the study of the Mexican American experience. Examines how social science theory and methodology produce stereotypes. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 1031-3. Chicano Fine Arts and Humanities.** Provides foundation for study of Chicano literature, music, the plastic arts, theatre, and film. Also introduces aesthetic and critical concepts and their applications in Chicano studies. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 2537-3. Chicano History.** Introduces historical developments of Chicano society and thought from pre-Columbian period to present. Same as HIST 2537. Approved for arts and sciences core curriculum: United States context or cultural and gender diversity.

**CHST 2742-3. Survey of Chicano Literature.** Introduces Chicano literary studies, focusing on narrative works by major Chicano/a writers. Examines a diverse range of Chicano/a writing as it addresses recurring issues and themes, including language, race and class oppression, questions of identity, and gender relations. Same as ENGL 2747.

**CHST 3023-3. Sociology of the Chicano and Mexican Americans.** Surveys contemporary sociological studies of Chicanos and theories used to understand and explain their status. Covers population growth, socioeconomic status, reverse discrimination, Chicana feminism, and U.S.–Mexico relations. Same as SOCY 3022.

**CHST 3026-3. Women of Color—Chicanas in U.S. Society.** Critically explores the Chicana experience and identity. Examines issues arising from the intersection of class, race, and gender. Focuses on an examination of controversies surrounding culture and gender through an analysis of feminism. Same as SOCY 3026.

**CHST 3100-3. Selected Topics in Chicano Studies.** Intensive examination of a particular topic, theme, issue, or problem in Chicano studies as chosen by the instructor. May be repeated for a total of 6 credit hours on different topics.

**CHST 3135-3. Chicana Feminisms and Knowledge.** Provides insight into the present socioeconomic condition of Mexican American women and the concept of *femenismo* through interdisciplinary study of history, sociology, literary images, and film portrayals. Prereq., CHST 1015 or 2537. Same as WMST 3135. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 3153-3. Folklore and Mythology of the Hispanic Southwest.** Concerned with the indigenous and Christian syncretic beliefs that underlie the many folkloric expressions of mysticism in the Hispanic Southwest. Focuses on traditional myths, storytelling, and the practice of *curanderismo* and shamanism. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 3670-3. Immigrant Women in the Global Economy.** Critically examines immigrant women's participation in the global economy. Focuses on the relationship between the larger social forces and the role of women in migration and the labor force. Emphasizes Latinas and Asian immigrant women. Prereq., junior or senior standing, or instructor consent. Same as WMST 3670, ETHN 3670, and AAST 3671. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 3824-3. Contemporary Chicano, Chicana Writers.** Covers the most important Chicano writers of prose fiction of the past three decades. Considers progression of Chicano fiction from naturalism, realism, and romanticism, to post-modernism. Recommended prereq., CHST 1031 or 1044.

**CHST 3905 (1-3). Independent Study.** Instructor consent required. May be repeated up to 7 total credit hours.

**CHST 4000-3. Hispanic and Native American Culture of the Southwest.** Lecture course on Mexican American culture. Includes guest presentations by experts in such fields as geography, anthropology, history, art and art history, comparative literature, political science, and sociology. Same as SPAN 4000.

**CHST 4128-3. The Emergence of Modern Mexico.** The study of Mexican history continues with the establishment of independence. Examines the upheavals of the Mexican Revolution and culminates with recent events in Mexico. Same as HIST 4128.

**CHST 4133-3. Latinos and the U.S. Political System.** Analyzes the social, cultural, and economic factors that affect political behavior of Mexican Americans. Pays special attention to Mexican American cultural heritage and to relationships between Mexican Americans and Anglo Americans. Prereq., CHST 1015, 2537, ETHN 2000, or PSCI 1101. Same as PSCI 4131. Approved for arts and sciences core curriculum: cultural and gender diversity.

**CHST 4303-3. The Chicano and the United States Social Systems.** Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity. Prereq., CHST 1015, 2537, ETHN/SOCY 1015, or ETHN 2000.

**CHST 4681-3. Special Topics.** Examines a particular topic, theme, issue, or problem concerning Chicano studies. May be repeated up to 6 total credit hours on different topics.

**CHST 4905 (1-3). Independent Study.** Instructor consent required. May be repeated up to 7 total credit hours.

## Farrand Residential Academic Program

**FARR 1000-1. Farrand Service-Learning Practicum: Special Topics.** Offers a varying service-learning practicum experience as corequisite to a service-learning lecture course. May be repeated up to 6 total credit hours, provided the practica are different. Graded pass/fail.

**FARR 1513-1. The Individual and the Community.** Examines the relationship between the individual and the community through films, both narrative and documentary. Focuses on the problems and possibilities of losing and/or promoting both community and individuality.

**FARR 1520 (1-3). Creative Arts Workshop.**

**FARR 1561-1. Nonviolence for Everyday: Meditation and Other Helpful Habits.** Focuses on the challenge of achieving nonviolence on a day-to-day basis by maintaining a peaceful, focused frame of mind. Explores ways to train the mind, including methods that may aid healing.

**FARR 1562-3. Gandhi's Satyagraha: Love in Action for Humans and Other Creatures.** Class texts and films explore social justice and structural violence in regard to humans, animals, and the environment in the light of a Gandhian approach to these issues. Outreach work in the community is included.

**FARR 1571-1. Taking Charge of Your Life.** Helps students establish a balanced life through development of conscious skills of self-awareness and effective relational interactions with others.

**FARR 1595-1. Community Service: Personal Growth and Public Good.** Provides an opportunity for students to engage in volunteer service. Provides support and guidance in reflecting on personal and sociological issues that derive from their experiences.

**FARR 2100-3. Digital Design Interfaces, Interactivities, and Information Design.** Learn the key components of digital design and how to create unique and informative digital designs. Has immediate application through work in small groups with nonprofit agencies with whom a web site, based on the agency's information and needs, will be designed. Same as SEWL 2100.

**FARR 2400-3. Understanding Privilege and Oppression in Contemporary Society.** Through a focus on race, class, sexual orientation, and physical ability, this course explores privilege, oppression, and empowerment in the United States. Through community service, students learn how oppression and privilege interact, and apply classroom learning to community experiences. Same as LDSP 2400. Approved for the arts and sciences core curriculum: cultural and gender diversity or contemporary societies.

**FARR 2510-3. Exploring Good and Evil through Film.** Eighteen films depict our capacities for good and evil. Topics addressed include the following: the Holocaust, Jung's concept of "the Shadow," the Seven Deadly Sins, altruistic and sociopathic personalities, capital punishment, the redemptive narrative, and the satanic in film. Approved for arts and sciences core curriculum: ideals and values.

**FARR 2660-3. Ethics of Ambition.** Same as HONR 2250.

**FARR 2820-3. Future of the Spaceship Earth.** Examines major ecological, political, economic, cultural, legal, and ethical issues that will shape the future. Students consider how their decisions influence the future, and reflect on fundamental values and ideals underlying the search for solutions to these complex problems. Approved for the arts and sciences core curriculum: ideals and values.

## Film Studies

### Production

**FILM 2000-3. Beginning Filmmaking.** Instructs students in making Super-8 films. Covers use of cameras and editing equipment, basic editing and splicing techniques, and analysis of pertinent films. May emphasize making personal, experimental films or making narrative sound films, according to instructor. Students need to purchase materials and rent the necessary equipment. The Film Studies Program maintains an equipment pool with modest rental fees for students needing equipment. Prereq., FILM 1502.

**FILM 2300-3. Beginning/Intermediate Filmmaking.** Covers basic camera, editing, and splicing techniques for Super-8 film. Equipment is available at the film studies office for a modest rental fee.

**FILM 2600-3. Intermediate Filmmaking, 16mm.** Film production class in 16mm (emphasizing personal, experimental films or with a documentary and/or narrative orientation). Covers 16mm camera operation, splicing, editing, sound transfer and recording, and lab dynamics. Students are expected to make a film by the end of the semester. Students should expect to spend a few hundred dollars on equipment rental, film stock, and lab costs. May be repeated once for credit with departmental consent. Prereqs., film major; FILM 1502 and 2000 or 2300; average combined grades in these two courses must be 3.00 with a minimum 2.50 overall GPA.

**FILM 2610-3. Animation Production.** Includes analysis of independent and experimental animation and an introduction to various animation techniques (object, line, collage, sand or paint on glass, Xerox, cameraless, pixillation, etc.). Students produce exercise films and a final film exploring these techniques. Prereq., FILM 2000. Recommended prereq., FILM 2600.

**FILM 2900-2. Lighting.** This course covers the basics of, "Why you need lighting?" It also covers color temp, as well as camera techniques, lighting theory and lighting set-ups for still and motion picture film and video. It emphasizes hands on as well as theory. Prereq., FILM 2000 or 2300. Recommended prereq., FILM 1502.

**FILM 3010 (1-3). Film Production Topics.** Offers students both theoretical and practical experience in various specialized areas of cinematic production. Topics vary but include production in the documentary, fictional narrative, animation, computer animation, and experimental genres. May be repeated up to 6 total credit hours. Prereq., FILM 2000 or 2300.

**FILM 3600-3. Digital Postproduction Techniques for Film and Video.** Offers a highly technical lecture and lab course, including thorough workshops on the Media 100, the Avid MC Express (computer-based nonlinear editing systems), Pro Tools III Digital Audio Mixing, and lectures on digital imaging with Adobe Photoshop and AfterEffects. Includes technical tests and studio/lab projects. Prereqs., FILM 1502 and 2000 or 2300 and 2600; and be a BFA film studies major.

**FILM 3610-3. The Art of Filmmaking Technique.** Explores the application of the technical methods of production for coherent, expressive purposes. Using classic, independent, and experimental films and videos as models, learn how to use light/shadow, composition, editing, and sound for the articulation and interpretation of content. Prereqs., FILM 1502 and 2000. Recommended prereq., FILM 2600.

**FILM 3700-3. Audio and Special Effects.** Explore special effects such as visual graphics, 2D Mattes and animation, 3D creation, color correction, DVD systems, and computer rendering. Second half of the semester is dedicated to audio mixing and sound design. Students who complete the course are eligible to work on sound mixes for FILM 2600 and 4500 final projects using film studies studio equipment. Prereqs., FILM 2000 or 2300; 2600 and proficiency in computers and digital editing.

**FILM 3900 (1-3). Independent Study (Production).** May be repeated up to 6 total credit hours.

**FILM 3930 (1-6). Film Studies Internship.** Provides an academically supervised opportunity for advanced-level students to work in public or private organizations on film projects. Relates classroom theory to practice. Students follow a written work plan and submit a final report. A conjunct course is offered for critical studies students who are interested in job experiences when available in critical studies areas. May be repeated up to 6 total credit hours. Prereqs., FILM 2600 with concurrent registration in FILM 3600, 6 hours of elective film students courses, and instructor consent.

**FILM 4000-3. Advanced Digital Postproduction.** How to edit and manage a post-production cycle, how to use digital nonlinear editing systems and packages such as compositing, digital audio, and optical effects treatments. Software covered includes: Avid, Final Cut Pro, Photoshop, AfterEffects, Pro Tools, and EDL Management. Prereqs., FILM 1502; 2000 or 2300; 2600 and 3600; BFA film studies major or instructor consent. Cannot take simultaneously with FILM 3600.

**FILM 4010 (1-3). Topics in Film Studies.** Prepares students for 4000-level critical studies film courses. Subject matter varies each semester. May be repeated up to 6 total credit hours, provided the topics are different.

**FILM 4500-3. Advanced Filmmaking.** Advanced training in 16mm camera operation, splicing, editing, sound transfer and recording, and conforming. Students are required to edit on the Steenbeck flatbed and produce a film that contains synch sound shot in double system. Course may be taken three times for credit to fulfill required course work and major requirements. Prereqs., FILM 1502; 2000 or 2300; 2600 and 3600; BFA film studies major or instructor consent.

## History

**FILM 2521-3. Classics of the Foreign Film: 1960s–Present.** Surveys the classics of international cinema from the 1960s to the present. Recommended prereq., FILM 1502. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3051-4. Film History 1.** Intensive introduction to film history from 1895 to 1935. Topics covered include the beginnings of motion picture photography, the growth of narrative complexity from Lumiere to Griffith, American silent comedy, Soviet theories of montage, German expressionist films, and the transition to sound. Prereq., FILM 1502.

**FILM 3061-4. Film History 2.** Starts with the late 1930s and early 1940s films of Renoir and Welles and follows the historical growth and evolution of film aesthetics to the present. Studies Italian neorealist, French new wave, and recent experimental films, as well as the films of major auteur figures such as Bergman, Kurosawa, Fellini, Hitchcock, Bunuel, Antonioni, and Coppola. Pre-reqs., FILM 1502 and 3051, or instructor consent.

**FILM 3071-3. American Film in the 1940s.** Examines the relationship between American films of the 1940s and their cultural and historical contexts. Films by Capra, Wyler, Curtiz, Kazan, Hitchcock, Siodmak, Polonsky, and Dmytryk, among others. Controlled enrollment. Prereqs., FILM 1502, 3051, 3061, and instructor consent.

**FILM 3081-3. American Film in the 1980s and 90s.** Examines the relationship between American films of the 1980s and 90s and their cultural and historical context. Includes films by Lynch, Stone, Solondz, Scott, Scorsese, Lee, Duayne, Lemmons, Tarantino, Altman. Controlled enrollment. Prereqs., FILM 1502, 3051, 3061, and instructor consent.

**FILM 3091-3. Post-War American Film/Culture/Politics.** Examines the relationship between American films from the mid-1940s to the present day and their cultural and historical context. Includes films by Capra, Curtiz, Frankenheimer, Kazan, Kramer, Jewison, Wexler, Pakula, Cimino, Fincher, Lynch, Stone, and Lee. Priority is given to students who have taken both semesters of Film History (FILM 3051 and 3061). Prereqs., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3191-3. "The Golden Age": Film Directors, Actors, and Writers from the Golden Age of Television.** Traces the roots of live television and anthologies of the fifties. Examines several of the most interesting and radical Hollywood directors, writers, and actors of the sixties and seventies who emerged from this "golden age" of television: Frankenheimer, Penn, Altman, Lumet, Cassavetes, Serling, and Chayevsky. Prereq., FILM 1502.

**FILM 3301-3. Contemporary Issues in Russian Film.** Examines the relationship between politics, economics, aesthetics, and the way moral and social issues are treated in noteworthy Russian films from the last 20 years. Same as RUSS 3301.

**FILM 3501-3. Film Production Management.** Familiarizes students with principles of film management techniques as well as problem-solving methodologies developed specifically for the film industry. Emphasizes the technique of production boarding as the central tool in production management as well as budget and contracts information. Offered through Continuing Education. FILM 3501 or 3563 may be used for partial fulfillment of major requirements. Prereq., FILM 2000, COMM 1240, and JOUR 3674.

**FILM 3901 (1-3). Independent Study (Critical Study).** May be repeated up to 6 total credit hours.

**FILM 4021-3. Film/Theatre Practicum.** Intensive workshop that provides students with experience directing dramatic material, acting before a camera, and interpreting or adopting dramatic material for film. No experience in directing or acting required. Attendance, research, papers required. Recommended prereq., FILM 1502.

## Genre and Movements

**FILM 1502-3. Introduction to Film Studies.** Introduces the critical study of film, exploring basic theoretical concerns while presenting a survey of important film genres, both narrative and nonnarrative. Lectures may be presented by various faculty members. Considerable amount of writing is required.

**FILM 2002-3. Recent International Cinema.** Familiarizes students with current trends and major directors in international cinema. Students attend specific films screened in class and/or offered in the International Film Series, and

read and write about these films. May be repeated up to 9 total credit hours. Prereq., FILM 1502 or 6 hours humanities courses involving critical writing.

**FILM 2012-3. Road Movies: Journeys Into the Interior.** Studies a popular genre, the road movie, with special emphasis on the philosophical and multicultural implications of the journey as a physical and inner voyage. Films by Herzog, Roeg, Kiarostami, Angelopoulos, Fellini, Bergman, Tarkovsky, Wenders, Varda, Cisse, Sembene, Guney, and Rocha. Prereq., FILM 1502. Recommended prereq., FILM 3051. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 2312-3. Film Trilogies.** Study of films designed as trilogies, drawing on a wide range of international cinema. Films include Satyajit Ray's *Apu Trilogy* (India), Krzysztof Kieslowski's *Three Colors Trilogy* (Poland), Francois Truffaut's *Antoine Doinel* cycle (France), and Abbas Kiarostami's *Iran Trilogy* (Iran). Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 2412-3. Melodrama and Culture.** Explores the evolution of melodrama as a film genre from the 1910s to the Hollywood classical era and contemporary cinema, and the genre's adaptability to different historical cultural contexts outside of American cinema. Analyzes the political and cultural functions of melodrama in contexts ranging from classical Hollywood to Latin American cinema, from European films of the 1960s to revisionist films of the 1990s. Prereq., FILM 1502. Recommended prereq., FILM 3051. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 2522-3. Hollywood Western.** Surveys the genre of the Hollywood western, showing forth the cinematic best of that form of filmmaking in juxtaposition with the nine documentaries comprising the film *The West*, by Stephen Ives, presented by Ken Burns. The facts of the Ives series are in careful juxtaposition with the myths of the western. Prereq FILM 1502. Recommended prereq FILM 3051.

**FILM 3002-3. Major Film Movements.** Historical-aesthetic survey dealing with various national cinemas, taught in conjunction with the appropriate language department. Typical offerings are the French film, the German film, the Russian film, and so on. Also offers a more detailed approach to a more restricted subject, i.e., film comedy, women filmmakers, German expressionist cinema, Italian neorealism. May be repeated up to 12 total credit hours within the same term with departmental consent. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3022-3. Jung, Film, and Literature.** The basic themes of C. G. Jung's archetypal psychology (shadow, anima/animus, character typology, and individuation) are studied and applied as tools of critical analysis to selected films and literary texts of the modern period. Prereq., instructor consent. Same as HUMN 3015.

**FILM 3032-3. Stage Tragedy and Film.** Presents an aerial survey of the history of Western drama as represented in film: Greek drama, the Elizabethans, Ibsen/Strindberg to O'Neill/Williams, Beckett, etc. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3042-3. Horror Film.** Serious investigation of the horror film genre as well as its origins in, and relation to, works of romanticist literature (e.g., Poe, Shelley). Issues include: the relation of fantasy and reality; gender in horror film; psychological issues raised by the films; historical issues generated by the genre. Prereq., FILM 1502. Recommended prereq., FILM 3051.

## Topics

**FILM 2003-3. Film Topics.** Varying topics on important individuals, historical developments, groupings of films, film directors, critical and theoretical issues in film. May be repeated up to 9 total credit hours, provided the topics are different.

**FILM 2013-3. Film and the Quest for Truth.** Concerns the subjectivity and relativity of truth. Focuses on how and why we pursue (or fail to pursue) the truths about ourselves and about the people and events around us, and how and why such truths are often elusive, fragmentary, and impermanent. Normally taught through Farrand Hall. Approved for the arts and sciences core curriculum: ideals and values.

**FILM 2413-3. Ken Burns and Documentary Film.** Compares and contrasts the films of Ken Burns and some of the historic classics of documentary. Focuses on the contemporary possibilities of document as art. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 2513-3. Major Asian Filmmakers.** Surveys the major Asian directors from China, India, Japan, Taiwan, and Vietnam. Recommended prereq., FILM 1502. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3003-3. Major Film Directors.** Focuses on the work of a single director or a group of related directors. Course content varies each semester. Consult the *Registration Handbook and Schedule of Courses* for specific topics. May be repeated up to 12 total credit hours with departmental consent. May be used for partial fulfillment of a college requirement only once. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3013-3. Women and Film.** Examines the representation of women both in mainstream movies and in women's counter-cinema that resists traditional form, content, and spectator-text relationships of Hollywood models. Emphasizes work by key women filmmakers such as Margarethe Von Trotta, Lizzy Borden, and Yvonne Rainer, as well as readings in feminist film theory. Approved for arts and sciences core curriculum: cultural and gender diversity.

**FILM 3023-3. Stage Drama Into Film: O'Neill and Williams.** Presents an introduction to the concept of photoplay, as movies used to be called, and will show in chronological order almost every film made based on the plays of Eugene O'Neill and Tennessee Williams. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3503-3. German Film and Society 1.** History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English. Same as GRMN 3503.

**FILM 3513-3. German Film and Society 2.** Examines the history and theory of German cinema with a sociocultural emphasis. Emphasis is on post-war film. Taught in English. Same as GRMN 3513.

**FILM 3563-3. Producing the Feature Film.** Focuses on the production process of movie making from idea through distribution, analyzing each of the five phases involved, including the major players, function and problems inherent in each. Emphasizes the critical role the script plays in this process. Designed to give students a "map of the minefield" before venturing out on their own. Offered through Continuing Education.

**FILM 3603-3. Sound and Vision.** Historical and aesthetic overview of sound in relation to film, ranging from Hitchcock's *Blackmail* to Mailick's *The Thin Red Line*. Pursues issues in sound design, mixing film scores, voiceovers, and film/sound theory in narrative, experimental, and documentary films. Among the filmmakers to be studied are Vertov, Welles, Altman, Brakhage, Lipsett, Eisenstein, Coppola, Scorsese, Stone, Leone, Godard, Nelson. Also explores a limited practicum using Pro Tools for sound design. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 4003-3. Film and Fiction.** Explores similarities and differences between literature and film as narrative arts. Studies several novels, short stories, and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting.

**FILM 4013-3. Film, Photography and Modernism.** Interdisciplinary study of film, photography, and modernism, focusing on issues such as dystopia, alienation, sexuality, subjectivity, and self-referentiality. Photographs for Stieglitz, Strand, Weston, Evans, Cartier-Bresson, Kertesz, and Moholy-Nagy. Films by Dziga-Vertov, Eisenstein, Resnais, Antonioni, Bergman, Bunuel, and Bertolucci. Prereq., FILM 1502. Recommended prereq., FILM 3051.

## Intensive and Small Courses

**FILM 3004-3. Films of Alfred Hitchcock.** Intensive, critical investigation of the films of one of cinema's greatest directors, Alfred Hitchcock. Concepts to be examined include authorship, desire, gender, and film acting. Critical and theoretical writings about Hitchcock are explored. Paper and exams required. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3504-3. Topics in German Film.** Analyzes key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women, and the Holocaust. Taught in English. May be repeated up to 6 total credit hours provided the topics are different. Same as GRMN 3504.

**FILM 4004-3. Film Theory.** Offers a philosophical attempt to define the nature of cinema. An intensive seminar, the course involves a great deal of reading in classic and contemporary film theory, and requires a working knowledge of silent film history. Prereqs., FILM 3051, and FILM or FMST major with senior standing. Same as HUMN 4004. Approved for arts and sciences core curriculum: critical thinking.

**FILM 4024-3. Advanced Research Seminar.** Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade. Prereq., FILM 1502. Recommended prereq., FILM 3051, 3061.

**FILM 4604-3. Colloquium in Film Aesthetics.** Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film. May be repeated up to 6 total credit hours. Same as FREN 4600.

## Workshops

**FILM 3005-3. Issues in Film Comedy.** Film comedies constitute one of cinema's most accomplished genres. This is a critical, historical, and theoretical investigation of silent, classical, and contemporary film comedy. Works by Chaplin, Keaton, Hawks, Cukor, Woody Allen, and others will be explored. Papers, exams required. Recommended prereq., FILM 1502.

**FILM 4005 (1-3). Screenwriting: Short Form.** A writing intensive course which focuses on the art of the short form screenplay. Students will complete regular writing exercises, presentations, and several short scripts. BFAs only.

**FILM 4015-3. Advanced Digital Postproduction.** Instructs how to edit and manage a postproduction cycle. Weekly assignments teach how to use digital non-linear editing systems and how, when, and why to use support software packages such as compositing, digital audio, and optical effects treatments. This class is an advanced editing class with a heavy workload and high expectations. Students who complete this class are eligible to edit other student's projects. Software covered include: Avid, Final Cut Pro, Photoshop, After Effects, Pro Tools, and EDL Management. Prereqs., FILM 2000, 2600, and 3600.

**FILM 4105-3. Advanced Screenwriting.** Introduction to professional screenwriting, in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio. Prereq., approved writing sample. Recommended prereqs., FILM 3051 and 3061.

**FILM 4505-3. Screenwriting—Long Form.** Creative writing workshop in which students plan and write a feature-length screenplay with emphasis on format, dialogue, characterization, and story. Prereqs., FILM 1502 and 2000. Recommended prereq., FILM 2600.

## Fine Arts

*See Art and Art History.*

## French and Italian

### French

**FREN 1010-5. Beginning French 1.** For students with no previous knowledge of French. Presents basic grammar and most commonly used French vocabulary. Introduces students to Francophone culture. Students may not receive credit if they have completed FREN 1050.

**FREN 1020-5. Beginning French 2.** Completes the presentation of most basic structures and French vocabulary. Prereq., successful completion of one semester of college-level French or one year of high school French. Students may not receive credit if they have completed FREN 1050.

**FREN 1050-5. Beginning French Review.** Covers the material of FREN 1010 and 1020 in one accelerated semester. Intended for students who know some French (i.e., three to five semesters in high school) but do not have skills adequate for 2000-level courses. Students may not receive credit for FREN 1050 if they have completed FREN 1010 or FREN 1020.

**FREN 1200-3. Medieval Epic and Romance.** Covers the most important works of medieval literature, in English translation. Among the texts studied are the *Nibelungenlied*, *the Song of Roland*, and Arthurian romances, including the stories of Lancelot and Guinevere and Tristan and Isolde. Offers a general introduction for nonmajors to medieval literature and society. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 1300-3. Discovering New Worlds.** Introduces the Renaissance European accounts of Africa, Asia, and especially America. Includes writings of Marco Polo, Jean de Mandeville, Christopher Columbus, Hernan Cortes, Jean de Lery, and Cabeza de Vaca (in translation), as well as maps and films.

**FREN 1400-3. Medieval/Renaissance Women Writers in Italy and France.** Introduces major literature through close readings of women's writings in their historical context. Offers a general introduction to women's status and roles in Italy and France. Taught in English. Same as ITAL 1400. Approved for arts and sciences core curriculum: cultural and gender diversity.

**FREN 1500-3. Literature and Politics in the Age of Enlightenment.** Introduces political dimensions of 18th century French literature. Surveys political and social preoccupations that manifest themselves across genres (novels, scientific treatises, dialogues, erotic literature, etc.). Examines contributions made by 18th century French writers to the sociological and political imagination of Western tradition. Taught in English.

**FREN 1600-3. Introduction to French Film.** History and evolution of French film from Lumiere to today. Scripts and modern literary texts used as reference points for studying narrative structures in both literature and film. Handouts of technical terms and critical theory supplement readings. Taught in English.

**FREN 1700-3. Francophone Literature in Translation.** Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and Canada. Gives special attention to oral tradition, identity, question, and cultural conflict. Taught in English. Approved for arts and sciences core curriculum: cultural and gender diversity.

**FREN 1800-3. Contemporary French Literature in Translation.** Reviews the major philosophical, political, and aesthetic issues in the 20th century French novel and drama. Beginning with existentialist literature, discussion focuses subsequently on the Theatre of the Absurd, the new novel, World War II and the Holocaust, and recent women writers. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 2110-3. Second-Year French Grammar Review and Reading 1.** Introduces cultural readings (track A) and literary readings (track B) as well as writing compositions in French. Prereq., successful completion of two semesters of college-level French or equivalent. Meets MAPS requirement for foreign language. Completes college undergraduate language requirement.

**FREN 2120-3. Second-Year French Grammar Review and Reading 2.** Completes detailed study of grammar begun in FREN 2110. Continued reading in French literature and culture, considerable practice in writing and speaking French. Prereq., FREN 2110 or equivalent.

**FREN 2500-3. Conversation in French.** This lower-division course is for students who have spent no time in a French-speaking environment. Sessions include a variety of discussion formats including presentations, debates, and occasional videotaping. All work is in French. Prereq., FREN 2120 or equivalent.

**FREN 3010-3. French Phonetics and Pronunciation.** Training in correct pronunciation of standard French through understanding of the function of speech organs. International phonetic alphabet learned and used throughout the course; intensive practice in class and language laboratory. Required of all majors. Prereq., FREN 2120 or equivalent.

**FREN 3050-3. French Composition 1.** Third year grammar course where students perfect their written French through written grammar exercises and guided composition. Should be taken before FREN 3060. Required for French majors. Prereq., FREN 2120 or equivalent.

**FREN 3060-3. French Composition 2.** Continues grammar study and composition practice begun in FREN 3050. Should be taken before 3100, 3110, or 3120, but may be taken concurrently. Required for majors. Prereq., FREN 3050 or equivalent.

**FREN 3100-3. Introduction to Critical Reading and Writing in French Literature.** Study of French literature through close readings of representative examples of major literary forms (poetry, fiction, drama, essay) and through the composition of critical writings in French. Required for French majors. Prereq., FREN 3050 or coreq., FREN 3060. Approved for arts and sciences core curriculum: critical thinking.

**FREN 3110-3. Main Currents of French Literature 1.** Surveys French literature from the Middle Ages through the 18th century. Students are expected to acquire a fairly detailed knowledge of principal writers and schools of the pe-

riods covered. Required for majors. Prereq. or coreq., FREN 3100. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 3120-3. Main Currents of French Literature 2.** Surveys 19th and 20th century French literature. Close reading of selected texts of the principal writers and schools. Required for majors. Prereq. or coreq., FREN 3100. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 3200-3. Introduction to Literary Theory and Advanced Critical Analysis.** Introduces important aspects of both classical and modern literary theory as an aid to reading and understanding literary texts. Covers theoretical works by figures ranging from Plato and Aristotle to modern French critics such as Barthes, Foucault, and Derrida in conjunction with selected literary works. Offers students more sophisticated means of understanding issues like gender, ethnicity, the roles of both author and reader in constructing meaning, the nature and functions of signs, and the relationship between literature and the larger society. Conducted in English, though French majors are required to read the texts in the original language. Required for students taking honors in French or Italian. Prereq., FREN 3100 or instructor consent. Approved for arts and sciences core curriculum: literature and the arts or critical thinking.

**FREN 3500-3. French Current Events: Conversation and Composition.** For students who have spent less than four months in a French-speaking environment. Focuses on presentation, debates, and occasional video-taping through discussion, readings, and written work. Prereq., FREN 3060 or equivalent.

**FREN 3600-3. Business French 1.** Designed primarily for students in business French who have not spent time in a French-speaking milieu; those with some experience should take FREN 4050. Concentrates on composing business letters and conducting business in French. Prereq., FREN 2120 or equivalent.

**FREN 3700-3. French-American Cultural Differences.** Through readings, films, discussion, and activities, students learn the defining values of their own country, those of France, and key differences between the two cultures. Taught in French. Prereq., FREN 3060 or equivalent.

**FREN 4010-3. Advanced Composition.** Systematic review of French grammar, vocabulary, and style. Prereq., FREN 3060 or equivalent.

**FREN 4030-3. Advanced Oral Practice and Interpreting.** Concentrates on developing (or preserving) speaking fluency, correct pronunciation, and a good working vocabulary. May be repeated once for credit. Prereq., FREN 3060 and/or 3500, or instructor consent.

**FREN 4050-3. Business French 2.** Prereq., FREN 3600 or instructor consent.

**Note: Prereqs. for the following courses (except FREN 4200) are FREN 3100, 3110, and 3120 or instructor consent.**

**FREN 4100-3. Translation.** Concentrates on the problems of written and oral translation, both into and out of French. Prereq., FREN 4010 or instructor consent.

**FREN 4110-3. French Special Topics.** Topics vary each semester. Students should consult the *Registration Handbook and Schedule of Courses* for specific topics. See also FREN 4120.

**FREN 4120-3. French Special Topics.** Topics vary each semester. Students should consult the *Registration Handbook and Schedule of Courses* for specific topics. See also FREN 4110.

**FREN 4130-3. Medieval Lyric Literature.** Examines the medieval concept of courtly love as both a cultural and literary phenomenon and its theoretical and stylistic evolution from the Provençal and Old French, with comparative reference to Italian lyric. Same as HUMN 4522 and ITAL 4130.

**FREN 4170-3. Francophone Literature.** Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and French Canada. Gives special attention to oral tradition, identity question, and cultural conflict. Prereqs., FREN 3100, 3110, 3120, or instructor consent.

**FREN 4200-3. Studies in Contemporary French Culture.** Through a wide variety of texts and audio-visual documents, students learn the structures of contemporary French society and study the cultural phenomena of that society. Prereqs., FREN 3050 and 3060.

**FREN 4250-3. Medieval and Renaissance Readings.** Explores the complex and evolving cultural and historical contexts of medieval and Renaissance French. Introduces the masterpieces of French medieval and Renaissance literature, including the *Chanson de Roland* and Arthurian romance. Also focuses on the work of Marie de France, Guillaume de Lorris, and Jean de Meun, Christine de Pisan, Machaut, Villon, Louise Labe, and the poets of the Pliade, Rabelais, and Montaigne.

**FREN 4300-3. Theatre and Modernity in 17th Century France.** Readings of plays by Corneille, Moliere, and Racine introduce students to theatre's role as a mirror of the multifarious tensions shaping modern Western experience. Taught in English with English translations. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 4310-3. 17th Century French Tragedy and Poetry.** Close readings of tragedies by Corneille and Racine placed in the evolving context of baroque and neoclassical political and artistic culture as illustrated by lyric poetry, the Fables of La Fontaine, moral philosophy, painting, and architecture. Examines the role of heroic drama as both a symptom and agent of early modern French social history.

**FREN 4320-3. 17th Century French Prose.** Close readings of selected works of Descartes, Pascal, Mme. de La Fayette, La Rochefoucauld, La Bruyere, and Perault. Themes include 17th century theories of self, notions of *honnêteté* and the critical analysis of human motives and behavior, the role of literary prose in the critique of heroic idealism and in demystifying the monarchic absolutism of the Sun King, Louis XIV.

**FREN 4330-3. Moliere and 17th Century French Comedy.** Close readings of farces and comedies of Moliere in context with selected comedies by Corneille, Rotrou, and Cyrano de Bergerac and selected satires by Boileau and La Fontaine. Themes include comedy as a form of social criticism and the sociocultural significance of such episodes of Moliere's career as the scandalous quarrels of L'École des Femmes and Tartuffe.

**FREN 4350-3. French Enlightenment.** Studies fiction, essays, theatre, and philosophical tales. Emphasizes the Enlightenment in France through the texts of its major representatives: Montesquieu, Voltaire, Marivaux, Diderot, and Rousseau. Prereqs., FREN 3100, 3110, and 3120, or instructor consent.

**FREN 4360-3. Survey of 18th Century French Literature.** Close readings of texts by Voltaire, Rousseau, Diderot, Marivaux, and Beaumarchais. Focuses on the evolution of literary genres and the influence of philosophy, politics, and social change on belles lettres.

**FREN 4430-3. Survey of 19th Century French Literature.** Examines fiction, poetry, and theatre in 19th century France. Focuses on developing and changing literary styles and subject matter throughout the century in historical, philosophical, and social context.

**FREN 4470-3. 20th Century French Theatre and Poetry.** Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts, and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre, and the dialectic of appearance and reality.

**FREN 4480-3. 20th Century French Novel.** Close readings of novels from the 1930s to the contemporary period introduce the principal themes and techniques of the modernist and postmodernist French novel. Students are encouraged to analyze a variety of questions commonly evoked in these texts, such as the problem of representation, the uses and abuses of writing, the relation of fiction and history, and the status of the subject in the world.

**FREN 4490-3. Women Novelists of the 20th Century in France.** Explores major aspects of the 20th century novel in France through works written by women. Gives historical perspective, studies a number of novels, and emphasizes works written since 1968, a turning point. Discusses relevance of women's writings today.

**FREN 4500-3. Reading the Orient: French Literature and Exoticism.** Examines representations of the non-Western world in French literature from the 19th century to the present. Taught in English, and may not be used as a senior seminar (senior essay course) for majors. Same as HUMN 4500. Approved for arts and sciences core curriculum: literature and the arts, or cultural and gender diversity.

**FREN 4520-3. Italian and French Poetry of the Renaissance.** Close reading of major poets of the Renaissance. Special attention given to cultural context (influence of Petrarchism, revival of Platonism, and impact of the counter-reformation, etc.). Taught in English; readings in Italian for Italian majors. Same as ITAL 4520.

**FREN 4600-3. Topics in French Film.** Covers various topics in the French and some other Francophone cinemas (Belgian, Swiss, Quebecois) from 1895 to the present. Focuses on periods, schools, themes, and directors from Melies to Duras, and the critical approaches by which they are studied. Varies from

year to year. May be repeated up to 6 total credit hours on different topics. Prereqs., junior standing and 6 hours in French literature, other literature, or film studies. Same as FILM 4604.

**FREN 4750-3. Methods of Teaching French and Professional Orientation.** To be taken one semester prior to or concurrently with student teaching.

**FREN 4840 (1-6). Independent Study: Language.** Upon consultation only and at the undergraduate level. May be repeated up to 7 total credit hours.

**FREN 4960-6. High School French Teaching.** Offered as part of the supervised student teaching in a secondary school required for state certification to teach French. These hours do not count toward student hours in the major nor in the maximum departmental hours allowed. Prereq., FREN 4750 and admission to the secondary teaching education program. Coreq., EDUC 4712. Graded pass/fail only.

**FREN 4980-3. French Senior Honors Thesis.** The senior honor thesis is a 40 to 45 page original research paper, written in French, and constitutes a requirement for graduating with departmental honors. Prereqs., all third-year course requirements including FREN 3200. Recommended prereq., at least one course numbered FREN 4100 or above.

**FREN 4990-3. Senior Seminar.** Preparation of a 15-page research paper in French presented to two members of the department faculty and defended orally in class. Prereq., all third-year requirements and advisor consent. Recommended prereq., at least one course numbered FREN 4100 or above.

**FREN 5080-3. Introduction to Old French.** Prereq., graduate standing or instructor consent.

**FREN 5110-3. French Special Topics.** Different topics are offered and, in a number of cases, cross-listed with other departments. Prereq., graduate standing or instructor consent. May be repeated up to 6 total credit hours on different topics.

**FREN 5120-3. French Special Topics.** Different topics are offered and, in a number of cases, cross-listed with other departments. Prereq., graduate standing or instructor consent. May be repeated up to 6 total credit hours on different topics.

**FREN 5130-3. Medieval Lyric Literature.** Prereq., graduate standing or instructor consent.

**FREN 5170-3. Francophone African Literature.** Prereq., graduate standing or instructor consent.

**FREN 5250-3. Medieval and Renaissance Readings.** Through close readings of masterpieces of French medieval and Renaissance literature in conjunction with contemporary criticism and theory, explores the contexts of medieval and Renaissance France. Readings in French. May be taught in English to accommodate students in other programs. May be repeated up to 12 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**FREN 5310-3. 17th Century French Tragedy and Poetry.** Close readings of tragedies by (among others) Corneille and Racine, placed in the context of baroque and neoclassical political and artistic culture as illustrated by philosophy, painting, and science. Drawing on recent criticism and theory, explores heroic drama's role as a symptom and agent of early modern French social and intellectual history. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5320-3. 17th Century French Prose.** Close readings of major works by, e.g., Descartes, Pascal, La Fayette, La Rochefoucauld, and La Bruyère. Themes include 17th century theories of self, early modern epistemology, notions of *honnêteté* and the critical analysis of human motives and behavior, the emerging novel, and the critique of heroic idealism and of the monarchic absolutism of the Sun King, Louis XIV. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5330-3. Moliere and 17th Century French Comedy.** Close readings of the comedies in context with the works of, e.g., Corneille, Rotrou, Cyrano, Boileau, and La Fontaine. Themes include Molière and the institution of literary authorship, comedy's role as social critique, the deconstruction of the early modern subject, and the cultural politics of the scandals surrounding L'École des femmes and Tartuffe. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5350-3. French Enlightenment.** Focuses on the uses of literature to address the revolutionary philosophical, scientific, religious, and/or sociopolitical questions of the day. Explores Diderot and d'Alembert's *Encyclopedie*, Voltaire and



Diderot's philosophical tales and dialogues, Rousseau's *Discours*, and other writings. Discusses the development of specific literary forms to promote the ideas and goals of the philosophers to reach a changing and diverse readership and to fight censorship. Prereq., graduate standing or instructor consent.

**FREN 5360-3. 18th Century French Literature.** Focuses on the study of a specific literary genre (e.g., theatre, the novel) or on the global production of a major author (e.g., Voltaire, Diderot, Rousseau). Discussion stresses both the uniqueness of the genre/writer and their significance as representatives of the century's changing society and culture. May be repeated up to 6 total credit hours during a student's graduate career. Prereq., graduate standing or instructor consent.

**FREN 5420-3. 19th Century French Literature.** A survey of principal works and movements, intended as an introductory course. Prereq., graduate standing or instructor consent.

**FREN 5430-3. Topics in 19th Century French Prose, Poetry, and Theatre.** Topics vary. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**FREN 5440-3. Literary Ludics.** Taught in French and English. Focuses on literary structures proposed by author to reader as games. Considers critical texts, both practical and theoretical, with a view toward defining the relation between criticism and its objects. Prereq., graduate standing or instructor consent.

**FREN 5470-3. 20th Century French Theatre and Poetry.** Prereq., graduate standing or instructor consent.

**FREN 5480-3. 20th Century French Novel.** Prereq., graduate standing or instructor consent.

**FREN 5490-3. Women Novelists of the 20th Century in France.** Prereq., graduate standing or instructor consent.

**FREN 5570-3. French Literary Criticism.** Prereq., graduate standing or instructor consent.

**FREN 5770-2. College Foreign Language Teaching.** Required for teaching assistants and graduate part-time instructors. Prereq., graduate standing or instructor consent.

**FREN 6840 (1-3). Independent Study.** May be repeated up to 3 total credit hours, except with permission of the director of graduate studies. Prereq., graduate standing or instructor consent.

**FREN 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Italian

**ITAL 1010-5. Beginning Italian 1.** The four skills of listening, speaking, reading, and writing are progressively developed in a predominantly oral presentation. The cultural focus is the personal world and life of students. Language laboratory work expected.

**ITAL 1020-5. Beginning Italian 2.** Continuation of ITAL 1010, with greater emphasis on reading and writing. The cultural focus shifts to social and civic areas. Prereq., ITAL 1010 with a grade of C- or better.

**ITAL 1400-3. Medieval/Renaissance Women Writers in Italy and France.** Introduces major literature through close readings of women's writings in their historical context. Offers a general introduction to women's status and roles in Italy and France. Taught in English. Same as FREN 1400. Approved for arts and sciences core curriculum: cultural and gender diversity.

**ITAL 1500-3. That's Amore: Introduction to Italian Culture.** Introduces students to representations of Italian society that have persisted through the ages. The course readings allow students to better understand how certain stereotypes about Italian society (e.g., Latin lover, Mafia) were born and persist in the present. Approved for arts and sciences core curriculum: contemporary societies.

**ITAL 2110-3. Intermediate Italian Reading, Grammar, and Composition 1.** Explores the more complex structures of Italian grammar, emphasizing reading and writing of compositions. Readings are predominantly cultural with some introduction to Italian literature. Taught in Italian. Prereq., ITAL 1020, with a grade of C- or better. Meets MAPS requirement for foreign language.

**ITAL 2120-3. Intermediate Italian Reading, Grammar, and Composition 2.** Continuation of ITAL 2110. Continued reading in Italian literature and culture with considerable practice in writing and speaking Italian. Fulfills the Graduate School language requirement for the PhD. Prereq., ITAL 2110 or equivalent.

**ITAL 2130-3. Introduction to Literary Analysis.** Increases student's ability to read and analyze literary texts by improving vocabulary and terminology. Students read short stories, essays, short plays, and poems to acquire critical skills and improve expression of opinions and arguments in Italian. Taught in Italian. Prereq., ITAL 2110 or instructor consent.

**ITAL 3010-3. Advanced Composition and Conversation 1.** Builds vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian. Exercises and themes are drawn primarily from current events and politics (e.g., print and broadcast news) and contemporary culture (e.g., magazines, films, and video). Prereq., ITAL 2120 or instructor consent.

**ITAL 3020-3. Advanced Composition and Conversation 2.** Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian. Exercises and themes are drawn primarily from Italian cultural history. Prereq., ITAL 3010 or instructor consent.

**ITAL 3030-3. Storia dell'arte: Advanced Composition/Conversation 3.** Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian through the study of the history of Italian art. Exercises and themes focus on Italian Classical, Medieval, and Renaissance Art. Prereq., ITAL 2120 or instructor consent.

**ITAL 3140-3. Readings in Italian Literature—20th Century.** Covers a selected reading of major texts, prose, and poetry of 20th century literature. Emphasizes critical reading and analysis of modern and contemporary Italian literature in its literary and historical context. Taught in Italian. Prereq., ITAL 2130 or instructor consent.

**ITAL 3150-3. Readings in Italian Literature—19th Century.** Introduces students to 19th century literary history through a selected reading of major texts, prose, and poetry. Emphasizes critical reading and analysis of Italian literature in its literary and historical context. Taught in Italian. Prereq., ITAL 2130 or instructor consent.

**ITAL 3160-3. Readings in Italian Literature—Medieval and Renaissance.** Covers a selected reading of major texts and genre of medieval and Renaissance literature. Emphasizes critical reading and analysis of texts in their literary and historical context. Taught in Italian. Prereq., ITAL 2130 or instructor consent.

**ITAL 3600-3. Workshop in Italian Theatre.** Consult department for information.

**ITAL 4010-3. Problems in Translation, Advanced Grammar, and Stylistics 1.** Emphasizes practice in translating varying types of prose from Italian into English and English into Italian. Consult instructor.

**ITAL 4030-3. Contemporary Italian Culture, Politics, and the Media.** Serves as an introduction to the study of the effect that politics and the media have in shaping Italian culture. Makes use of the World Wide Web for instruction. Taught in Italian. Familiarity with Internet helpful. Prereq., ITAL 2120 or equivalent.

**ITAL 4130-3. Medieval Lyric Literature.** Examines the medieval concept of courtly love as both a cultural and literary phenomenon and its theoretical and stylistic evolution from the Provencal and Old French to Italian lyric. No knowledge of Italian is necessary. Consult instructor. Same as FREN 4130 and HUMN 4522.

**ITAL 4140-3. The Age of Dante: Readings from *The Divine Comedy*.** Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English. Prereq., junior standing or instructor consent. Same as HUMN 4140. Approved for arts and sciences core curriculum: literature and the arts.

**ITAL 4150-3. *The Decameron* and the Age of Realism.** Analyzes the rise of realism in the 13th and 14th century Italian literature and parallel manifestations in the visual arts. Focuses on Boccaccio's *Decameron* and contemporary realistic prose and poetry with emphasis on gender issues and medieval cultural diversity. Taught in English. Prereq., junior standing or instructor consent. Same as HUMN 4150. Approved for arts and sciences core curriculum: literature and the arts, or cultural and gender diversity.

**ITAL 4160-3. Italian Literature Special Topics.** Topics vary each semester. Students should consult the *Registration Handbook and Schedule of Courses* for specific topics. May be repeated up to 6 total credit hours, provided the topics are different.

**ITAL 4170-3. Italian Literature Special Topics.** Topics vary each semester. Students should consult the *Registration Handbook and Schedule of Courses* for specific topics. May be repeated up to 6 total credit hours, provided the topics are different.

**ITAL 4200-3. Topics in Italian Culture and Civilization from the Origins through the Renaissance.** Taught in English. Topics vary. May be repeated up to 6 total credit hours, provided the topics are different.

**ITAL 4250-3. History of Italy.** Survey of political, social, and intellectual history of Italy and its people. Taught in English. Same as HIST 4313.

**ITAL 4280-3. Topics in Italian Cinema.** Examines different aspects of Italian cinema from the origins of neorealism to the present. May focus on a particular director, the culture of a specific period, or certain themes (e.g., the representation of women, the relationship between cinema and literature, or socio-aesthetic movements like Futurism or Fascism). Taught in English. May be repeated up to 6 total credit hours, provided the topic is different. Prereq., junior standing and 6 hours of Italian literature and/or history.

**ITAL 4520-3. Italian and French Poetry of the Renaissance.** Close reading of major poets of the Renaissance. Special attention given to the cultural context (influence from Petrarchism, revival of Platonism, and impact of the counter-reformation, etc.). Taught in English; readings in Italian for Italian majors. Same as FREN 4520.

**ITAL 4710-3. Italian Literature of the 19th Century.** Focuses on the preromantics, Italian romanticism, verismo, and decadentismo literary and cultural movements, particularly in their European context. Taught in English; readings in Italian for Italian majors.

**ITAL 4720-3. Italian Literature of the 20th Century.** Studies Italian novel, theatre, poetry, and short story in the period from World War I to the present. Taught in English; readings in Italian for Italian majors.

**ITAL 4730-3. Italian Feminisms: Culture, Theory, and Narratives of Difference.** Studies Italian women writers, artists, and film makers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors. Same as HUMN 4730. Approved for arts and sciences core curriculum: cultural and gender diversity or literature and the arts.

**ITAL 4840 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**ITAL 4930 (1-3). Languages Internship for Professions.** Offers opportunities to use Italian skills in service to various sectors of the community, including private industry, government, and education. Instructor consent required. Prereq., ITAL 2120.

**ITAL 4980-3. Italian Senior Honors Thesis.** The senior honors thesis is a 40 to 45 page original research paper, written in Italian, and constitutes a requirement for graduating with departmental honors. Prereqs., all third-year course requirements including FREN 3200. Recommended prereq., at least one course numbered ITAL 4100 or above.

**ITAL 4990-3. Senior Seminar.** Preparation of a 15-page research paper in Italian presented to two members of the faculty and defended orally in class. Prereq., advisor consent. Recommended prereq., at least one course numbered ITAL 4100 or above.

## Geography

**GEOG 3840 (1-3). Undergraduate Independent Study.** Provides an independent study opportunity, by special arrangement with faculty, for students presenting strong geography preparation. May be repeated up to 8 total credit hours. Restricted to geography majors.

**GEOG 3930-3. Internship.** Provides an academically supervised opportunity for advanced geography or environmental conservation majors to work in public and private organizations on projects related to the student's career goals and to relate classroom theory to practice. May be repeated up to 6 total credit hours. Restricted to geography and environmental studies majors.

**GEOG 4100 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4110 and 4120. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4110 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4100 and 4120. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4120 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4100 and 4110. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4160-3. Teaching Geography.** Provides a practicum and/or tutorial, by special arrangement only, in the teaching of geography. Includes serving as small-group leaders or tutors in introductory courses or developing and/or testing curriculum materials. May be repeated up to 6 total credit hours. Restricted to geography and environmental studies majors.

**GEOG 4430-3. Seminar: Conservation Trends.** Provides environmental studies or geography majors with an undergraduate format for interdisciplinary discussion and research into current and future directions of conservation. May be repeated up to 6 total credit hours. Restricted to junior and senior geography and environmental studies majors. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4990-3. Senior Thesis.** Offers thesis research under faculty supervision. Prereq., senior standing as geography or environmental studies major.

**GEOG 5100 (1-4). Special Topics: Geography.** Covers various topics outside of the normal curriculum; offered intermittently depending on student demand and availability of faculty. May be repeated up to 9 total credit hours.

**GEOG 5840 (1-3). Graduate Independent Study.** Offers independent research for master's students only. May be repeated up to 6 total credit hours. Restricted to graduate students.

**GEOG 5930-3. Advanced Internship.** Provides an academically supervised opportunity for graduate-level geography majors to work in public and private organizations on advanced projects related to geographic theory and their career goals. May be repeated up to 7 total credit hours. Restricted to graduate students.

**GEOG 6160-3. Seminar: Geographic Education.** Surveys and critiques ideas from education, psychology, philosophy, and geography related to teaching and learning, especially for graduate students in geography who plan careers in college teaching. May be repeated up to 7 total credit hours. Restricted to graduate students.

**GEOG 6170 (1-4). Geography Teaching Materials.** Emphasizes creation of materials for classroom use in geography (individual work under supervision). Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6180 (1-3). Seminar: Geographic Problems.** Applies research methods to selected problems. Topics vary with instructor. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6940-3. Master's Degree Candidate.**

**GEOG 6950 (1-6). Master's Thesis.**

**GEOG 7840 (1-3). Graduate Independent Study.** Offers independent research for doctoral students only. Restricted to graduate students. May be repeated up to 6 total credit hours.

**GEOG 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Physical Geography

**GEOG 1001-4. Environmental Systems 1—Climate and Vegetation.** Lect. and lab. Introduces the atmospheric environment of the Earth: elements and controls of climate and their implications for hydrology, vegetation, and soils. Emphasizes distribution of physical features across the Earth's surface and interactions between humans and their environment, especially those leading to global change on the decade to century time scale. Meets MAPS requirement for natural science: nonlab or lab. Approved for arts and sciences core curriculum: natural science.

**GEOG 1011-4. Environmental Systems 2—Landscapes and Water.** Lect. and lab. Introduces landscapes and flowing water, emphasizing the formation and geographic distribution of mountains, volcanoes, valleys, and deserts, and

their shaping by rivers and glaciers. Includes field trips. Meets MAPS requirement for natural science: nonlab or lab. Approved for arts and sciences core curriculum: natural science.

**GEOG 3251-3. Mountain Geography.** Surveys mountain environments and their human use with illustrations from temperate and tropical mountain areas.

**GEOG 3301-3. Analysis of Climate and Weather Observations.** Prereqs., ATOC 1050/1060, 3600, or GEOG 1001, and a statistics course. Same as ATOC 3300. Approved for arts and sciences core curriculum: natural science.

**GEOG 3351-3. Biogeography.** Surveys and analyzes plant and animal distributions on a world scale from ecological and historical perspectives. Emphasizes human impact on vegetation.

**GEOG 3511-4. Introduction to Hydrology.** Examines hydrologic processes in the surface environment, emphasizing the environment of the western United States. Emphasizes natural processes and their management to augment water resources. Restricted to junior and senior geography and environmental studies majors. Approved for arts and sciences core curriculum: natural science.

**GEOG 3601-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system, including the hydrological cycle and its role in climate, climate stability, and global change. Covers forecasting climate, its applications, and human dimensions. Prereq., one semester of calculus or instructor consent. Same as ATOC 3600 and ENVS 3600. Approved for arts and sciences core curriculum: natural science.

**GEOG 4201-3. Biometeorology.** Interdisciplinary science, studying the interactions between atmospheric processes and living organisms (plants, animals, and humans). Discusses how organisms adapt to a changing environment. Uses a practical, problem-solving approach to explore these interactions. Prereq., GEOG 1001. Same as ENVS 4201.

**GEOG 4211-3. Physical Climatology—Principles.** Introduces physical principles of flows of heat and moisture to and from the Earth's surface, interaction and modeling of such flows, and their distribution in space and time.

**GEOG 4231-4. Physical Climatology/Field Methods.** Highlights theory and field measurements in boundary layer climatology, emphasizing radioactive and turbulent fluxes near the ground. Field calibration of flux equipment and measurements of radioactive, sensible, latent, and ground heat fluxes over different terrain types. Prereq., GEOG 4211 or 5211. Same as GEOG 5231.

**GEOG 4241-4. Principles of Geomorphology.** Studies weathering, mass-wasting, fluvial, wind, and marine processes and the resulting landforms. Prereqs., GEOG 1001 and 1011 or any 1000-level sequence in geological sciences. Restricted to junior and senior geography, geology, and environmental studies majors. Same as GEOL 4241. Restricted to junior/senior GEOL/GEOG/ENVS majors. Approved for arts and sciences core curriculum: natural science.

**GEOG 4251-4. Fluvial Geomorphology.** Emphasizes landscapes formed by running water. Includes basic fluid mechanics, sediment transport, hillslope and channel erosion, and sediment yield. Prereqs., GEOG 1011 and 3511. Recommended prereq., GEOG 3023. Same as GEOG 5251.

**GEOG 4291 (3-4). Mountain Geomorphology.** Provides a field course emphasizing the study of landforms produced by weathering and soils, mass movement, and erosional processes under all climatic and altitudinal conditions. Call for schedule of offerings. May be offered during the summer at the Mountain Research Station. Prereqs., a college course in physical geology or geography and instructor consent. Same as GEOG 5291 and GEOL 4291, 5291.

**GEOG 4311-3. Watershed Biogeochemistry.** Emphasizes terrestrial-aquatic linkages in headwater catchments, focusing on hydrologic pathways, isotopic and geochemical tracers, nutrient cycling, water quality, experimental manipulations, and modeling. Prereq., GEOG 3511. Recommended prereq., parametric statistics.

**GEOG 4321 (3-4). Snow Hydrology.** Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS, and quantitative methods. Prereqs., GEOG 1001 or 1011, and any statistics course. Same as GEOG 5321.

**GEOG 4331 (3-4). Mountain Climatology.** Surveys and analyzes climatic characteristics of mountain environments worldwide. Prereq., GEOG 1001 or ATOC 1050 or 1060. Same as GEOG 5331.

**GEOG 4371-3. Forest Geography: Principles and Dynamics.** Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems. Same as GEOG 5371.

**GEOG 4401-3. Soils Geography.** Discusses chemical and physical properties of soils, soil development, distributions, and management relevant to understanding plant-soil relationships in natural and human-altered landscapes. Prereq., GEOG 1011. Recommended prereq., inorganic chemistry. Same as GEOG 5401.

**GEOG 4411-3. Methods of Soil Analysis.** Applies methods of soil sampling and laboratory analysis toward an understanding of the relationships between soils, the environment, and landscape impacts. Field trips explore field observation and sampling techniques. Laboratory analyses determine soil physical and chemical properties. Prereq., GEOG 1001 or 1011; prereq./coreq., GEOG 4401/5401. Same as GEOG 5411.

**GEOG 4501-3. Water Resources and Water Management of Western United States.** Interprets and analyzes hydroclimatic data, surface, and groundwater. Critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution, and regional development. Same as GEOG 5501.

**GEOG 5161-3. Research Design in Geography.** The human section reads and discusses contemporary research philosophies and methodologies in human geography. Practices the development of research proposals and presentation of research ideas and results. The physical section reads and discusses contemporary research philosophies and methodologies in physical geography (climatology, geomorphology, biogeography, and soils geography). Practices the development of research proposals and presentation of research ideas. Restricted to geography graduate students.

**GEOG 5211-3. Seminar: Physical Climatology.** Involves a research seminar concerned with problems of mass and energy exchange in the Earth-atmosphere system. Selects topics from such areas as air quality, bioclimatology, hydrology, climate change, and the climates of urban, agricultural, and natural environments. Restricted to graduate students.

**GEOG 5221-3. Synoptic and Dynamic Climatology.** Examines global climates from the standpoint of synoptic and dynamic climatology. Prereqs., GEOG 3201 or equivalent, 3000-level course in climate/atmospheric sciences, and instructor consent. Restricted to graduate students.

**GEOG 5231-4. Physical Climatology/Field Methods.** Prereq., GEOG 4211 or 5211. Restricted to graduate students. Same as GEOG 4231.

**GEOG 5241 (1-3). Topics in Physical Geography.** (Precise title specified in the *Registration Handbook and Schedule of Courses*.) Presents recent research topics that vary from year to year. Restricted to graduate students. May be repeated for up to 6 total credit hours.

**GEOG 5251-4. Fluvial Geomorphology.** Restricted to graduate students. Same as GEOG 4251.

**GEOG 5291 (3-4). Mountain Geomorphology.** Same as GEOG 4291 and GEOL 5291.

**GEOG 5321 (3-4). Snow Hydrology.** Restricted to graduate students. Prereqs., introductory GEOG, or equivalent, and any parametric statistics. Same as GEOG 4321.

**GEOG 5331 (3-4). Mountain Climatology.** Restricted to graduate students. Same as GEOG 4331.

**GEOG 5371-3. Forest Geography: Principles and Dynamics.** Restricted to graduate students. Same as GEOG 4371.

**GEOG 5391-3. Seminar: Biogeography.** Considers in detail current research themes in biogeography. Includes intensive reading of current research literature and preparation of research papers. Restricted to graduate students. Topics vary; may be taken twice.

**GEOG 5401-3. Soils Geography.** Restricted to graduate students. Same as GEOG 4401.

**GEOG 5411-3. Methods of Soil Analysis.** Restricted to graduate students. Same as GEOG 4411.

**GEOG 5501-3. Water Resources and Water Management of Western United States.** Restricted to graduate students. Same as GEOG 4501.

**GEOG 5951-3. Seminar: Climatic Change.** Offers a cross-disciplinary survey of evidence for the theories of climatic change. Prereq., instructor consent. Restricted to graduate students. Same as ATOC 5950.

**GEOG 5961-3. Theories of Climate and Climate Variability.** Critically reviews current theories of climatic variability based on analysis of the different physical processes affecting climate. Restricted to graduate students. Same as ATOC 5960.

**GEOG 6181 (1-4). Special Topics.** Highlights current problems in geography, particularly physical and environmental geography. Topics vary with instructor. Restricted to graduate students. May be repeated up to 6 total credit hours.

**GEOG 6211 (1-3). Readings in Climatology.** Discusses selected topics in current climatological literature. Specific themes vary. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6241 (1-3). Seminar in Hydrology and Geomorphology.** Emphasizes process-oriented research in hydrology and geomorphology. Sample topics include river mechanics, snow hydrology, and periglacial processes. See the *Registration Handbook and Schedule of Courses* for specific title. May be repeated up to 6 total credit hours. Restricted to graduate students. Same as GEOL 6241.

## Human and Cultural Geography

**GEOG 1982-3. World Regional Geography.** Involves an intellectual journey around the globe, stopping at major regions to study the people, their environments, and how they interact. Topics include the political/economic tensions in changing Europe, conflicts in Brazilian rain forests, transitions facing African peoples, and rapid changes in China. Meets MAPS requirement for social science: geography.

**GEOG 1992-3. Human Geographies.** Examines social, political, economic, and cultural processes creating the geographical worlds in which we live, and how these spatial relationships shape our everyday lives. Studies urban growth, geopolitics, agricultural development and change, economic growth and decline, population dynamics, and migration exploring both how these processes work at global scale as well as shape geographies of particular places. Meets MAPS requirement for social science: geography.

**GEOG 2002-3. Geographies of Global Change.** Familiarizes students with spatial and ecological perspectives on economic, political, social, cultural, and environmental changes. Examines roles of transnational corporations, global media, world cities, food security, labor, migration, human rights, ethnicity, nationalism, resources, environmental degradation, and sustainable development in global change. Meets MAPS requirement for social science: geography.

**GEOG 2412-3. Environment and Culture.** Examines nature-culture interactions and the effects of development and resource use on environmental quality, as well as practical efforts to manage and protect the environment. Meets MAPS requirement for social science: geography.

**GEOG 3402-3. Natural Hazards.** Explores the impacts of extreme geophysical events on human society. Emphasizes adaptations to extreme events and ways of reducing vulnerability and damage.

**GEOG 3412-3. Conservation Practice and Resource Management.** Studies inventory, policy, and management of natural resources. Emphasizes practical approaches to the conservation and management of soil, land, water, and air resources. Restricted to geography and environmental studies majors.

**GEOG 3422-3. Conservation Thought.** Provides an historical survey of human consumption of earthly materials; environmental and global considerations of population growth, cultural attitude, and technological development; and diverse goals and philosophy of conservation movements in time and place.

**GEOG 3612-3. Geography of American Cities.** Introduces geography of American cities. Includes demographic and ideological contexts of urban development, emergence of the city system, location theory and rent models, and urban-economic problems.

**GEOG 3662-3. Economic Geography.** Presents several theories of location of economic activity: general theory of land use, agricultural location theory, plant location theory, central place theory, location of systems of cities, and geographical organization of industries. Studies aggregate geographical structure of regions as the geography of three major markets: labor, product, and capital, including the banking system. Explores the economic growth of regions and policies designed to influence regional growth and welfare.

**GEOG 3672-3. Gender and the Global Economy.** Examines the role of gender in global economy. Explores the impacts of colonialism and modern global economy on gender relations, with particular emphasis on third world societies. Also focuses on related issues of population politics, environmental crisis, women's sexual exploitation, and women's social movements worldwide. Recommended prereqs., GEOG 1982, 1992, 2002, 2412, WMST 2000 or 2050. Same as WMST 3672. Approved for arts and sciences core curriculum: cultural and gender diversity.

**GEOG 3682-3. Geography of International Development.** Compares and contrasts global characteristics and processes of development, emphasizing the developing countries of the world. Integrates theories of development, specific development topics, and case studies to explore the problems of development.

**GEOG 3742-3. Place, Power, and Contemporary Culture.** Presents a radical reexamination of the geography of culture. Examines the relationship between places, power, and the dynamics of culture. Explores how the globalization of economics, politics, and culture shapes local cultural change. Looks at how place-based cultural politics both assist and resist processes of globalization. Recommended prereq., GEOG 1982, 1992, or 2002. Approved for arts and sciences core curriculum: contemporary societies.

**GEOG 3812-3. Mexico, Central America, and the Caribbean.** Introduces the geography of Latin America, focusing on the lands and peoples of Mexico, Central America, and the Caribbean. Examines regional and national culture, history, environment, and population, as well as ongoing environmental and socioeconomic changes.

**GEOG 3822-3. Geography of China.** Surveys the world's most populous country, examining physical and historical geography, urbanization and regional development, agriculture, population, energy, and the environment. Seeks to situate China's development in a broader Asian and global context. Recommended prereq., GEOG 1982. Approved for arts and sciences core curriculum: cultural and gender diversity.

**GEOG 3862-3. Geography of Africa.** Studies physical and cultural regions of Africa. Analyzes and compares natural and cultural regions and the development of present nation-states.

**GEOG 4292-3. Migration, Urbanization, and Development.** Examines historical and current patterns of national settlement system development. Focuses on quantitative analysis of problems associated with population growth and decline, urbanization, and economic structural change in more developed and less developed countries. Same as GEOG 5292 and ECON 4292.

**GEOG 4622-3. City Life.** Analyzes social, behavioral, political, and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities. Same as GEOG 5622. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4702-3. Digital Literacy and Citizenship.** Focuses on the relationships between digital literacy and citizenship. Investigates media and educational policies that shape civic competence and the uses to which new techniques are used by citizens and community organizations in activism and in serving citizens. Prereq., junior or senior standing.

**GEOG 4712-3. Political Geography.** Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts. Restricted to juniors and seniors. Same as GEOG 5712.

**GEOG 4722-3. Field Methods in Human Geography.** Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; and discussion of the politics, ethics and gender, race, class, and cross-cultural issues related to field work. Prereqs., 15 credit hours in human geography. Same as GEOG 5722.

**GEOG 4732-3. Population Geography.** Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution, and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations. Same as GEOG 5732.

**GEOG 4742-3. Environments and Peoples.** Studies the interaction of people and the environment, including human adaptation and modification of environments, cultural interpretation and construction of landscapes, and natural resources and land management. May be taken twice. Topics vary. Restricted to

junior and senior students. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4812-3. Environment and Development in South America.** Presents theoretical approaches to the links between environment and development in Latin America and focuses on analytical discussion of contemporary (and controversial) issues in sustainable development in South America. Examines social, ecological, economic, and political forces influencing the use of natural resources. Recommended prereq., GEOG 3812 or 3422. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4822-3. Environment and Development in China.** Examines key environmental problems in relation to China's rapid modernization and development. Recommended prereqs., GEOG 1982, 1992, and HIST 1608. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4882-3. Geography of the Former Soviet Union.** Offers a systematic and regional survey of features that characterize the physical, economic, and social geography of the former Soviet Union.

**GEOG 4892-3. Geography of Western Europe.** Provides a regional survey of cultural, political, economic, social, and physical geography of Western Europe, emphasizing the distinctive character and problems of each major area and the relationship of the region to the world. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 5152-3. History and Theory of Geography.** History of ideas and institutions that have shaped contemporary geographic inquiry. Examines the evolving relations among human geography, physical geography, environment-society relations, and geographic information processing. Designed to situate graduate student research within major subfields and intellectual currents of geography. Restricted to graduate students.

**GEOG 5222-3. Continuities and Changes in the Modern World Economy.** Introduces the topics of globalization and democratization from an interdisciplinary perspective. Examines major changes to global political economy and explores their implications for local, national, regional, and international political and economic processes. Restricted to graduate students in GEOG, PSCI, SOCY, or ECON. Same as PSCI 5223 and SOCY 5223.

**GEOG 5292-3. Migration, Urbanization, and Development.** Restricted to graduate students. Same as GEOG 4292 and ECON 4292.

**GEOG 5332-3. Globalization and Democratization.** Restricted to graduate students in GEOG, PSCI, SOCY, ECON. Same as PSCI 5333 and SOCY 5333.

**GEOG 5622-3. City Life.** Restricted to graduate students. Same as GEOG 4622.

**GEOG 5642-3. Seminar: Urban Geography.** Restricted to graduate students. Surveys current research topics in urban geography. Emphasizes definition of possible student thesis topics.

**GEOG 5712-3. Political Geography.** Restricted to graduate students. Same as GEOG 4712.

**GEOG 5722-3. Field Methods in Human Geography.** Restricted to graduate students. Same as GEOG 4722.

**GEOG 5732-3. Population Geography.** Restricted to graduate students. Same as GEOG 4732.

**GEOG 5762-3. Sustainable Development: Theory and Classic Issues.** Provides an assessment of sustainable development primarily as it relates to the Third World. Follows a sequence from development theory through facts, approaches, and goals. Investigates specific topical problems and closes with analyses of case studies. Restricted to graduate students.

**GEOG 5772-3. Sustainable Development: Institutions and Policy.** Investigates the links between social theory, development practice, and policy. Restricted to graduate students.

**GEOG 5782-3. Sustainable Development: Critique.** Investigates historical and contemporary theories and critiques of development and their implications for geographic theory and method. Focuses on the role of representation in evaluating case studies and examining the potential for a sustainable development. Prereq., graduate standing. Recommended prereq., GEOG 5762.

**GEOG 6402-3. Seminar: Comparative Environmental Studies.** Critically examines cross-cultural experience with adjustments to natural hazards and political management of resource exploitation. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6712-3. Seminar: Political Geography.** Considers in detail history and methodology of the field, including an analysis of selected systematic topics such as frontiers and boundaries, international rivers, conflicting claims to territory, and electoral geography. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6732-3. Formal Population Geography: Analysis and Forecasting.** Focuses on methods for describing, interpreting, and forecasting the spatial dynamics of human populations disaggregated by age and such state categories as different marital and labor force statuses. Prereq., GEOG 4023/5023 or equivalent. Restricted to graduate students.

**GEOG 6742-3. Seminar: Cultural Geography.** Explores various geographic topics emphasizing the concept of culture. Emergence of several points of view in the development of cultural geography. Restricted to graduate students. May be repeated up to 7 total credit hours.

## Techniques (Skills)

**GEOG 2043-3. Special Topics in Geography.** Covers various topics not normally covered in the curriculum. May be repeated up to 6 total credit hours within a term.

**GEOG 2053-4. Mapping a Changing World.** Overviews the vital role cartography plays in modern society and contemporary science. Includes fundamentals of reading and creating maps for research and enjoyment. Lab provides hands-on experience with computer-based methods for creating useful maps.

**GEOG 3023-4. Statistics for Earth Sciences.** Introduces parametric and distribution-free statistics, emphasizing applications to earth science problems. Not open to students who have taken a college-level statistics course. Restricted to junior and senior geography, geology, and environmental studies majors. Same as GEOL 3023.

**GEOG 3053-4. Cartography: Visualization and Information Design.** Introduction to the fundamentals of cartography—the science and art of map design. Emphasis on map projections, symbolization, and the design of maps with computers. Students produce series of thematic maps with modern computer-assisted techniques. Basic familiarity with computers strongly recommended. Restricted to junior or senior GEOG/ENVS majors.

**GEOG 3093-3. Geographic Interpretation of Aerial Photographs.** Emphasizes use of aerial and space photography in geographic research. Includes properties and systematic application of imagery in the photographable portion of the spectrum for the evaluation of urban, transportation, landform, and vegetation features. Restricted to junior and senior geography and environmental studies majors.

**GEOG 4023-3. Introduction to Quantitative Methods in Human Geography.** Introduces fundamental statistical and quantitative modeling techniques widely used in geography today. Emphasizes geographic examples and spatial problems, as are statistical routines now available on most computers. Prereq., GEOG 3023 or equivalent. Same as GEOG 5023.

**GEOG 4033-2. Quantitative Methods in Geography Laboratory.** Introduces the use of personal computers and statistical software in geographical analysis. Coreq., GEOG 4023. Same as GEOG 5033.

**GEOG 4043-4. Cartography 2: Interactive and Multimedia Mapping.** An advanced course in interactive, multimedia, animated, and Web-based cartography stressing the important role digital cartography plays in cyberspace. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects. Prereq., GEOG 3053. Same as GEOG 5043.

**GEOG 4083-4. Mapping from Remotely Sensed Imagery.** Acquaints students with mapping of spatial information from remotely sensed imagery, specifically high spatial resolution imagery (e.g., photography) in digital form. Emphasizes correction of 2- and 3-D geometric distortions, topographic influences, planimetric, topographic, and thematic mapping concepts. Prereqs., GEOG 3093, 4093, or equivalent. Restricted to junior and senior geography and environmental studies majors. Same as GEOG 5083.

**GEOG 4093-4. Remote Sensing of the Environment.** Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum. Same as GEOG 5093 and GEOL 4093, 5093.

**GEOG 4103-4. Introduction to Geographic Information Science.** Examines construction and use of an information system and its data specifically designed for representing and manipulating geographical data. Emphasizes modern geographical information systems including computer hardware/software with a collection of methods/procedures for recording, transforming, storing/retrieving, analyzing, and mapping geographic data. Prereq., GEOG 2053, 3053, or equivalent. Restricted to junior and senior geography and environmental studies majors. Same as GEOG 5103.

**GEOG 4173-3. Research Seminar.** Examines the nature of research and develops pregraduate skills for geographic research, emphasizing problem definition, methods, sources, data interpretation, and writing. Restricted to senior geography and environmental studies majors. Recommended for students pursuing honors. Approved for arts and sciences core curriculum: critical thinking.

**GEOG 4203-4. Geographic Information Science: Modeling Applications.** Extends basic GIS concepts and mechanics. Develop GIS models for human and environmental applications. Grid and vector data models, tessellated and hierarchical data structures, terrain representation, interpolation and kriging, spatial regression. Small group projects design, implement and run GIS models. Prereq., GEOG 4103/5103 or instructor consent. Recommended prereq., working knowledge of GIS software. Same as GEOG 5203.

**GEOG 4303-4. Geographic Information Science: Programming.** Focuses on interacting with geographic information systems (GIS) through programming languages. Topics covered include customization of the GIS graphic user interface (GUI), spatial data structures and algorithms, GIS system design, and principles of GIS database design. Prereq., GEOG 4103 OR 5103. Same as GEOG 5303.

**GEOG 4383-3. Methods of Vegetation Analysis.** Techniques of describing, sampling, classifying, and analyzing change in vegetation applied to a variety of local vegetation types. Involves field trips and laboratory work. Prereq. or coreq., GEOG 4371. Same as GEOG 5383.

**GEOG 4983 (1-3). Field Problems.** Selected geographic problems investigated through intensive, instructor-directed field work. The instructor and the problem(s) vary and are announced. May be repeated up to 12 total credit hours. Same as GEOG 5983.

**GEOG 5003-4. Elements of Geographic Information Systems.** Discusses incorporating GIS methods into graduate thesis or dissertation research. Reviews basic mapping concepts (scale and projections), acquiring different types of spatial data (raster and vector), building an error-free database, making simple queries, overlays, charts, and maps. Intended for students who want to learn GIS but lack background skills in computing or cartography. Recommended prereq., some experience with Mac or Windows. Restricted to graduate students.

**GEOG 5023-3. Introduction to Quantitative Methods in Geography.** Restricted to graduate students. Same as GEOG 4023.

**GEOG 5033-2. Quantitative Methods in Geography Laboratory.** Restricted to graduate students. Same as GEOG 4033.

**GEOG 5043-4. Cartography 2: Interactive and Multimedia Mapping.** Restricted to graduate students. Same as GEOG 4043.

**GEOG 5083-4. Mapping from Remotely Sensed Imagery.** Restricted to graduate students. Same as GEOG 4083.

**GEOG 5093-4. Remote Sensing of the Environment.** Restricted to graduate students. Same as GEOG 4093 and 5093.

**GEOG 5103-4. Geographic Information Systems.** Prereq., instructor consent. Restricted to graduate students. Same as GEOG 4103.

**GEOG 5113-3. Seminar: Geographic Information Systems.** Focuses on the current research topics in geographical information systems and selected areas of application. Includes major journal articles related to each topic. Students complete and present a seminar paper. Prereq., GEOG 4103, 5103, or instructor consent. Restricted to graduate students.

**GEOG 5183-3. Data Processing in the Earth Sciences.** Restricted to geography graduate students. Same as GEOL 5183.

**GEOG 5203-4. Geographic Information Science: Modeling Applications.** Prereq., GEOG 4103/5103 or instructor consent. Restricted to graduate students. Recommended prereq., working knowledge of GIS software. Same as GEOG 4203.

**GEOG 5303-4. Geographic Information Science: Programming.** Same as GEOG 4303.

**GEOG 5383-3. Methods of Vegetation Analysis.** Restricted to graduate students. Same as GEOG 4383.

**GEOG 5983 (1-3). Field Problems.** Restricted to graduate students. May be repeated up to 7 total credit hours. Same as GEOG 4983.

**GEOG 6443-2. Remote Sensing Field Methods.** Theory and practical field measurements for validation of airborne and spaceborne spectral image acquisition. Emphasizes radiative scattering properties of soil, vegetation, cryosphere, and atmosphere. Also focuses on characterization and calibration of instrumentation to measure these properties. Restricted to graduate students. Prereqs., GEOL/GEOG 4093/5093. Recommended prereq., GEOL 5240. Same as GEOL 6440 and EBIO 6440.

## Political Data

**GEOG 5095-3. Advanced Political Data Analysis.** Restricted to graduate students. Same as GEOG 7095, PSCI 5095/7095.

**GEOG 7095-3. Advanced Political Data Analysis.** Provides advanced training in empirical and analytic methods of political analysis. Covers general multivariate linear (regression) model as employed in political science. Also covers a variety of dynamic approaches to empirical analysis (stochastic models, time series, and simulation). Restricted to graduate students. Prereq., instructor consent. Same as GEOG 5095, PSCI 5095 and 7095.

## Geological Sciences

**GEOL 1010-3. Introduction to Geology 1.** Introductory geology for majors and nonmajors. Studies the Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. Separate lab (GEOL 1030) is optional. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**GEOL 1020-3. Introduction to Geology 2.** Introductory geology for majors and nonmajors. Studies evolutionary history of the Earth and life. Separate lab (GEOL 1030) is optional. Prereq., GEOL 1010. Approved for arts and sciences core curriculum: natural science.

**GEOL 1030-1. Introduction to Geology Laboratory 1.** Features field trips to local points of geologic interest. Studies rocks and topographic and geologic maps. Prior or current registration in 1000-level geology recommended. Meets MAPS requirements for natural science lab, if taken with GEOL 1010. Approved for arts and sciences core curriculum: natural science. Formerly GEOL 1080.

**GEOL 1060-3. Global Change 1—An Earth Science Perspective.** Lect. Surveys the problems of global change. Emphasizes the Earth as an interlocking system consisting of the lithosphere, hydrosphere (including snow and ice), and atmosphere. Discusses circulation and interaction of these components, as well as geological evidence for environmental changes in the recent past and prospect for future change. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**GEOL 1070-3. Global Change 2—An Earth Science Perspective.** Lect. Surveys the problems of global change. Emphasizes changes occurring in the oceans, atmosphere, and freshwater reservoirs from an earth science perspective. Topics include greenhouse warming of the atmosphere, acid rain, coastal erosion, and controlling bio-geochemical cycles. Prereq., GEOL 1060. Approved for arts and sciences core curriculum: natural science.

**GEOL 1110-1. Global Change Laboratory.** Optional laboratory for GEOL 1060 or 1070, featuring field excursions and laboratory exercises on topics such as solid waste management, flooding, climate change, desertification, and water treatment. Approved for arts and sciences core curriculum: natural science.

**GEOL 1600-4. Order, Chaos, and Complexity.** Develops the foundations for understanding new ideas in science, focusing on fractals, and chaos in complex interacting systems. Topics include the historical perspective, fractal geometry, complex nonlinear systems, and the nature of uncertainty. Same as PHYS 1600. Approved for arts and sciences core curriculum: natural science, or quantitative reasoning and mathematical skills.

**GEOL 2100-3. Environmental Geology.** Introduces the influences of geologic processes on human lives and the changes human actions cause in geologic systems. Uses examples and case studies from Colorado and the West. Approved for the arts and sciences core curriculum: natural science.

**GEOL 2110-4. Physical Science of the Earth System.** Covers basic concepts of physics and chemistry, taught in the context of Earth and space science. Small class size and emphasis on student investigations, lab and field work, and active learning make this course particularly appropriate for future K-6 teachers. Prereq., two high school science courses (college prep level). Same as ARSC 2110. Approved for arts and sciences core curriculum: natural sciences.

**GEOL 2700-2. Introduction to Field Geology.** Introduces basic field techniques necessary to collect geologic data and samples, and necessary to map geologic units. Prereqs., GEOL 1010 and 1020; or GEOL 1060 and 1070; or GEOG 1001 and 1011.

**GEOL 3010-3. Introduction to Mineralogy.** Two lects. and one lab per week. Origin, occurrence, identification, classification, and uses of minerals. Applications of mineralogy to economic geology and petrology are emphasized. Prereq., CHEM 1111 and MATH 1300.

**GEOL 3020-3. Petrology.** Field relations, petrography, petrology, chemistry, and origins of igneous and metamorphic rocks are studied by means of lectures, reading, and lab and field experience. Labs include instruction in the fundamentals of optical petrography and the study of rocks in thin section. Prereq., GEOL 3010.

**GEOL 3023-4. Statistics for Earth Sciences.** Introduces parametric and distribution-free statistics, emphasizing applications to earth science problems. Same as GEOG 3023.

**GEOL 3030-3. Introduction to Hydrogeology.** Introduces groundwater flow concepts, hydrologic cycle, physical and chemical properties, flow net, hydraulic potential, geologic controls on heterogeneity and anisotropy, aquifers and aquitards in a geologic system, saturated and unsaturated flow, flow to a well, pumping tests, and role of groundwater in geologic processes. Prereqs., GEOL 1010 or 1060, and MATH 1300; or instructor consent.

**GEOL 3040-3. Global Change: The Recent Geological Record.** Geological records in lakes, oceans, deserts, and around glaciers indicate the significant changes in the global system that have taken place over the last few hundred or thousand years. Explores the timing and nature of these changes. Prereqs., any two-course sequence of natural science core courses. Approved for arts and sciences core curriculum: natural science.

**GEOL 3050-2. Computer-Assisted Geologic Techniques.** Methods for computing, analyzing, and graphing geologic data using microcomputers. Prereq., two semesters of 1000-level geology.

**GEOL 3070-3. Introduction to Oceanography.** Surveys ocean features and processes including ocean water, circulation, sediments, structure, faunas, floras, and history of the ocean basins. Prereq., any two-course sequence of natural science courses. Approved for arts and sciences core curriculum: natural science.

**GEOL 3120-4. Structural Geology.** Geometrical techniques for describing and illustrating geological structures. Major topics include graphic methods and geometry of fractures and folds. Prereqs., any 1000-level sequence in geological sciences.

**GEOL 3300-3. Extraterrestrial Life.** Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth, possibility of life elsewhere in the solar system (including Mars), and the possibility of life on planets around other stars. Prereq., one-year sequence in a physical science. Same as ASTR 3300.

**GEOL 3320-3. Introduction to Geochemistry.** Introduces chemical principles as applied to geologic processes. Includes an introductory discussion of mineral and rock chemistry, aqueous geochemistry, and organic geochemistry. Prereqs., CHEM 1111 and MATH 1300.

**GEOL 3410-3. Paleobiology.** Surveys morphology, ecology, and evolution of ancient animal and plant life and their interactions with the Earth. Fossils used to solve geological and biological problems. Prereqs., any 1000-level sequence in geological science or environmental, population, and organismic biology or instructor consent.

**GEOL 3430-4. Sedimentology and Stratigraphy.** Introduces the study of sedimentary rocks emphasizing their origin, characteristics, and interpretation; and the principles and techniques for establishing the temporary order and spatial distribution of sedimentary layers. Prereqs., any 1000-level sequence in geological sciences or equivalent.

**GEOL 3500-3. Mineral Resources, World Affairs, and the Environment.** Covers the geology of mineral resource deposits: metals, nonmetals, fuels, mineral

economics, practical prospecting for mineral deposits, and the environmental impact of mineral extraction. Prereq., GEOL 1010 or 1060. Approved for arts and sciences core curriculum: natural science.

**GEOL 3520-3. Environmental Issues in Geosciences.** Addresses current environmental problems in which an understanding of geology is needed. Topics include energy resources, climate modification, hydrology, waste disposal, and mining resources. Specific examples used to illustrate restrictions imposed by nature and man on solutions to these problems. Prereq., a two-course sequence in any natural science. Same as ENV5 3520. Approved for arts and sciences core curriculum: natural science.

**GEOL 3720-3. Evolution of Life: The Geological Record.** Discusses the evolution of life on Earth, beginning with the earliest origins and surveying the major steps that led to the rise of higher plants and animals. Covers modern ideas on the causes of periodic mass extinctions in both the marine and terrestrial realms. Emphasizes geologic evidence for the pathways of evolution, using examples from the ordinary to the bizarre. Approved for arts and sciences core curriculum: natural science.

**GEOL 3930 (1-6). Internship.** Offers an academically supervised opportunity for geological sciences majors to work with public or private organizations. Projects are usually associated with students' career goals; each project has an academic emphasis. Prereq., junior standing and completion, with a B or better, of at least two courses for geology majors.

**GEOL 3950-3. Natural Catastrophes and Geologic Hazards.** Surveys historic and prehistoric natural disasters, their cause, and potential for recurrence. Meteorite impact, earthquakes, volcanic eruptions, tsunamis, landslides, floods, magnetic reversals, and major extinction events. Course formerly numbered as GEOL 4950. Prereq., one year science. Approved for arts and sciences core curriculum: natural science.

**GEOL 4060-4. Oceanography.** Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data. Prereq., one semester chemistry, physics, or geology. Same as GEOL 5060.

**GEOL 4080-3. Societal Problems and Earth Sciences.** Analyzes contemporary societal problems involving geoscience. One class period per week is generally devoted to lecture. During class discussions the professor acts as scientific advisor while students debate material they have researched. Prereqs., one year of calculus and one year of natural science (physics, chemistry, biology) or equivalent, or instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**GEOL 4093-4. Remote Sensing of the Environment.** Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors, as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum. Same as GEOL 5093 and GEOG 4093.

**GEOL 4100-3. X-Ray Crystal Chemistry.** Topics in physics and chemistry of minerals are covered, particularly crystal structure control on chemical substitution and order-disorder phenomena. Laboratory covers methods of mineral identification and characterization by x-ray powder and single-crystal diffraction. Prereqs., GEOL 3010 and MATH 2300. Same as GEOL 5100.

**GEOL 4130-3. Principles of Geophysics.** Students are introduced to fundamental geophysics including seismology, geomagnetism, gravity, radiometric dating, and heat flow with applications to plate tectonics and exploration of the subsurface. Prereqs., MATH 1300 and PHYS 1110 and any 1000-level sequence in geological sciences; GEOL 3120 recommended.

**GEOL 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere; and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as ENV5 4160 and EBIO 4160.

**GEOL 4200-3. Advanced Mineralogy.** Covers topics in crystal chemistry of major rock-forming mineral groups, specifically reactions, transformations, deformations, and geothermometry and geobarometry based on inter- and intracrystalline element distributions in these major mineral groups. Prereq., GEOL 4100 or 5100. Same as GEOL 5200.

**GEOL 4241-4. Principles of Geomorphology.** Systematic study of weathering, mass wasting, fluvial, and marine processes and the resulting landforms. Prereqs., any 1000-level sequence in geological sciences or GEOG 1001 and 1011. Same as GEOG 4241. Approved for arts and sciences core curriculum: natural science.

**GEOL 4250-4. Introduction to Ore Deposits.** Surveys processes of ore formations, with examples drawn from selected districts. Field trips to representative deposits. Prereq., GEOL 3010. Same as GEOL 5250.

**GEOL 4291 (3-4). Mountain Geomorphology.** Field course emphasizing study of landforms produced by weathering and soils, mass movement, and erosional processes under all climactic and altitudinal conditions. Offered during the summer at the Mountain Research Station. Prereqs., a college course in physical geography or geology, and instructor consent. Same as GEOL 5291 and GEOG 4291.

**GEOL 4360-3. Glacial Geology.** Introduces glaciology, glacial influence on topography, crustal rebound, and sea level, and glacial chronology for northern North America. Prereq., any 1000-level sequence of geological sciences or instructor consent. Same as GEOL 5360.

**GEOL 4470-4. Paleontology of the Lower Vertebrates.** Focuses on the evolution of the nonmammalian vertebrates emphasizing evolutionary development of major vertebrate features. Prereqs., GEOL 3410, one year of biology, and one year of geology. Same as GEOL 5470.

**GEOL 4480-4. Paleontology of the Higher Vertebrates.** Examines the evolution of mammals and birds emphasizing evolutionary history of modern and prominent fossil orders. Prereq., GEOL 3410, one year of biology, one year of geology, or instructor consent. Same as GEOL 5480.

**GEOL 4500-3. Critical Thinking in the Earth Sciences.** Deals with controversies within the broad realm of geological sciences, including either planetary geology, evolution, paleobiology, global change, environmental issues, plate tectonics, resources, other societal problems, or geologic thought in general. Students are provided the opportunity to analyze and debate scientific issues in the earth sciences. Prereq., any 1000-level science sequence. May be repeated up to 6 total credit hours. Approved arts and sciences core curriculum: critical thinking.

**GEOL 4540-4. Petroleum Geology.** Covers theoretical and applied aspects of petroleum geology and geochemistry. Discusses organic geochemistry, time-temperature models, migration, trapping mechanisms, log analysis, application of facies models in the subsurface, and reservoir geology. Prereqs., course work in structure, stratigraphy, sedimentology, deposits, environment, physics, and chemistry. Same as GEOL 5540.

**GEOL 4640-3. Glaciology.** Explores ice physics, snow, glaciers, floating ice, ice in the ground and in the solar system. Emphasizes glaciers and ice sheets, including reconstruction of past glaciations and impacts of ice and snow on society. Prereq., MATH 1300. Same as GEOL 5640.

**GEOL 4670-3. Isotope Geology.** Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic, and sedimentary petrology, geobiochemistry, and petroleum genesis. Prereqs., CHEM 1131, MATH 1300, and GEOL 3020. Same as GEOL 5670.

**GEOL 4700 (1-4). Special Geological Topics.** Studies in selected geological subjects of special current interest (for undergraduates). May be repeated up to 9 total credit hours within a term. Prereq., instructor consent. Restricted to juniors and seniors.

**GEOL 4711-2. Igneous and Metamorphic Field Geology.** Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units. Prereqs., GEOL 2700 and 3020.

**GEOL 4712-2. Structural Field Geology.** Methods of field study of structure of rocks, including observations, data collection, and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps, and compass and tape. Prereqs., GEOL 2700 and 3120.

**GEOL 4713-2. Field Techniques in Stratigraphic Sciences.** Methods of field study of sedimentary rocks and fossils, including observation of lateral and vertical variations, data collection, and interpretation. Field projects include description of stratigraphic sections, mapping at a variety of scales, and data synthesis into cohesive two- and three-dimensional interpretations. Prereqs., GEOL 2700 and 3430.

**GEOL 4714-2. Field Geophysics.** Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic, and electrical measurements. Prereqs., GEOL 2700, MATH 1300, PHYS 1110, or instructor consent.

**GEOL 4715-2. Field Techniques in Surficial Geology and Geohydrology.** Field mapping and description of a variety of surficial deposits and soils in various environments (moraines and terraces) and estimating their age relations. Also techniques for surface and ground water field measurements: mapping water tables, measuring stream flows, conducting pump tests, and collecting water samples. Prereqs., GEOL 2700, 3030, or GEOG 3511, and GEOL/GEOG 4241 or GEOL 3430.

**GEOL 4716-2. Environmental Field Geochemistry.** Develops basic field skills in the most commonly performed tasks required for the environmental characterization of solid and aqueous wastes. Media of study include soils, stream sediments, surface waters, ground waters, and atmospheric particulates. Prereqs., GEOL 2700 and CHEM 1011/1031, or CHEM 1051/1071, or CHEM 1111/1131, or CHEM 1151/1171.

**GEOL 4717-2. Field Seminar in Geology and Tectonics.** Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S. Prereqs., GEOL 2700 and one or more of GEOL 3120, 3320, or 3430.

**GEOL 4718-2. Paleoenvironmental Field Techniques.** Provides experience in field techniques used to reconstruct paleoenvironments, including sediment coring and cataloging. Emphasis on glacial, lacustrine, bog, soil, and cave environments. Prereqs., one year introductory geology or other environmental science and GEOL 2700.

**GEOL 4719-2. Field Mapping of Mineral Deposits.** Maps mineral deposits, primarily in underground mines of the Colorado Front Range. Emphasizes techniques of mapping structure, petrology, wall-rock alteration, and three-dimensional nature of ores. Results are compiled on level plans and cross-sections. Prereq., GEOL 2700. Recommended prereqs., GEOL 3010 and 4250.

**GEOL 4840-4849 (1-3). Independent Study in Geology.** Time and credit to be arranged. Numbered GEOL 4840 through GEOL 4849. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated up to 7 total credit hours.

**GEOL 4960-1. Writing in Geosciences.** Emphasizes strategies of literature research and scientific writing in the geosciences. Includes small writing assignments and a larger library research paper. Prereq., 15 hours of upper-division course work in geological sciences.

**GEOL 4990 (1-3). Honors Thesis.** Supervised project involving original research in any area of the geological sciences. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. The candidate must have a cumulative GPA of 3.30 or better and must be accepted by the departmental honors committee.

## Graduate Courses

**GEOL 5010-3. Computational Methods in Geosciences.** Numerical method application to the study of deformation of geological materials, fluid flow, diagenesis, thermal convection, and solute transport. Covers finite difference, finite element, integrated finite difference, boundary element methods, and method of characteristics. Includes computer modeling of geologic problems.

**GEOL 5060-4. Oceanography.** Same as GEOL 4060.

**GEOL 5070-3. Advanced Sedimentology.** Goal is to be able to more fully interpret the stratigraphic record. First half of the course studies fluid flow, sediment transport, and resultant bedforms. Second half focuses on carbonates, biological and chemical processes, and the resultant sedimentary products. Prereq., GEOL 3430.

**GEOL 5080-3. Advanced Hydrogeology and Modeling Concepts.** Introduces advanced groundwater flow and modeling concepts, equations for steady state and transient flow, saturated and unsaturated flow, finite difference method, application of modeling in geologic processes, radial flow and aquifer parameters, infiltration and groundwater recharge, model calibration, verification, and prediction. Prereqs., MATH 2300, FORTRAN, or instructor consent.

**GEOL 5093-4. Remote Sensing of the Environment.** Same as GEOL 4093 and GEOG 5093.

**GEOL 5100-3. X-Ray Crystal Chemistry.** Same as GEOL 4100.



**GEOL 5183-3. Data Processing in the Earth Sciences.** Advanced statistical analysis, multivariate statistics, time series, classification models. Prereq., GEOL 3023 or instructor consent. Same as GEOG 5183.

**GEOL 5200-3. Advanced Mineralogy.** Same as GEOL 4200.

**GEOL 5240-4. Remote Sensing Image Analysis.** Digital image processing emphasizing hands-on computer analysis of space-acquired images. Theory and practice of image enhancement and thematic information extraction. Knowledge of multivariate statistics recommended. Prereq., GEOG 4093 or 5093, GEOL 4093 or 5093.

**GEOL 5250-4. Introduction to Ore Deposits.** Same as GEOL 4250.

**GEOL 5280-3. Principles of Aqueous Geochemistry.** Composition and origin of natural waters. Principles relating to reactions between rock materials and water. Discusses natural waters, ionic equilibria, and computer methods. Prereq., one year of college chemistry.

**GEOL 5291 (3-4). Mountain Geomorphology.** Same as GEOL 4291 and GEOG 5291.

**GEOL 5360-3. Glacial Geology.** Same as GEOL 4360.

**GEOL 5410-3. Ancient Sedimentary Environments.** Analysis of sedimentary rock sequences, sedimentary environments, and stratigraphic synthesis. Prereq., GEOL 3430.

**GEOL 5420-3. Quaternary Dating Methods.** In-depth survey of standard and experimental dating methods that provide absolute ages for events of the last two million years of Earth history. Includes theory and application of radiocarbon, uranium series, amino acid, thermo-luminescence, fission track, potassium/argon, hydration, light stable isotopes, and other radioactive techniques.

**GEOL 5470-4. Paleontology of the Lower Vertebrates.** Same as GEOL 4470.

**GEOL 5480-4. Paleontology of the Higher Vertebrates.** Same as GEOL 4480.

**GEOL 5490-3. Geochemistry of Hydrothermal Ore Deposits.** Laboratory studies, thermodynamic data, chemical data, fluid inclusions, stable isotopes, and field occurrences are all used to explain composition, origin, and history of hydrothermal ore deposits. Prereq., GEOL 4250/5250 or equivalent, or instructor consent.

**GEOL 5540-4. Petroleum Geology.** Same as GEOL 4540.

**GEOL 5610-2. Mammalian Micropaleontology.** Studies mammalian microfossils. Methods of analysis, collection, and use in stratigraphic problems such as correlation, paleoecology, and earth history. Prereq., instructor consent.

**GEOL 5640-3. Glaciology.** Prereq., calculus. Same as GEOL 4640.

**GEOL 5650-3. Carbonate Sedimentary Environments.** Examines recognition and interpretation of modern and ancient carbonate sedimentary environments through the analysis of fauna, texture, sedimentary structures, and primary geochemistry. Emphasizes eustatic sea level and climatic controls. Prereqs., GEOL 3410 and 3430.

**GEOL 5670-3. Isotope Geology.** Same as GEOL 4670.

**GEOL 5680-3. Global Tectonics.** Studies geological and geophysical aspects of plate motions along accretionary transforming, subducting, and collisional margins. Relationships of sedimentation, volcanism, metamorphism, and deformation to mountain building are studied in conjunction with examination of type areas. Prereq., graduate standing or instructor consent.

**GEOL 5700 (1-4). Geological Topics Seminar.** Seminar studies in geological subjects of special current interest are offered primarily for graduate students, as departmental staff and facilities permit. May be repeated up to 9 total credit hours.

**GEOL 5711 (1-3). Igneous and Metamorphic Field Geology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5712 (1-3). Structural Field Geology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5713 (1-3). Field Techniques in Stratigraphic Sciences.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5714 (1-3). Field Geophysics.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5715 (1-3). Field Techniques in Surficial Geology and Geohydrology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5716 (1-3). Environmental Field Geochemistry.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5717 (1-3). Field Seminar in Geology and Tectonics.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5718 (1-3). Paleoenvironmental Field Techniques.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5719 (1-3). Field Mapping of Mineral Deposits.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5800-3. Planetary Surfaces and Interiors.** Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors, and the integrated geologic histories of the terrestrial planets and satellites. Prereq., graduate standing in physical sciences or instructor consent. Same as ASTR 5800.

**GEOL 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Includes the origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres—past and future. Same as ATOC 5810 and ASTR 5810.

**GEOL 5820-3. Origin and Evolution of Planetary Systems.** Considers the origin and evolution of planetary systems, including protoplanetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings, and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies. Prereq., graduate standing in physical sciences or instructor consent. Same as ASTR 5820 and ATOC 5820.

**GEOL 5830-3. Topics in Planetary Science.** Current topics in planetary science, based on recent discoveries, spacecraft observations, or other developments. Focuses on a specific topic each time it is offered, such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be repeated up to 6 total credit hours, provided the topics vary. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC/ASTR 5830.

**GEOL 5835-1. Seminar in Planetary Science.** Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent. Same as ATOC 5835 and ASTR 5835.

**GEOL 5840–5851 (1-3). Graduate Independent Study.** Numbered GEOL 5840 through GEOL 5851. May be repeated up to 7 total credit hours.

**GEOL 6060-4. Petroleum Geology of Turbidite Systems.** Covers the exploration and production aspects of petroleum submarine fans and turbidite systems. A one-week field trip to Arkansas is included. Students are responsible for part of the trip expenses. Prereq., GEOL 6330.

**GEOL 6241 (1-3). Seminar in Hydrology and Geomorphology.** Emphasizes process-oriented research in hydrology and geomorphology. Sample topics include river mechanics, snow hydrology, and periglacial processes. Same as GEOG 6241. May be repeated up to 6 total credit hours.

**GEOL 6310-3. Sedimentary Petrology.** Interpretation of depositional and diagenetic history of sedimentary rocks as determined from thin-section studies. Prereqs., GEOL 3010, 3020, and 3430.

**GEOL 6330-4. Applied Sequence Stratigraphy and Basin Analysis.** Develops skills in the stratigraphic interpretation of seismic reflection data, recognition of sequence stratigraphy in well logs and outcrop, and their applications to

basin analysis in petroleum exploration. Prereqs., graduate standing, introductory undergraduate physics, and sedimentology/stratigraphy.

**GEOL 6440-2. Remote Sensing Field Methods.** Theory and practical field measurements for validation of airborne and spaceborne spectral image acquisition. Emphasizes radiative scattering properties of soil, vegetation, cryosphere, and atmosphere. Characterization and calibration of instrumentation to measure these properties. Prereqs., GEOL/GEOG 4093/ 5093. Recommended prereq., GEOL 5240. Same as GEOG 6443 and EBIO 6440.

**GEOL 6610-3. Earth and Planetary Physics 1.** Offered alternate years. Mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Inversion of seismic data for the structure, composition, and state of the interior of the Earth. Same as ASTR 6610 and PHYS 6610.

**GEOL 6620-3. Earth and Planetary Physics 2.** Offered alternate years. Space and surface geodetic techniques, as well as potential theory, are covered. Other topics are definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; tides and the rotation of the Earth. Same as ASTR 6620 and PHYS 6620.

**GEOL 6630-3. Earth and Planetary Physics 3.** Offered alternate years. The solar system: theories of its origin, meteorites. Distribution of radioactive materials; age dating. Heat flow through continents and the ocean floor; internal temperature distribution in the Earth; mantle convection. Origin of the oceans and atmosphere. Same as ASTR 6630 and PHYS 6630.

**GEOL 6640-3. Introduction to Planetary Science.** Overview of the nature of the solar system. Topics include geologic processes and histories of solid planets, planetary chemistry, interiors, and atmospheres, the outer planets, planetary rings, comets and asteroids, extrasolar planets, and formation of the solar system. Prereqs., graduate standing in a physical science and basic undergraduate physics. Same as ASTR 6640.

**GEOL 6650 (1-3). Seminar in Geophysics.** Advanced seminar studies in geophysical subjects for graduate students. Same as ASTR 6650 and PHYS 6650. May be repeated up to 6 total credit hours.

**GEOL 6670-2. Geophysical Inverse Theory.** Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure, and earthquake locations. Prereqs., calculus and computer programming (any language). Same as PHYS 6670.

**GEOL 6940-3. Master's Degree Candidate.**

**GEOL 6950 (1-6). Master's Thesis.**

**GEOL 6960-3. Plan II Master's Research.**

**GEOL 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Germanic and Slavic Languages and Literatures

### German

**GRMN 1010-4. Beginning German 1.** For students with no previous training in German.

**GRMN 1020-4. Beginning German 2.** Prereq., GRMN 1010 with a grade of C- or better.

**GRMN 1500-3. German for Reading Knowledge.** Designed especially for graduate students. Emphasizes analytical skills for acquiring reading proficiency in specialized and technical German in one's field of research. Recommended for pass/fail registration. Does not satisfy the arts and sciences foreign language requirement. Does not count towards the German major.

**GRMN 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**GRMN 2010-4. Intermediate German 1.** Review and continuation of basic skills begun in the first year: reading, writing, speaking, and oral comprehension. Prereq., GRMN 1020 with a grade of C- or better. Meets MAPS requirement for foreign language. Satisfies arts and sciences language requirement.

**GRMN 2020-4. Intermediate German 2.** Prereq., GRMN 2010 with a grade of C- or better.

**GRMN 2050 (2-4). Intermediate German: Conversation.** For students who wish supplementary conversational practice at the third-semester level. Students may take this course concurrently with GRMN 2010. May be repeated up to 8 total credit hours. Prereq., GRMN 1020 or equivalent. Does not count towards the German major. Does not satisfy the arts and sciences foreign language requirement.

**GRMN 2220-4. Scientific German.** Prereq., GRMN 2010 or equivalent, or instructor consent.

**GRMN 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**GRMN 3010-3. Advanced Conversation and Grammar.** Reviews special grammatical topics, reading, and conversation. Students have the option of taking the internationally recognized exam *Zertifikat Deutsch* in GRMN 3010. Prereq., four semesters of college German or equivalent. Open to freshmen with instructor consent.

**GRMN 3020-3. Professional German.** Emphasizes practical communications and correspondence and professional transactions. With option to take Goethe-Institute-sponsored *Pruefung Deutsch fuer den Beruf*. Prereq., GRMN 3010 or equivalent, or instructor consent.

**GRMN 3110-3. German Literature from 1910 to the Present.** Examines selected literary texts. Emphasizes longer unedited texts as well as critical skills. May be taken either before or after GRMN 3120. Prereq., GRMN 2020 or equivalent, or instructor consent.

**GRMN 3120-3. Modern German Literature from 1750 to 1910.** Examines selected literary texts of various periods. Emphasizes longer texts and critical skills. May be taken either before or after GRMN 3110. Prereq., GRMN 2020 or equivalent, or instructor consent.

**GRMN 3140-3. Current Issues in German Literature.** Examines issues pervading contemporary German literature, such as concerns of youth, gender, stereotyping as it affects women and men in their relations with one another, loneliness and sexual frustration, work experiences, and other issues. Prereq., ability to read unedited German and to speak German.

**GRMN 3520-3. Open Topics in the Cultural Context.** Examines topics in the cultures of German-speaking central Europe. Contact the departmental office for specific course offerings. May be repeated up to 6 total credit hours when topic varies. Prereq., GRMN 3020 or equivalent, or instructor consent.

**GRMN 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**GRMN 3930 (1-6). Internship.** Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. May be repeated up to 6 total credit hours. Restricted to junior and senior GRMN majors and minors.

**GRMN 4010-3. Advanced Grammar, Stylistics, and Conversation.** Offers a complete final review of German grammar and syntax and its more complex aspects. Prepares students for the *Zentrale Mittelstufenpruefung* of the Goethe Institute. Prereq., GRMN 3020 or instructor consent.

**GRMN 4030-3. Business German.** Develops the more sophisticated language skills required by employees of German organizations and foreign business persons who wish to transact business with German firms. Examines current issues in German business. With option to take the Goethe Institute-sponsored *Pruefung Wirtschaftsdeutsch International*. Prereq., GRMN 3020 or instructor consent.

**GRMN 4100-3. Applied Linguistics.** Introduces the study of language and its applications to the teaching of German. Analysis of phonology, grammatical structure, and vocabulary of German and English for high school and college teachers of German.

**GRMN 4330-3. The Age of Goethe.** German literature from 1770 to 1830. Close examination of representative texts from the periods of Sturm und Drang, classicism, and romanticism. Emphasizes philosophical and social background. Prereq., GRMN 3020 or instructor consent.

**GRMN 4340-3. Seminar in German Literature.** Intensive study of a particular literary period, author, or genre. Secondary sources are used. Course content differs each time. May be repeated up to 6 total credit hours when topic varies. Prereq., GRMN 3020 or instructor consent.

**GRMN 4370-3. Introduction to German Literary History 1.** Examines main currents in German literature, including the Middle Ages, the Renaissance, Baroque, and early classicism. Prereq., GRMN 3020 or instructor consent.

**GRMN 4380-3. Introduction to German Literary History 2.** Continuation of GRMN 4370. From 1750 to the present. Covers Weimar classicism, romanticism, realism, naturalism, and currents of the 20th century. Prereq., GRMN 3020 or instructor consent.

**GRMN 4450-3. Methods of Teaching German.** Required of students who desire the recommendation of the department for secondary school teaching positions. For student teaching in German, see EDUC 4712 under the School of Education. Restricted to students who have been admitted to the teacher education program in the School of Education.

**GRMN 4460-6. High School German Teaching.** Part of the supervised student teaching in a secondary school required for state certification to teach German. Restricted to students who have been admitted to the teacher education program in the School of Education.

**GRMN 4550-3. Senior Seminar: The Roles of Intellectuals and Academics in German Culture.** Examines the articulation of the German bourgeoisie during critical periods in German history. Looks at specific groups and their participation in German public culture, e.g., writers, artists, journalists, academics, and political figures. Students work closely with a faculty advisor during the semester and are expected to produce a major research paper. Prereq., GRMN 3020 or instructor consent. Restricted to senior GRMN majors. Approved for arts and sciences curriculum: critical thinking.

**GRMN 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

### *German Courses Taught in English*

**GRMN 1601-3. Introduction to Modern German Culture and Civilization.** Introduces the culture of contemporary German-speaking central Europe, examining historical processes, social and political patterns, and the intellectual and artistic responses to problems of the 20th century. Approved for arts and sciences core curriculum: contemporary societies.

**GRMN 1602-3. Metropolis and Modernity.** An interdisciplinary introduction to the modern industrial city in Europe and the USA, with particular attention to the representation of urbanism in the visual arts. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 1603-3. Should I or Shouldn't I: Ethical Dilemmas in the Modern World.** Examines the moral dilemmas that arise when opportunities afforded by basic freedoms or advances in technology clash with the ethical imperatives that issue from the Enlightenment and the social contract. Guiding questions include: When does the quest for knowledge legitimate transgression of prevailing morality? By what standard do we adjudicate the ambitions of the individual when they compete with the interests of the state? Taught in English. Approved for art and sciences core curriculum: ideals and values.

**GRMN 2501-3. 20th-Century German Short Story.** Short stories by Thomas Mann, Kafka, Boell, and Grass, such as *Death in Venice*, *Metamorphosis*, and *Cat and Mouse*. Emphasizes literary themes, their traditions, and their cultural significance. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 2502-3. Representing the Holocaust.** Examines how the memory of the Holocaust in Nazi Germany is increasingly determined by the means of its representation, e.g., film, autobiography, poetry, architecture. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 3201-3. German and Russian Culture in Comparative Perspective.** Comparative overview of the evolution of German and Russian civilizations in the social, political, religious, and cultural spheres. Taught in English. Same as RUSS 3201. Approved for arts and sciences core curriculum: historical context.

**GRMN 3501-3. German-Jewish Writers: From the Enlightenment to the Present.** Provides insight into the German-Jewish identity through essays, autobiographies, fiction, and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Approved for arts and sciences core curriculum: cultural and gender diversity.

**GRMN 3502-3. Literature in the Age of Goethe.** Features the writings of Germany's major literary figures from 1749 to 1832. Special attention is paid to the formation of literary periods, genres, aesthetic, and socio-historical developments contributing to the birth of modernism in German intellectual history and literature. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 3503-3. German Film and Society 1.** History and theory of Weimar and Nazi film with sociocultural emphasis. Same as FILM 3503.

**GRMN 3504-3. Topics in German Film.** A comparative analysis of key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women, and the Holocaust. May be repeated up to 6 total credit hours when topic varies. Same as FILM 3504.

**GRMN 3505-3. The Enlightenment: Tolerance and Emancipation.** Examines the enlightenment belief in reason and the common humanity of all individuals and cultures. Emphasizes arguments for and against freedom of religion, abolition of slavery, and emancipation of women in 18th century European and American literature and thought. Same as HUMN 3505. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 3513-3. German Film and Society 2.** History and theory of postwar German cinema with sociocultural emphasis. Same as FILM 3513.

**GRMN 4501-3. Seminar: Literature in Cultural Context.** Provides a broader basis for the work of literature, viewing it from various cultural perspectives. Specific content of course is defined by the instructor. May be repeated up to 6 total credit hours when topic varies.

**GRMN 4502-3. Nietzsche: Literature and Values.** Emphasizes Nietzsche's major writings from 1872 to 1888 with particular attention to the critique of Western values. Includes a systematic exploration of doctrines, concepts, and ideas leading to the values of creativity. Same as HUMN 4502. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 4503-3. Issues in German Thought.** Provides the opportunity to examine major issues in German philosophical, social, and religious thought from the end of German idealism to existentialism and critical theory. Emphasizes the relationship between ideas and social and political action. May be repeated up to 6 total credit hours when topic varies.

**GRMN 4504-3. Goethe's Faust.** Systematic study of the Faust motif in Western literature, with major emphasis on *Faust I* and *II* by Goethe and Thomas Mann's *Doctor Faustus*. Same as HUMN 4504. Approved for arts and sciences core curriculum: literature and the arts.

## German Graduate Courses

**GRMN 5010-3. Bibliography and Methods of Research.** Required of all German MA students. Training in the use of reference works for conducting research in the humanities and social sciences. Analysis of, and hands-on practice with, bibliographic tools specific to German, as well as reference tools inclusive of German-area materials but broader in their scope. Students learn proper procedure for manuscript preparation and submission. Prereq., graduate standing or instructor consent.

**GRMN 5020-3. Applied Linguistics and Foreign Language Teaching Methodology.** Required of all graduate teaching assistants, this course provides a knowledge of the aspects of German linguistics that are important for teaching German and a survey of foreign language teaching methods and second language acquisition research. Prereq., graduate standing or instructor consent.

**GRMN 5110-3. Seminar: Germanic Literature and Society from the Beginning to the Renaissance.** Treats cultural, intellectual, linguistic, and literary developments, with emphasis on the medieval period. Readings include Gottfried's *Tristan und Isolde*, *Das Nibelungenlied*, courtly lyric poetry, Wolfram's *Parzival*, and other Arthurian romances. Prereq., graduate standing or instructor consent.

**GRMN 5120-3. Seminar: Germanic Literature and Society from the Renaissance through the Baroque.** Intellectual, cultural, and literary developments from about 1450 through the early 18th century, with emphasis on Baroque literature. Prereq., graduate standing or instructor consent.

**GRMN 5210-3. Seminar: The Age of Enlightenment.** Examines the influence of the emerging middle class on the transformation of aesthetic and societal values. Major works of theory, philosophy, literature, and criticism by Lessing, Herder, Kant, J. E. Schlegel, and others. Examines major literary and cultural influences from France and Great Britain. Prereq., graduate standing or instructor consent.

**GRMN 5220-3. Seminar: Topics in the Age of Goethe.** Examines various aspects of German-speaking society from the 1770s to 1830s. Topics may include Sturm und Drang as social commentary; romantic theory in the wake of the French Revolution; romantic nationalism; the Faust theme; Weimar as a cultural center; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5230-3. Seminar: Concepts of the Self from Schlegel to Freud and Jung.** Profound contributions to the discourses of modernity begin with romanticism

and lead to the depth-psychology of Freud and Jung. Examines the major stages in this process: the symbolism of the self in romanticism (Schlegel, E.T.A. Hoffman, Chamisso), the seminal role of Schopenhauer and Nietzsche, and finally the emergence of the self as the hidden god in the thought of Freud, Jung, Hesse, and others. Prereq., graduate standing or instructor consent.

**GRMN 5310-3. Seminar: Topics in the 19th Century.** Examines the transformation of realism from Buechner to Gerhart Hauptmann. Topics may include literary responses to the Restoration; intellectuals and the Revolution of 1848; philosophy and literature; theatrical representations of woman, family, and gender; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5320-3. Seminar: The German Novel from 1901–1956.** Beginning with T. Mann's *Buddenbrooks*, charts the rise of the German novel in the early 20th century and examines such topics as Wilhelminian society; intellectuals and World War I; dehumanization and alienation; national socialism and literary exile; and others. Authors include T. Mann, H. Hesse, R. Rilke, F. Kafka, A. Seghers, and A. Zweig. Prereq., graduate standing or instructor consent.

**GRMN 5330-3. Seminar: German Intellectuals and Society Between the Wars.** Examines the period of social crisis and the intellectual responses to the collapse of the prewar order. Gives attention to the antidemocratic thought of Spengler, Juenger, Stefan George and his circle, to the emergence of existentialism with Scheler and Heidegger, and to the search for a new political humanism as evidenced by the work of Thomas Mann. Prereq., graduate standing or instructor consent.

**GRMN 5410-3. Seminar: Topics in Early 20th Century German Society.** Focuses on major issues, events, movements, and figures prior to World War II. Topics may include the ontology of lyric poetry; Berlin in the 1920s; exiles, their communities, and their writings; women writers from Andreas-Salome to Anna Seghers; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5420-3. Seminar: Topics in Later 20th Century German Society.** Analyzes major currents and events such as the Holocaust, coming to terms with the past (*Vergangenheitsbewältigung*), German Democratic Republic (GDR) literature, and responses to the reunification. Topics may include the Austrians from Anschluss to Haider; Paul Celan; East German writers between Wolf Biermann and Christa Wolf; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduated standing or instructor consent.

**GRMN 5510-3. Seminar: Open Topics in German Civilization.** Focuses on cultural issues that cross lines of literary periodization. Topics may include the theater as social criticism from Lessing to Handke; forms of German protest from Luther to Thomas Mann; nihilism from Bonaventura to Thomas Bernhard; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5520-3. Seminar: Current Issues in German Literature and Media.** Examines issues pervading contemporary German literature and media, such as concerns of youth, xenophobia, stereotyping as it affects women and men in their relations, work experience, feminism, problems connected with the reunification, and other issues. Prereq., graduate standing or instructor consent.

**GRMN 5900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**GRMN 6900 (1-6). Master's Thesis.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**GRMN 6940 (1-3). Master's Degree Candidate.**

## Polish

**PLSH 1010-4. Beginning Polish 1.** Elementary description and analysis of pronunciation, morphology, grammar, and usage of modern standard Polish, supported by contemporary readings in Polish. Not designed to fulfill the arts and sciences foreign language requirement.

**PLSH 1020-4. Beginning Polish 2.** Continuation of PLSH 1010. Prereq., PLSH 1010 with a grade of C- or better.

## Russian

**RUSS 1010-4. Beginning Russian 1.** For students with no previous training in Russian.

**RUSS 1020-4. Beginning Russian 2.** Continuation of RUSS 1010. Prereq., RUSS 1010 with a grade of C- or better.

**RUSS 1030-3. Russian for Reading Knowledge.** Provides the requisite structure and vocabulary of Russian in an intensive format, such that students are able to read and translate Russian in their field of study with the help of a dictionary. Does not count towards the Russian major.

**RUSS 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**RUSS 2010-4. Second-Year Russian 1.** Review and continuation of basic skills learned in the first year: reading, writing, speaking, and oral comprehension. Prereq., RUSS 1020 with a grade of C- or better. Meets MAPS requirement for foreign language. Satisfies arts and sciences language requirement.

**RUSS 2020-4. Second-Year Russian 2.** Continuation of RUSS 2010. Prereq., RUSS 2010 with a grade of C- or better.

**RUSS 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**RUSS 3000-3. Advanced Conversation.** Enables students to speak and understand contemporary Russian. Discussion topics and source materials vary. May be repeated up to 6 total credit hours. Prereq., RUSS 2020.

**RUSS 3010-3. Third-Year Russian 1.** Review of Russian grammar coordinated with reading, speaking, writing, and understanding modern Russian. Uses some texts from modern Russian literature. Prereq., RUSS 2020.

**RUSS 3020-3. Third-Year Russian 2.** Continuation of RUSS 3010. Prereq., RUSS 3010.

**RUSS 3050-3. Business Russian.** Studies general commercial practices, vocabulary, and terminology applied in various business transactions. Emphasizes oral and written communication and correspondence. Prereq., RUSS 2020 or instructor consent.

**RUSS 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**RUSS 3930 (1-6). Russian Internship.** Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. May be repeated up to 6 total credit hours. Restricted to junior and senior RUSS majors.

**RUSS 4010-3. Advanced Conversation and Composition 1.** Prereq., RUSS 3020.

**RUSS 4020-3. Advanced Conversation and Composition 2.** Prereq., RUSS 4010.

**RUSS 4210 (1-3). Open Topics: Russian Literature and Culture.** Selected topics in Russian literature, film, art, and music. May be repeated up to 9 total credit hours when topic varies. Prereq., RUSS 3020.

**RUSS 4230-3. Russian Cultural Idioms.** Focuses on the critical analysis of the Russian cultural discourse through Russian idioms. Taught in Russian. Prereq., RUSS 2020 or instructor consent. Approved for arts and sciences core curriculum; critical thinking.

**RUSS 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Russian Courses Taught in English

**RUSS 2211-3. Introduction to Russian Culture.** Examines what Russians are like and how they got that way; development of national consciousness from feudalism through imperialism; Russian cookery, folklore, popular literature, religious thought, art, and architecture. Lectures, slides, films, guest speakers. Approved for arts and sciences core curriculum: historical context.

**RUSS 2221-3. Introduction to Modern Russian Culture.** Forces shaping 20th century Russian culture. Evolution of Russian literature, art, film, music, and ballet. Approved for arts and sciences core curriculum: contemporary societies or historical context.

**RUSS 2231-3. Fairy Tales of Russia.** Introduces students to Russian, Gypsy, and Russian-Jewish fairy tales using scholarly classification and psychoanalytic, sociological, and feminist approaches. Examines continuing cultural influence of fairy tales in Russian literature, music, ballet, film, and popular culture. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 3201-3. German and Russian Culture in Comparative Perspective.** Comparative overview of the evolution of German and Russian civilizations in the social, political, religious and cultural spheres. Taught in English. Same as GRMN 3201. Approved for arts and sciences core curriculum: historical context.

**RUSS 3301-3. Contemporary Issues in Russian Film.** Examines the relationship between politics, economics, aesthetics, and the way moral and social issues are treated in noteworthy Russian films from the last 20 years. Same as FILM 3301.

**RUSS 3502-3. Ideals and Values in Modern Russia.** Covers sources and evolution of contemporary Russian ideals and values in the spheres of religion, education, law, business, family life, ethnicity, gender, and sexuality. Approved for arts and sciences core curriculum: ideals and values.

**RUSS 3601-3. Russian Culture Past and Present.** Russian culture from the ninth century to the present. Focuses on interdisciplinary exploration of literature, folklore, art, architecture, and music through study in St. Petersburg. Offered abroad only. Similar to RUSS 1601. Approved for arts and sciences core curriculum: historical context.

**RUSS 4221-3. Cultural Mythologies of Russian Communism.** Analyzes cultural mythologies produced by the Soviet ideology from the 1920s to the 1980s. Educates students in both theory and practice to recognize and deconstruct totalitarian myths, as well as to detect them in different contexts, e.g., in Post-Communist Russian and/or American contemporary cultures. Investigates why and how such myths as those of a great leader, utopian future, a new man, a hero, the people vs. intelligentsia, class enemies, and “enemies of the people” were produced in Soviet Russia; what factors made these myths so popular; what general mechanisms of the cultural production in the age of modernity do they reveal. Recommended prereqs., RUSS 4821, 2221, 2211. Approved for arts and sciences core curriculum: ideals and values.

**RUSS 4421-3. Gogol.** Noteworthy short stories as well as his novel, *Dead Souls*.

**RUSS 4431-3. Dostoevsky.** Focuses on the close reading of major novels and other major works by Dostoevsky—one of the most important psychological novelists in modern literature, a profound religious thinker, and the greatest crime novelist in the world. Same as GSSL 5431.

**RUSS 4441-3. Tolstoy.** Examines the development of Tolstoy’s thought and literary style through his novel *War and Peace* and through the study of his short works. Recommended prereq., some experience with college-level expository writing. Same as GSSL 5441.

**RUSS 4451-3. Chekhov.** Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in the history of Russian literature. Also examines Chekhov’s major plays that laid the foundation for modernist theatre. Same as GSSL 5451.

**RUSS 4471-3. Women in 20th Century Russian Culture.** Acquaints students with literature and cinema focusing on women in 20th century Russia, with Anglo-American and French feminist criticism. All texts and films in English translation. Students should be prepared to write college-level analytical essays. Recommended prereq., course(s) in literature or film studies, and upper-division writing course(s). Same as WMST 4471. Approved for arts and sciences core curriculum: cultural and gender diversity.

**RUSS 4811-3. 19th Century Russian Literature.** Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov. Same as HUMN 4811. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 4821-3. 20th Century Russian Literature and Art.** Interdisciplinary course emphasizing the influence of art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the gradual cultural relaxation that culminated in perestroika and glasnost. Same as HUMN 4821. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 4831-3. Contemporary Russian Literature.** Acquaints students with the most representative works of Russian writers from the 1960s to the present in a broad historical and political perspective. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are provided in translation. Recommended prereq., lower level literature course. Approved for arts and sciences core curriculum: literature and the arts or contemporary societies.

**RUSS 4851-3. Critical Thinking: Russian Film and Society.** Through structured discussions, selected readings, and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Identification and critical analysis of concepts and assumptions underlying differing cinematic approaches to controversial topics. Prereqs., RUSS 2221 or RUSS/FILM

3301 and RUSS 3010 or equivalent. Approved for arts and sciences core curriculum: critical thinking. Same as GSSL 5851.

**RUSS 4861-3. Absurd and Supernatural in Russian Literature.** Studies themes of grotesque, bizarre, surreal, absurd, supernatural, and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharmis, Bulgakov, Siniavskii, Petrushevskaja, and Pelevin, within contexts of Russian folklore, Freud and Jung’s interpretations of jokes and dreams, and Romanticism. Recommended prereq., one upper-division humanities course. Same as RUSS 5861.

**GSSL 4861-3. Absurd and Supernatural in Russian Literature.** Same as RUSS 4861.

**GSSL 5230-3. Russian Cultural Idioms.** Same as RUSS 4230.

**GSSL 5431-3. Dostoevsky.** Same as RUSS 4431.

**GSSL 5441-3. Tolstoy.** Same as RUSS 4441.

**GSSL 5451-3. Chekhov.** Same as RUSS 4451.

**GSSL 5851-3. Critical Thinking: Russian Film and Society.** Same as RUSS 4851.

## Scandinavian

**NORW 1010-4. Beginning Norwegian 1.**

**NORW 1020-4. Beginning Norwegian 2.** Prereq., NORW 1010 with a grade of C- or better.

**NORW 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**NORW 2110-4. Second-Year Norwegian Reading and Conversation 1.** Prereq., NORW 1020 with a grade of C- or better. Fulfills the arts and sciences language requirement for the BA and BFA. degrees. Meets MAPS requirement for foreign language.

**NORW 2120-4. Second-Year Norwegian Reading and Conversation 2.** Continuation of NORW 2110, with focus on Norwegian culture and society. Small group work and class discussions. Prereq., NORW 2110 with a grade of C- or better.

**NORW 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**NORW 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**NORW 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Scandinavian Courses Taught in English

**SCAN 2201-3. Introduction to Modern Scandinavian Culture and Society.** Provides a comprehensive introduction to modern Scandinavian culture and society. Surveys the history of Scandinavian countries and examines their culture using art, architecture, literature, and film. Studies social issues, environmental concerns, and political patterns. In profiling aspects of culture and society unique to Scandinavian countries, students arrive at a conception of a collective Scandinavian identity. Approved for arts and sciences core curriculum: contemporary societies.

**SCAN 2202-3. The Vikings.** Examines the social, cultural, technological, and artistic backgrounds of the Viking experience, charting the history of the period both within Scandinavia and Europe as well as North America. Additionally, looks at some of the lasting influences of the Vikings on Western civilization. Approved for arts and sciences core curriculum: historical context.

**SCAN 3202-3. Old Norse Mythology.** Surveys the mythology and heathen cult practices of the Old Norse world. Students learn how to read mythological texts and study the major gods (Odin, Thor, and Frey among others) along with supernatural beings like valkyries, dwarves, giants, and berserks, and examine the evidence for cult practices in texts, art, and archeological finds. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3203-3. Masterpieces of Modern Scandinavian Literature.** Examines Scandinavia’s influence on social realism, expressionism, and postwar literature, including such themes as women in society, nature and industrialization, and identity and angst. Works by Ibsen, Strindberg, Dinesen, and Nobel Prize winners Lagerlof, Hamsun, Undset, and Lagerkvist. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3204-3. Medieval Icelandic Saga.** Advanced introduction to medieval Icelandic saga with readings in the family, outlaw, skald, and legendary sagas as well as the main scholarly approaches to this unique literature. Topics include honor, blood feud, fate, sexuality/gender, oral composition, and legend. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3205-3. Scandinavian Folk Narrative.** Introduces the rich tradition of Scandinavian folk narrative. Looks at relationship between the tales and the rural culture in which they existed. Explores various interpretive methodologies. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3209-3. Contemporary Nordic Literature and Film.** Advanced introduction to contemporary Nordic literature and film. Readings/screenings of recent translated Nordic texts and films, presenting a broad spectrum of contemporary issues, along with current critique and theoretical approaches. Topics: history, culture, translation, gender/sexuality, national identity, minority issues, etc. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3506-3. Scandinavian Drama.** Examines the many contributions of Scandinavian dramatists to world theater from the 18th century to the present. With emphasis on Holberg, Bjornsen, Ibsen, Strindberg, and Bjorneboe, surveys Enlightenment comedy, national romanticism, realism, naturalism, symbolism, expressionism, and Brechtian epic theater. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

## Slavic

**SLAV 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SLAV 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SLAV 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SLAV 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Swedish

**SWED 1010-4. Beginning Swedish 1.**

**SWED 1020-4. Beginning Swedish 2.** Prereq., SWED 1010 with a grade of C- or better.

**SWED 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SWED 2110-4. Second-Year Swedish Reading and Conversation 1.** Prereq., SWED 1020 with a grade of C- or better. Meets MAPS requirement for foreign language. Fulfills the arts and sciences language requirement for the BA and BFA degrees.

**SWED 2120-4. Second-Year Swedish Reading and Conversation 2.** Prereq., SWED 2110 with a grade of C- or better.

**SWED 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SWED 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SWED 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Hebrew

*See Linguistics.*

## History

*All 1000-level courses, most 3000-level seminars, and all 4000-level courses count toward the 36 credit hour major requirements. Only one 2000-level course may be applied to the major requirements. The remaining 1000-level courses and any further 2000-level courses count within the 45 credit hour maximum in history but do not fill requirements toward the 36 credit hour major.*

### Methodological, Comparative, and General

**HIST 1010-3. Western Civilization 1: From Antiquity to the 16th Century.** Surveys the development of Western civilization from its beginnings in the ancient Near East through the Reformation of the 16th century. Also available through correspondence study. Meets MAPS requirement for social science: general and world history. Approved for arts and sciences core curriculum: historical context.

**HIST 1020-3. Western Civilization 2: 16th Century to the Present.** Surveys political, economic, social, and intellectual developments in European history from the 16th century to the present. Similarities and contrasts between European states are underscored, as is Europe's changing role in world history. Also available through correspondence study. Students may receive credit for only one of HIST 1020 and HIST 1040. Meets MAPS requirement for social science: general and world history. Approved for arts and sciences core curriculum: historical context.

**HIST 1040-3. Honors: Western Civilization 2.** Studies the history of social, political, and cultural development of the Western world from the 16th century to the present. Designed for freshmen with advanced standing. Emphasizes reading and discussion. Prereq., 1200 on SAT, 28 on ACT, or 3.50 GPA in high school. Students may receive credit for only one of HIST 1020 or 1040. Approved for arts and sciences core curriculum: historical context.

**HIST 2100-3. Revolution in History.** Examines the causes, character, and significance of political revolution in world history. Concentrating on one of the major revolutions of modern history, it examines why revolutions occur, who participates in revolution, and to what effect. Specific course focus varies. Approved for arts and sciences core curriculum: historical context.

**HIST 2170-3. History of Christianity to the Reformation.** General introduction to the history of Christianity from its beginnings through the first period of the Protestant Reformation. Examines religious life and the church in relation to its social and cultural setting.

**HIST 2180-3. History of Christianity 2: From the Reformation.** General introduction to the history of Christianity from the Reformation to the present. Examines religious life and the church in relation to social and cultural setting. Approved for arts and sciences core curriculum: historical context.

**HIST 3000-3. Seminar in History.** Encourages students to explore and analyze a problem, topic, or area through selected readings in primary (when feasible) and secondary sources. Exposes students to the way historians view various complex issues. Enrollment limited to nonmajors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3010-3. Communist Societies in Historical Perspective.** Examines communist societies in Asia and Europe, 1917 to the present, using primary sources to compare how different social groups experienced such regimes, the social bases of revolutions that created and ended communism, and why some communist regimes have survived. Enrollment limited to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3100-3. History Seminar in Honors.** Approaches to the historian's craft. Gives honors students (both history and nonhistory majors) an opportunity to engage significant issues in historical interpretation chosen from the field of the instructor. Primary sources typically form the basis for reading, writing, and discussion. Prereq., honors standing.

**HIST 3110-3. Honors Seminar.** Practical historiography for students who wish to write a senior honors thesis. Emphasizes choice of topic, critical methods, research, organization, argumentation, and writing. Prereqs., honors standing and instructor consent. Approved for arts and sciences curriculum: critical thinking.

**HIST 3120-3. Honors Thesis.** Prereq., HIST 3110 and instructor consent.

**HIST 3840 (1-3). Independent Study.**

**HIST 4020-3. Capstone: Comparative History.** Explores historical themes from a comparative perspective. As a culmination of the major, it encourages students to think more analytically about historical change. Consult the *Registration Handbook and Schedule of Courses* to determine the course's focus each semester. Team-taught by several faculty. May be repeated up to 6 total credit hours within the degree. Prereq., 12 hours of upper-division history. Restricted to history majors and minors.

**HIST 4030-3. History of Slavery: Origins to Present.** Examines slavery across the globe from its origins in ancient societies to the present. Includes the legal, social, economic, linguistic, and gender aspects of slavery, among other subjects.

**HIST 4040-3. The History of Space Exploration and Defense.** This course examines the development and impact of American, Soviet/Russian, and European civilian and military space activities from the dawn of the space age to the space challenges of the 21st century.

**HIST 4050-3. The World War II Era.** The World War II era witnessed transformations in the social, political, and economic orders across the globe. Traces the domestic and international developments, including military issues, that

shaped the period in Europe, Asia, and the United States and assesses the war's legacy. Prereq., sophomore standing.

**HIST 4140-3. Anschutz Lecture in International History.** Explores a special topic in international history. Taught by the Anschutz Fellow, a world-renowned scholar and teacher who is the recipient of the department's most prestigious appointment. The Fellow will also periodically invite top scholars and practitioners to instruct in the course. Specific course focus will vary. Prereq., must have completed lower division major requirements. Restricted to senior history majors.

**HIST 4930. History Internship.** Matches selected students with supervised internships in professional archives research libraries, historical associations, and special projects. Interns apply their academic area specialty to their work in the field. Internships have a work and academic (reading and writing) component. May be repeated up to 6 total credit hours. Recommended prereq., completion of lower-level HIST course work (HIST 1015/1025, etc.). Restricted to junior or senior HIST majors. May be taken pass/fail only.

**HIST 5000-3. Historical Methods: Introduction to the Professional Study of History.** Introduces purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism.

**HIST 5840 (1-3). Independent Study.**

**HIST 6330-3. History of Sex and Sexuality.** Examines major historical trends in the study of meanings and practices of sex and sexuality. Focuses on emergence and negotiation of sexual matters in circumstances where sex and identity were not coterminous. Prereq., graduate standing.

**HIST 6500-3. Comparative Labor History.** Examines major issues in labor history through comparative study of Europe, the United States, and Latin America. Issues to be studied include working-class formation, the development of worker identities, and workers and the state.

**HIST 6940 (1-3). Master's Degree Candidate.**

**HIST 6950 (1-6). Master's Thesis.**

**HIST 7840 (1-3). Independent Study.**

**HIST 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Europe: Ancient and Medieval

**HIST 1051-3. The World of the Ancient Greeks.** Surveys the emergence, major accomplishments, failures, and decline of the world of the ancient Greeks, from Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (200–30 B.C.) Same as CLAS 1051. Approved for arts and sciences core curriculum: historical context.

**HIST 1061-3. The Rise and Fall of Ancient Rome.** Surveys the rise of ancient Rome in the eighth century B.C. to its "fall" in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. Same as CLAS 1061. Approved for arts and sciences core curriculum: historical context.

**HIST 2041-3. War and Society in Ancient Greece.** Studies Greek warfare in its cultural, social, and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required. Same as CLAS 2041.

**HIST 3011-3. Seminar in Ancient History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3511-3. Seminar in Medieval History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3841 (1-3). Independent Study.**

**HIST 4021-3. Athens and Greek Democracy.** Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources. Same as CLAS 4021.

**HIST 4031-3. Alexander the Great and the Rise of Macedonia.** Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great. Prereq., one of the following: CLAS 1509, 3039, 3113, 4051, 4139, 4149, CLAS/HIST 1051, 2041, 4021, or 4041. Same as CLAS 4031.

**HIST 4041-3. Classical Greek Political Thought.** Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Same as CLAS 4041, PHIL 4210, PSCI 4094.

**HIST 4061-3. The Twilight of Antiquity.** Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the east as Byzantium. Emphasizes Christianity; barbarians; social, economic, and cultural differences; contemporary views of Rome; and modern scholarship. Same as CLAS 4061.

**HIST 4071-3. Seminar in Ancient Social History.** Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence, and the selective use of comparisons with better known societies. Same as CLAS 4071.

**HIST 4081-3. The Roman Republic.** Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republic government. Readings are in the primary sources. Same as CLAS 4081.

**HIST 4091-3. The Roman Empire.** Studies Imperial Roman history beginning with the Roman Revolution and ending with examination of the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters, and personalities of the Empire. Same as CLAS 4091.

**HIST 4121-3. Diving for the Ancient Past.** Through discussions, readings, videos, and student research, this course explores all aspects of Mediterranean maritime archaeology and examines the role of the sea and seafaring in the ancient civilizations of Greece and Rome. Prereq., HIST 1051 or 1061.

**HIST 4511-3. Social Foundations of European Civilization.** Studies social structures of Europe and their relationship to political, religious, and economic institutions, from A.D. 400 to 1500.

**HIST 4521-3. Intellectual History of Medieval Europe.** Changing theories and realities of the relationship between religious and secular elements of medieval civilization with particular emphasis on the evolution of the medieval empire and the culture of the universities and schools.

**HIST 4711-3. History of the Mediterranean World, 1099–1571.** Examines Mediterranean civilizations from the First Crusade to the Battle of Lepanto. Topics include the commercial revolution, medieval colonization, the Byzantine and Ottoman states, shipping and navigation, and the Atlantic threat. Equal treatment of eastern and western Mediterranean.

**HIST 4761-3. Roman Law.** Same as HIST 5761 and CLAS 4761.

**HIST 5761-3. Roman Law.** Same as HIST 4761 and CLAS 5761.

**HIST 5841 (1-3). Independent Study.**

**HIST 6011-3. Readings in Ancient History.** Prereq., graduate standing. Same as CLAS 6011.

**HIST 6511-3. Readings in Medieval History.** Prereq., instructor consent.

**HIST 7551-3. Seminar: Medieval History.**

**HIST 7581-3. Latin Paleography.** Discusses the development of formal scripts from the late Roman Empire to the 15th century. Provides practice in identification, transliteration, and translation of medieval manuscripts. Prereqs., graduate standing and reading knowledge of Latin.

**HIST 7841 (1-3). Independent Study.**

## Europe: Modern

**HIST 2002-3. Introduction to Central and East European Studies.** Examines major themes in the history of Russia and East-Central Europe since the early modern era, introduces the literature and arts of the region, and presents current political, social, and economic issues. Same as CEES 2002. Approved for arts and sciences core requirement: historical context.

**HIST 2112-3. Early Modern Societies (1450–1700).** Examines major themes in European Early Modern history. Issues to be explored include the Renaissance and the Reformation, popular culture, social history, and states and warfare. Specific course focus may vary. Similar to HIST 2113. Approved for arts and sciences core curriculum: historical context.

**HIST 2222-3. War and Society in the Modern World.** Focuses on war in European and/or American history. Explores the character, origins, and social, political, and intellectual impact of war in contexts ranging from several centuries of international conflict to the experience of individual nations in specific wars. Specific course focus may vary. Approved for arts and sciences core curriculum: historical context.

**HIST 3012-3. Seminar in Modern European History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3112-3. Seminar in Renaissance and Reformation.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3212-3. Seminar in Early Modern Europe.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3842 (1-3). Independent Study.**

**HIST 4112-3. Venice and Florence in the Renaissance.** Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy.

**HIST 4122-3. Europe During the Renaissance.** Explores the history and culture of Western Europe, 1300–1520. Comprehensive in scope, with analysis of political, economic, social, religious, intellectual, and artistic matters. Discusses significance of the Renaissance for origins of modern civilization.

**HIST 4212-3. Early Modern Europe: Religion, Politics, and Society (1500–1789).** Examines European history through three centuries of dynamic change. Addresses the rise of centralized nation-states, the Reformation and Counter-Reformation, religious wars, colonialism and racism, shifting class and gender relations, and the emergence of Enlightenment culture. Restricted to sophomores, juniors, and seniors.

**HIST 4222-3. War and the European State, 1618–1793.** Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution). Same as HIST 5222.

**HIST 4232-3. The Age of Reason, Montaigne to Voltaire.** Studies major European intellectual trends from late 16th century through the Enlightenment.

**HIST 4312-3. 19th Century Europe.** Concerned with major social, political, and cultural developments in Europe from circa 1800 to the outbreak of World War I. Special emphasis is placed upon the Napoleonic experience, the rise of modern nationalism, romanticism, Darwinism and its social applications, the Industrial Revolution, imperialism, the emergence of modern ideologies, and the background of World War I. Prereq., junior or senior standing or instructor consent.

**HIST 4412-3. Europe, 1890–1945.** Examines the origins, character, and significance of the First and Second World Wars for the major nations of Europe during the first half of the 20th century. Prereq., junior or senior standing.

**HIST 4422-3. World War I: The Brutalization of Europe.** Examines the causes of World War I, the nature of the war itself, and its political, psychological, cultural, and social impacts. Considers the link between World War I and the rise of modern totalitarian movements and ideologies. Prereq., HIST 1020 or 1040.

**HIST 4442-3. Europe since 1945.** Explores Europe from the end of World War II through the present day. Topics include postwar reconstruction; the cold war; anticommunist opposition and new social movements; consumer culture and punk music; the fall of communism; the Yugoslav wars; and European unity.

**HIST 5012-3. Graduate Colloquium in European History.** Acquaints students with key works in the literature of European history, and addresses matters of method and interpretation. May be repeated up to 6 total credit hours. Prereq., admission to the graduate program in history.

**HIST 5222-3. War and the European State, 1618–1793.** Prereqs., HIST 1010 and HIST 1020 or equivalent; and at least two of the following: HIST 4133, 4223, 4232, 4613, or equivalent upper-division graduate courses. Same as HIST 4222.

**HIST 5842 (1-3). Independent Study.**

**HIST 6012-3. Readings in Modern European History.**

**HIST 6122-3. Readings in 16th Century Europe.**

**HIST 6212-3. Readings in 17th Century Europe.**

**HIST 7052-3. Seminar: Modern European History.**

**HIST 7162-3. Seminar: Reformation Europe.**

**HIST 7252-3. Seminar: Early Modern Europe, 16th to 18th Centuries.**

**HIST 7842 (1-3). Independent Study.**

## Europe: Specific Countries

**HIST 2103-3. The History of England to 1660.** Deals with Roman, medieval, and early modern periods. Covers the demographic, economic, and social patterns, political and religious developments, and cultural changes that contributed to the formation of the English nation. Approved for arts and sciences core curriculum: historical context.

**HIST 2123-3. The History of England, 1660 to Present.** Deals with the period from the 17th century to the present. Political, economic, social, and imperial developments that contributed to creation of the modern industrial and democratic state are the major issues covered. Approved for arts and sciences core curriculum: historical context.

**HIST 2513-3. The History of Ireland, 1600 to Present.** Examines major themes in Irish history from the Tudor conquest of Ireland and the ensuing Ulster plantation in the early 17th century, to the current unrest in Northern Ireland. Particular emphasis is placed on political, social, and religious issues. Approved for arts and sciences core curriculum: historical context.

**HIST 2543-3. Medieval Societies.** Examines major themes in European history during the medieval period: the origins and development of states, social and economic life, religion, and popular culture. Specific course focus may vary. Approved for arts and sciences core curriculum: historical context.

**HIST 3113-3. Seminar in Medieval and Early Modern English History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3133-3. Seminar in Britain since 1688.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3713-3. Seminar in Russian History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3843 (1-3). Independent Study.**

**HIST 4053-3. Britain and the Empire, 1688–1964.** Examines the external polity of Great Britain from 1688 to 1964 in Europe, the East, Africa, and the Americas. Prereq., sophomore standing.

**HIST 4063-3. Women in Victorian England.** Examines changing roles and status of women in a period of expansion. Studies the impact of industrialization on working women, sexuality, family planning, expansion of women in education, politics and the professions, the single women crisis, and women's rights. Same as WMST 4063.

**HIST 4123-3. Medieval England.** Treats the major developments in English history from the Anglo-Saxon period through the 15th century. Emphasizes late medieval English society during the 13th and 14th centuries. Prereq., junior or senior standing.

**HIST 4133-3. Tudor and Stuart England.** Deals with the history of England from 1485 to 1714. Examines the principal, social, political, religious, and cultural development under the Tudor and Stuart dynasties. Prereq., HIST 1010 or 2103.

**HIST 4153-3. England in the Age of Revolution, 1688–1832.** Deals with major political, social, and economic events and movements between the accession of King James II and the passage of the Reform Act of 1832. Prereq., junior standing or 6 hours of history credit.

**HIST 4223-3. Revolutionary France.** Examines the two questions most fundamental to any scholarly understanding of the French Revolution: What were the political, social, and cultural causes of revolution in 1789? Why did the French Revolution become increasingly radical after 1789? Prereq., junior standing or 6 hours of history credit.

**HIST 4233-3. History of France since 1815.** Examines the ongoing struggle between the revolutionary and counter-revolutionary traditions of France and how it shaped the political history and affected the social, cultural, and intellectual character of the nation from 1815 to the present. Prereq., junior standing or 6 hours of history credit.

**HIST 4313-3. History of Italy.** Survey of political, social, and intellectual history of Italy and its people. Taught in English. Same as ITAL 4250.

**HIST 4413-3. German History to 1849.** Cultural, political, and social history of Germany up to and including the revolutions of 1848. Emphasizes the political history of Prussia and such cultural phenomena as German romanticism.



**HIST 4423-3. German History since 1849.** Cultural, political, and social history of Germany since 1849. Emphasizes German unification, Bismarkian foreign policy, the rise of neoromanticism, Weimar politics, and the rise of national socialism.

**HIST 4433-3. Nazi Germany.** Focuses on the political, social, cultural, and psychological roots of national socialism, with the nature of the national socialist regime, and those politics and actions that came directly out of its challenge to values central to Western civilization. Studies how Nazism came out of this civilization. Restricted to seniors.

**HIST 4613-3. History of Eastern Europe to 1914.** Examines the conquering of the kingdoms of Eastern Europe by the Russian, Prussian, Habsburg, and Ottoman Empires, and the formation of national consciousness among the subject peoples of the region before World War I.

**HIST 4623-3. History of Eastern Europe since 1914.** Examines the struggle of nations of eastern Europe to assert their independence, from break-up of the imperial system at the end of World War I, through the Soviet bloc that emerged after World War II, to the establishment of democratic governments after the 1989 revolutions.

**HIST 4643-3. Poland since the 16th Century: Democracy and Nation.** Traces themes of democracy and nationalism in Polish history from the “noble republic” of the early modern era, through the struggles with fascism and communism in the 20th century, to Poland’s current position on the eastern edge of Western Europe.

**HIST 4713-3. History of Russia through the 17th Century.** Introduces the history and culture of Russia from the 9th to the 17th century. Emphasizes selected topics in social, economic, religious, and cultural history, including the formation of the Russian state conversion to Orthodox Christianity, the Mongol invasion, and the reign of Ivan the Terrible.

**HIST 4723-3. Imperial Russia.** Surveys major cultural, social, and economic changes from the reign of Peter the Great through World War I.

**HIST 4733-3. The Russian Revolution and the Soviet Regime.** Covers in detail the significant social, economic, and political events of Soviet Russia from the February Revolution of 1917 to the present. Prereq., junior or senior standing.

**HIST 5843 (1-3). Independent Study.**

**HIST 6113-3. Readings in English History to 1714.**

**HIST 6123-3. Readings in English History since 1688.**

**HIST 6413-3. Readings in Modern German History.** Prereq., general background in European history.

**HIST 7153-3. Seminar: English History, 800–1688.** Prereq., background in English or European history.

**HIST 7183-3. Interdisciplinary Seminar in British Studies.** Introduces students to the methodologies and texts/sources of current work in English literature, history, theatre, art history, and social sciences. Students write a paper based upon the University of Colorado’s distinctive research collections in British studies. Prereq., graduate standing. Same as ENGL 7889.

**HIST 7843 (1-3). Independent Study.**

## Europe: Topical

**HIST 3414-3. Seminar in European Intellectual History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3844 (1-3). Independent Study.**

**HIST 4064-3. Problems and Topics in Spanish History, 711–1700.** Examines Spanish history at a time of dynamic change, uncommon achievement, and extraordinary atrocities. Addresses questions of religious co-existence, religious intolerance, imperial expansion, and natural unification, among others.

**HIST 4134-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors and seniors. Same as ENGL 4583 and THTR 4091.

**HIST 4164-3. History and Literature of Georgian England.** Provides interdisciplinary study of England in one of its most vibrant cultural and historical periods. Topics include politics, religion, family life, and the ways contemporary authors understood their world. Same as ENGL 3164. Approved for arts and sciences core curriculum: historical context.

**HIST 4314-3. History of Science from the Ancients to Sir Isaac Newton.** History of science from pre-Socratics to Isaac Newton, underscoring major intellectual themes in scientific thought and the historical context in which they developed. Same as HIST 5314. Approved for arts and sciences core curriculum: natural science.

**HIST 4324-3. History of Modern Science.** Historical and sociological study of scientific institutions and ideas as they interacted with Western culture and society from the 17th through the 20th centuries. Examines controversies in astronomy, geology, genetics, Darwinism, and nuclear science. Prereq., HIST 1020. Recommended prereq., HIST 1025. Approved for arts and sciences core curriculum: historical context.

**HIST 4414-3. European Intellectual History, 1750–1870.** Explores major developments in European thought from the Enlightenment to Nietzsche. Special attention given to the individuals whose ideas have had the greatest influence on modern intellectual history, e.g., Rousseau, Hegel, Herder, Marx, Kierkegaard, Baudelaire, Darwin, and others.

**HIST 4424-3. European Intellectual History, 1870 to Present.** Emphasizes Nietzsche and the youth revolt against middle class society, the literary and artistic avant garde (impressionism to existentialism), the psychoanalytic movement, the European right and left, and post-WWII European thought.

**HIST 4444-3. Topics in Modern European Thought.** Explores a selected theme in European thought since the Enlightenment. Topics vary each term.

**HIST 4614-3. Women and Society in Industrial Europe.** Examines impact of industrialization and related social change on women in modern European history. Topics include work, family, sexuality, and women in movements for social and political change. Prereq., HIST 1020 or equivalent. Same as WMST 4614.

**HIST 5014-3. Law and Legal History in Early Modern Europe.** Explores use of legal records as a source for writing not only political and economic history, but social and cultural history as well. Traces the historiographic and methodological trajectory of legal history in early modern European countries. Prereq., graduate standing.

**HIST 6414-3. Readings in European Intellectual History.** Prereq., graduate standing or instructor consent.

**HIST 7214-3. Seminar: Economic Development.** Prereq., graduate standing. Same as ECON 8764.

**HIST 7424-3. Research Methods in Medieval/Early Modern European History.** Introduces students to research skills needed to work with historical manuscripts. Students learn to read late medieval/early modern handwriting, explore CU’s microfilmed collections of manuscripts, and write a research paper based on the manuscript materials. Prereq., graduate standing or instructor consent.

**HIST 7464-3. Seminar: European Intellectual History.**

**HIST 7844 (1-3). Independent Study.**

## United States: Chronological Periods

**HIST 1015-3. History of the United States to 1865.** Surveys American history from first settlement until end of the Civil War. Also available through correspondence study. Meets MAPS requirement for social science: general and U.S. history. Approved for arts and sciences core curriculum: United States context.

**HIST 1025-3. History of the United States since 1865.** Surveys social, economic, political, and cultural development of the United States from the close of the American Civil War to the present. Also available through correspondence study. Meets MAPS requirement for social science: general and U.S. history. Approved for arts and sciences core curriculum: United States context.

**HIST 1035-3. Honors: The United States to 1865.** Surveys American history from the first settlement until the end of the Civil War for students with honors standing. Emphasizes reading and discussion of primary sources and interpretations of significant topics of this time period. Students explore critical thinking skills of analysis, evaluation, and interpretation from the historian’s perspective. A student receiving credit for HIST 1015 may not receive credit for HIST 1035. Prereq., 1200 on SAT, 28 on ACT, or 3.36 GPA in high school. Restricted to freshmen. Approved for arts and sciences core curriculum: United States context.

**HIST 1045-3. Honors: The United States since 1865.** Surveys American history from the Civil War to the present for students with honors standing. Emphasizes reading and discussion of primary sources and interpretations of significant topics of this time period. Students learn critical thinking skills of analysis,

evaluation, and interpretation from the historian's perspective. A student receiving credit for HIST 1025 may not receive credit for HIST 1045. Prereq., 1200 on SAT, 28 on ACT, or 3.36 GPA in high school. Restricted to freshmen. Approved for arts and sciences core curriculum: United States context.

**HIST 2015-3. The History of Early America.** Examines major themes in the development of colonial societies in North America from the 15th to the early 19th centuries. Explores intercultural relations, economic development, labor systems, religion and society, and family life. Specific course focus may vary. Approved for arts and sciences core curriculum: United States context.

**HIST 2215-3. The Era of the American Revolution.** Explores the foundation of the American republic and promotes an understanding of the social, cultural, and political circumstances that define the era of the American Revolution. Specific course focus may vary. Similar to HIST 4205, 4215. Approved for arts and sciences core curriculum: United States context.

**HIST 3115-3. Seminar in Early American History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3415-3. Seminar in Recent American History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3425-3. The Great Depression: 1929–1945.** The new deal response to the great depression strongly influenced America's politics, its economy, and its culture. Examines the political, economic, and cultural issues that resulted from the great depression and the new deal, 1929–1945. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3845 (1-3). Independent Study.**

**HIST 4115-3. Natives and Newcomers: Encounters in the New World.** Focuses on the first generations of interaction between natives and newcomers in the northern and middle regions of the Americas during the 16th and 17th centuries. Areas include New England, the Chesapeake, Canada, Spanish borderlands, and the West Indies. Prereq., junior standing or successful completion of one lower-division history course.

**HIST 4125-3. British Colonial America, 1580–1756.** Studies settlement and evolution of British Colonial America until the Seven Years' War.

**HIST 4205-3. The Colonial Wars and the Coming of American Independence, 1739–1776.** Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754–1763), the disruption of Anglo-American relations, and the origins of the War of American Independence (1775–1783). Recommended prereq., HIST 1015 or 1035. Same as HIST 5205. Similar to HIST 2215.

**HIST 4215-3. The Revolutionary War and the Making of the American Republic, 1775–1801.** Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social, and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson. Recommended prereq., HIST 1015 or 1035. Same as HIST 5215. Similar to HIST 2215.

**HIST 4225-3. The New Nation: America, 1800–1828.** History of the United States from George Washington's inauguration to the election of Andrew Jackson. Deals with the political, social, economic, and cultural currents in the life of postrevolutionary America. Recommended prereq., HIST 1015 or 1035.

**HIST 4235-3. Jacksonian America.** Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture.

**HIST 4315-3. Civil War and Reconstruction.** Describes the forces at work in the antebellum period that led to sectional warfare; social, economic, and political changes effected by the war; the American agony of reconstruction; and the long-range results of that difficult era. Prereq., HIST 1015.

**HIST 4415-3. United States History, 1900–1929.** History of the United States during the progressive years, 1900 to 1929, emphasizing social, economic, cultural, and political evolution of the American people and the nation's role in world affairs.

**HIST 4425-3. United States History, 1933–1968.** Examines American history, 1933–1968, with attention to domestic and foreign policy issues. Emphasizes the Great Depression, WW II, the Cold War, the Korean conflict, and the Truman administration's Fair Deal.

**HIST 4445-3. United States since 1968.** Traces political, diplomatic, economic, and social developments in the United States from 1968 to the present. Prereq., junior or senior standing.

**HIST 5205-3. The Colonial Wars and the Coming of American Independence, 1739–1776.** Prereq., graduate standing. Same as HIST 4205.

**HIST 5215-3. The Revolutionary War and the Making of the American Republic, 1775–1801.** Prereq., graduate standing. Same as HIST 4215.

**HIST 5845 (1-3). Independent Study.**

**HIST 6115-3. Readings in American Colonial History.** Prereq., graduate standing.

**HIST 7155-3. Seminar: Early American History.**

**HIST 7485-3. Seminar: United States History, 1948–Present.**

## United States: Topical Courses 1

**HIST 2126-3. Modern U.S. Politics and Diplomacy.** Traces the development of contemporary U.S. politics and foreign relations. Analyzes subjects such as the Cold War, the relationship between foreign and domestic politics, the developing meaning of conservatism, liberalism, and radicalism. Explains the impact of race, gender, class, and immigration. Specific course focus may vary. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**HIST 2166-3. The Vietnam Wars.** Traces the causes, course, and outcome of the wars in Vietnam from 1940 until 1975. Explains the successes of the revolutionaries and the failures of the French and Americans. Analyzes the development of Vietnamese nationalism, French colonialism, and U.S. intervention. Similar to HIST 4166. Approved for arts and sciences core curriculum: contemporary societies or United States context.

**HIST 2316-3. History of American Popular Culture.** Traces changes in American society from the Revolution to the present. Focuses on the increasing levels of mediation represented by print, spectacular performance, radio, television, and recorded music. Approved for arts and sciences core curriculum: United States context.

**HIST 2326-3. Issues in American Thought and Culture.** Examines the origins, development, and impacts (social, political, cultural, etc.) of significant ideas and themes in the history of American thought. Topics may include Darwinism, technology, race, success and failure, the social gospel, national mission, and utopia. Approved for arts and science core curriculum: United States context.

**HIST 2516-3. America through Baseball.** Baseball could not have existed without America. Course explains how the game fit into the larger context of social, cultural, economic, and political history from the nineteenth century to the present. Studies the events and people who made baseball the national pastime. Similar to HIST 4556. Approved for arts and sciences core curriculum: United States context.

**HIST 2616-3. Women's History.** Examines the history of women in culture and society over time. Particular emphasis on the roles of women in family, economy, society, and politics. Specific course focus may vary. May be repeated up to 6 total credit hours. Approved for arts and sciences core curriculum: cultural and gender diversity.

**HIST 2626-3. Gender and Culture.** Examines the construction of gender in a specific culture and society over time. Particular emphasis on the production, maintenance, and critique of sex roles and gender ideologies. Specific course focus may vary. Approved for arts core curriculum: culture and gender diversity.

**HIST 2746-3. Christianity in American History.** Examines the history of religious life in America, with special attention to Protestant and Catholic traditions, as affected by (and affecting) changing historical contexts. Approved for arts and sciences core curriculum: United States context.

**HIST 2866-3. American History and Film.** Teaches students to read films as historical documents, with an emphasis on the 20th century. Focuses on selected moments in U.S. history, studying the historical background and viewing and critiquing relevant films. Approved for arts and sciences core curriculum: United States context.

**HIST 3016-3. Seminar in the History of Gender and Science.** Focuses on the participation of women and the gendering of scientific disciplines in the modern era (especially in the U.S.). Includes the changing definition of science, changing requirements for participation in science, and interactions between ideas about

gender and the scientific method. Prereq., HIST 1015 and 1025. Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3116-3. Seminar in American Diplomatic History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3416-3. Seminar in American Society and Thought.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3516-3. American Culture and Reform, 1880–1920.** Addresses the issues of reform, religion, and culture that emerged as a 19th century world view confronted a 20th century America. Recommended prereq., HIST 1025. Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3616-3. Seminar in Women's History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3656-3. History of Women in Progressive Social Movements.** Explores women's involvement in the United States and international peace movements, including feminist and civil rights movements of the 19th and 20th centuries. Students learn research methods by using a variety of primary and secondary sources and writing an original research paper. Prereq., WMST 2000 or 2010, or HIST 1015 or 1025. Restricted to majors. Same as WMST 3656. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3846 (1-3). Independent Study.**

**HIST 4016-3. African American History, 1619–1865.** Explores the history of Africans in America from the first arrivals to emancipation, and their role in the social, cultural, economic, and political evolution of the United States.

**HIST 4116-3. U.S. Diplomatic History, 1865–1939.** Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture, and economics.

**HIST 4126-3. U.S. Diplomatic History since 1940.** Traces the development of the United States as a superpower. Special attention is paid to the way in which foreign policy was created and the relationship between foreign and domestic affairs.

**HIST 4146-3. Military History.** Examines America's national defense and war efforts from the Spanish American War to the present, emphasizing causes and consequences of modern conflicts, and the impact of military activities on American society.

**HIST 4166-3. The War in Vietnam and Its Legacy.** Traces diplomatic, military, cultural, social, and political history of the war in Vietnam from the beginning of U.S. involvement in 1950 to its aftermath in the 1980s. Prereq., junior or senior standing. Similar to HIST 2166.

**HIST 4316-3. The Origins of American Culture, 1600–1830.** Traces the development of American culture from its colonial roots to the early decades of the 19th century. Focuses on regional differences in the colonial period, the creation of a new cultural synthesis during the Revolution, and the cultural implications of the Revolutionary legacy. Prereq., HIST 1015.

**HIST 4326-3. Health and Disease in the United States.** Examines health care and disease patterns in the United States, from the colonial period through the 1980s. Topics include biomedicine and alternative therapies, changing ideas about health and disease, the patient perspective, and financing health care. Recommended prereq., HIST 1015 and 1025. Approved for arts and sciences core curriculum: United States context.

**HIST 4336-3. 19th Century American Intellectual History.** Examines developing intellectual traditions in their social and political contexts. Addresses democracy, religion, transcendentalism, women, race, union or disunion, the Darwinian revolution, and literary realism and naturalism.

**HIST 4346-3. 20th Century American Intellectual History.** Addresses the impacts of political, social, and economic developments on ideas about democracy, science, race, gender, faith, the supposed mission of America, and the role of intellectuals in society.

**HIST 4356-3. The Spanish Civil War.** Discusses how the Spanish Civil War was a stage for competing cultural and social ideologies, change, idealism and realism, tragedy and triumph, and revolution and conservatism. It also provided a dress rehearsal for World War II. Explores the conflict in its Spanish, European, and global contexts.

**HIST 4516-3. U.S. Society in the 19th Century.** Concerned with the American family and community in the changing social environments of the 19th century. Exam-

ines families of different ethnic and class backgrounds, observing how they are changed by new economic conditions, reform, or new political institutions.

**HIST 4526-3. U.S. Society in the 20th Century.** Primarily concerned with family roles and community values, and how they are altered by economic, demographic, and intellectual changes during the 20th century. Some of the more important themes are acculturation, the idea of success, reform, and the changing structure of opportunity. Prereq., HIST 1025.

**HIST 4556-3. America through Baseball.** Baseball serves as a window to view the American experience. Covers U.S. history since 1830, addressing the major topics that reflect on American society, such as professionalization, labor management conflict, race, gender, culture, politics, economics, and diplomacy. Prereq., HIST 1025. Recommended prereq., HIST 1015. Similar to HIST 2516.

**HIST 4566-3. 20th Century United States Labor History.** Traces development of an industrial labor force in the United States and focuses on gender, ethnicity, and class. Three major themes covered are transformation of the organization of work, everyday lives of workers, and the role of government. Prereq., junior or senior standing.

**HIST 4616-3. History of Women in the United States to 1890.** Examines female experience in the United States from 17th century European colonization to 19th century settlement of the frontier. Emphasizes comparison between classes, regions, and racial/ethnic groups. Women's writings provide the basis for discussions of private and public roles, definitions of femininity, interpersonal relationships, and struggles for survival and self-expression. Same as WMST 4616. Prereq., junior or senior standing.

**HIST 4626-3. History of Women in the United States since 1890.** Examines what it means to be female in 20th century United States, emphasizing comparison between classes and racial/ethnic groups. Women's writings serve as the basis for discussions of private and public roles, definitions of womanhood, interpersonal relationships, and struggles for autonomy and equality. Prereq., junior or senior standing. Same as WMST 4626.

**HIST 4636-3. Lesbian and Gay History: Culture, Politics, and Social Change in the United States.** Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the United States through investigation of lesbian/gay identity formation, community development, politics, and queer cultural resistance. Prereqs., WMST 2000 and junior or senior standing. Same as WMST 4636.

**HIST 4726-3. U.S. Immigration History.** Focuses on economic, social, and cultural history of immigration, return migration, and permanent settlement in the U.S. during the 19th and 20th centuries. Examines the ways in which race, class, ethnicity, gender, and sexuality shape social relations.

**HIST 5106-3. Graduate Colloquium in United States History.** Students gain an acquaintance with major works in the field and discuss current issues of interpretation and methodology. May be repeated up to 9 total credit hours. Prereq., graduate standing.

**HIST 5846 (1-3). Independent Study.**

**HIST 6116-3. Readings in American Diplomatic History.** Prereq., undergraduate work in American history.

**HIST 6146-3. Readings in U.S. Political History.** Explores the history of politics in the U.S., with an emphasis on the period since 1865. Key themes include the relations between state and society, the origins and nature of social movements, and the role played by political culture. Prereq., graduate standing.

**HIST 6326-3. Readings in United States Intellectual History.** Examines the history of ideas and the social history of intellectuals in American society during the 19th and 20th centuries. Stresses social and political dimensions and the changing cultural and institutional contexts of intellectual discourse. Prereq., graduate standing or instructor consent.

**HIST 6526-3. Readings in U.S. Social History, 1880–1940.** Prereq., graduate standing or instructor consent.

**HIST 6536-3. Readings in 20th Century U.S. Labor History.** Prereq., graduate standing.

**HIST 6546-3. Readings in Cultural History and Theory.** Introduces standard works and recent developments in cultural history. Explores structuralism and post-structuralism, semiotics, social construction, relativism, hegemony, and the idea of postmodernity in the uses of culture as an historical category. Prereq., graduate standing or instructor consent.

**HIST 6616-3. Readings in the History of American Women.**

**HIST 6756-3. Race and Nationalism.** Focuses on analytical, ideological, cultural, and political tensions between understandings of race and nationalism. Readings are interdisciplinary, but students identify and analyze tensions between race and nationalism at particular historical moments. Prereq., graduate standing or instructor consent.

**HIST 7156-3. Seminar: American Diplomatic History.** Prereq., graduate standing.

**HIST 7326-3. Seminar: U.S. Intellectual History.** Prereq., graduate standing.

**HIST 7556-3. Seminar: American Society and Thought.** Prereq., graduate standing.

**HIST 7566-3. Research Seminar in Labor History.** Explores various issues in U.S. labor history through readings and research projects. Most of the readings are taken from writings on U.S. labor history. Special attention is given to women, immigration, and regional patterns. Research skills emphasized. Prereq., HIST 6536 or instructor consent.

**HIST 7656-3. Seminar: Women's History.** Prereq., one 6000-level readings course in women's history.

**HIST 7846 (1-3). Independent Study.**

## United States: Topical Courses 2

**HIST 2117-3. History of Colorado.** Emphasizes historical variety and ethnic diversity of Colorado. Along with traditional themes in Colorado history, such as the gold rush, attention is given to Indian and Hispanic activity and culture. Also available through correspondence study. Approved for arts and sciences core curriculum: United States context.

**HIST 2227-3. History of the American Southwest.** Covers major observations and criticisms central in shaping the history of the southwest. Approved for arts and sciences core curriculum: United States context.

**HIST 2437-3. Afroamerican History.** Surveys Afroamerican history. Studies, interprets, and analyzes major problems, issues, and trends affecting Afroamericans from about 1600 to the present. Same as BLST 2437. Approved for arts and sciences core curriculum: cultural and gender diversity or United States context.

**HIST 2537-3. Chicano History.** Examines social, economic, political, and cultural history of Americans of Mexican descent and focuses on the heritage of Mexican society and thought, the Mexican–U.S. war, Mexican American society and thought, and the Chicano movement of the 1960s. Same as CHST 2537. Approved for arts and sciences core curriculum: United States context or culture and gender diversity.

**HIST 2717-3. Introduction to Asian American History.** Introductory-level survey of the social history of Asians in America from the 19th century to the present. Primary focus is on delineating and explaining changes that Asian Americans, one of the most visible ethnic groups in our society, have undergone since their arrival in the United States. Same as AAST 2717. Approved for arts and sciences core curriculum: United States context.

**HIST 2837-3. Topics in American Working Class History.** Students gain an understanding of the historical influence and contributions of the working class through lectures, textbook readings, and discussions of assigned primary literature written by or about America's working classes. Approved for arts and sciences core curriculum: United States context.

**HIST 3317-3. Seminar in the American West.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3417-3. Seminar in African American History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3847 (1-3). Independent Study.**

**HIST 4217-3. The American West in the 19th Century.** Explores cultural, social, and political interaction in the American West during the 19th century. Themes include environmental change; conflict and syncretism across race, class, and gender lines; and mythic images, and their relationship to the "real" West.

**HIST 4227-3. The American West in the 20th Century.** Explores cultural, social, and political interaction in the American West during the 20th century. Themes include popular culture, state-federal relationships, environmental change, urbanization, immigration, and cultural formation.

**HIST 4267-3. U.S. Mining West.** Integrates social, economic, technological, and environmental aspects of industrial mining in the U.S. West. Explores urban de-

velopment and economic adaptations, mining and reclamation technology, and federal mining law and policies that accompanied the evolution of the industry.

**HIST 4327-3. The American Southwest.** Focusing on the region's three main peoples (Indian, Hispanic, and Anglo), emphasizes dynamics of interethnic relations. Indian migrations, Spanish conquest and Indian response, Mexican-Indian interaction, and Anglo domination are among the themes discussed.

**HIST 4417-3. Environmental History of North America.** Examines how people of North America, from precolonial times to the present, organized their lives within the ecological systems of the area, how they conceived of their natural world, and how they reshaped their environment according to their human needs. Prereqs., HIST 1015 and 1025.

**HIST 4617-3. The Indian in American History: The Eastern Region.** Explores pre-European social and cultural developments, longevity, and continuity of human history in North America. By examining ways in which Indian societies east of the Mississippi River responded to Euro-Americans, the Indians' role in eastern North American history is demonstrated.

**HIST 4627-3. The Indian in American History: The Western Region.** Explores the longevity and continuity of human history in North America by discussing pre-European social and cultural developments. By examining ways in which Indian societies west of the Mississippi River responded to Euro-Americans, the Indians' role in western North American history is demonstrated.

**HIST 4717-3. Chinese American History.** Examines Chinese American history from 1848 to the present day within context of socioeconomic and political developments in China and the United States. Topics include the Chinese diaspora, immigration to the United States, participation in the economy, the exclusion movement, community development, women, and family. Prereqs., AAST 1015, or HIST/AAST 2717, or instructor consent.

**HIST 5847 (1-3). Independent Study.**

**HIST 6317-3. Readings in the American West.** Prereq., graduate standing.

**HIST 6417-3. Readings in Environmental History.** Offers historical perspective on the complex and interdependent relationship between human social and cultural institutions and the natural world. Considers interdisciplinary methodologies incorporating history, biology, geography, law, and other disciplines. Same as EPOB 6410.

**HIST 7257-3. Seminar: History of the American Frontier.** Prereq., graduate standing.

**HIST 7847 (1-3). Independent Study.**

## World Areas: Specific Regions

**HIST 1038-3. Introduction to Latin American History.** Broad survey of the history of that part of the Western Hemisphere now known as Latin America. Chronologically covers prehistorical period to present. Provides an understanding of the relationship of Latin America to the Western world, and is concerned with Latin American social and political development. Approved for arts and sciences core curriculum: historical context.

**HIST 1208-3. Sub-Saharan Africa to 1800.** Introduces the peoples of Africa south of the Sahara and some major developments in the region up to A.D. 1800. Approved for arts and sciences core curriculum: historical context.

**HIST 1308-3. Introduction to Middle Eastern History.** Interdisciplinary course that focuses on medieval and modern history of the Middle East (A.D. 600 to the present). Introduces the Islamic civilization of the Middle East and the historical evolution of the region from the traditional into the modern eras. Covers social patterns, economic life, and intellectual trends, as well as political development. Approved for arts and sciences core curriculum: historical context.

**HIST 1408-3. Introduction to South Asian History.** Introduction to South Asian History is a survey of the history of the South Asian subcontinent from prehistoric times to the present. Lectures and readings deal with political, economic, social, and intellectual history. Approved for arts and sciences core curriculum: historical context.

**HIST 1608-3. Introduction to Chinese History.** Introduces students to Chinese civilization and to its historical evolution, from Neolithic period to present. Focuses on social patterns, economic structure, intellectual trends, and political developments. Approved for arts and sciences core curriculum: historical context.

**HIST 1708-3. Introduction to Japanese History.** A broad interdisciplinary survey of the history of Japan from earliest times to the 20th century. Explores the

development of political institutions, social structures, cultural and religious life, economic development, and foreign relations in an historical perspective. Approved for arts and sciences core curriculum: historical context.

**HIST 3018-3. Seminar in Latin American History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3218-3. Seminar in African History.** Deals with particular themes in African history. Check with department for details. Restricted to majors.

**HIST 3328-3. Seminar in Middle Eastern History.** Examines selected issues in modern Middle Eastern history. Check with the department concerning the specific subject of the seminar. Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3628-3. Seminar in Recent Chinese History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3718-3. Seminar in Japanese History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3848 (1-3). Independent Study.**

**HIST 4118-3. History of Mexico to 1821.** Studies Mexican history beginning with roots and evolution of pre-Columbian civilizations and concluding with the events of Mexican independence in 1821. Emphasizes society and culture of the Aztecs and Mayans, the Spanish conquest of Mexico, and the colonial regime of New Spain.

**HIST 4128-3. The Emergence of Modern Mexico.** Study of Mexican history continues with the establishment of independence in 1821. Examines the upheavals of the Mexican Revolution and culminates with recent events in Mexico. Same as CHST 4128.

**HIST 4218-3. States and Societies of West Africa to 1900.** Examines the history of West Africa from the earliest times to the 19th century. Prereq., junior standing.

**HIST 4248-3. Africa in the 19th Century.** Juxtaposes an increasing process of indigenous state-building with increasing European presence.

**HIST 4258-3. Africa under European Colonial Rule.** Focuses on the political, economic, and social dimensions of colonialism, as well as African nationalism and decolonization.

**HIST 4318-3. The Medieval Middle East, A.D. 500–1600.** Examines the history of the Middle East from 600 to the early modern period. Attention divided equally between political and economic history, and the arts and sciences characteristic of the civilization of Islam (theology, philosophy, mysticism, etc.).

**HIST 4328-3. The Modern Middle East, 1600 to the Present.** Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social, and cultural modernization in the main countries. Same as HIST 5328.

**HIST 4538-3. History of Modern India.** Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic, and social development of modern India. Recommended prereq., at least 6 hours of history credit.

**HIST 4618-3. Traditional China.** Examines major traditions in philosophy, art, politics, society, and economy of China during the premodern period.

**HIST 4628-3. Modern China.** Examines China from 1750 to 1949. Focuses on such issues as the influence of imperialism, the emergence of nationalism, and the meaning of revolution. Same as HIST 5628.

**HIST 4638-3. Contemporary China.** Examines the history of the People's Republic of China from 1949 to the present. Focuses on such issues as the nature of Maoism, foreign policy, political campaigns such as the Cultural Revolution and the Democracy movement, and recent economic developmental efforts.

**HIST 4648-3. History of Modern Chinese Intellectual Thought.** Examines major intellectual movements in modern China from Ch'ing neo-Confucianism, empiricism, and nationalism to Chinese communism.

**HIST 4718-3. Ancient, Classical, and Medieval Japanese History.** Begins with the prehistoric and protohistoric periods. Explores the development of Japan's classical age and traces the rise and attenuation of an elite warrior government.

**HIST 4728-3. Modern Japanese History.** Begins with early modern Japan, proceeds through the era of rapid modernization after the Meiji Restoration in the mid-19th century, and concludes with Japan's gradual descent into prolonged war, first with China and then in the Pacific.

**HIST 4738-3. History of Early Modern Japan (1590–1868).** Covers the history of early modern Japan (1590–1868). Explores the political, social, cultural, and economic context of Japan's history from the era of Warring States through the rise and fall of the Tokugawa military government (Shogunate). Recommended prereq., HIST 1708. Same as HIST 5738.

**HIST 5248-3. History of Anglo-American Criminal Justice.** Explores the social, cultural, and legal history of Anglo-American criminal justice from the 17th to the 20th centuries. Also examines tensions between various methods that historians employ to study crime and law.

**HIST 5328-3. The Modern Middle East, 1600 to the Present.** Prereq., graduate standing. Same as HIST 4328.

**HIST 5628-3. Modern China.** Prereq., graduate standing. Same as HIST 4628.

**HIST 5738-3. History of Early Modern Japan (1590–1868).** Same as HIST 4738.

**HIST 5848 (1-3). Independent Study.**

**HIST 7848 (1-3). Independent Study.**

## World Areas: Comprehensive and General

**HIST 3019-3. Seminar in Asian and African History.** Restricted to majors. Approved for arts and sciences core curriculum: critical thinking.

**HIST 3849 (1-3). Independent Study.**

**HIST 4109-3. World War II in Asia and the Pacific.** For Asia, World War II began with the Mukden Incident (1931), resulting in the Japanese domination of Manchuria and leading to a full-scale war between China and Japan in 1937. Only after the Japanese attacked the U.S. Pacific fleet at Pearl Harbor four years later did the United States enter the war. Discusses the various socioeconomic and political factors leading to the war in Asia, examines the nature of the conflict on the Asian mainland and in the Pacific, and assesses legacy of the war on all those involved.

**HIST 4619-3. Women in Asian History.** Considers major issues in the history of Asian women in the 18th, 19th, and 20th centuries. Focuses on gender roles in Asian family, state, and religious systems. Same as WMST 4619.

**HIST 5849 (1-3). Independent Study.**

**HIST 6019-3. Readings in World History.** Prereq., graduate standing.

**HIST 6329-3. Readings in Comparative Ethnohistory.** Prereq., graduate standing.

**HIST 7849 (1-3). Independent Study.**

## Honors

**HONR 1001-1. Honors Coseminar.** Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 10–15 students, coseminars are taken either for an additional 1 credit hour or in place of a recitation. Coseminars are designed to provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.

**HONR 1810-3. Honors Diversity Seminar.** In this course, students develop an appreciation for and experience with diverse perspectives, particularly racial/ethnic, gender, sexual orientation, and class perspectives, for constructing knowledge as they proceed through their undergraduate studies. Three themes provide the framework for the course: education for the next century, the 21st century citizen, and the modern individual in a diverse society. Topics explored in the course include stigmatization, privilege, targeted and nontargeted grouping, and oppression. Students are required to engage in independent research and experiential, empathetic experiences. Prereq., overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: cultural and gender diversity.

**HONR 1820-3. Critical Issues in Contemporary Society.** Pursue an in-depth research project on a subject chosen in collaboration with the instructor. Both the research and writing process are emphasized. In addition, numerous articles and works concerning issues of importance to the social sciences are read. Such topics may include, but are not limited to, environmental concerns, questions of justice in society, income distribution, issues of ethnicity. Prereq., overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: contemporary societies.

**HONR 2001-1. Honors Coseminar.** Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 10–15 students, coseminars are taken either for an additional 1 credit hour or in place of a recitation. Coseminars are designed to provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.

**HONR 2020-3. Honors Writing Workshop: Fundamentals.** Focuses on every part of the writing process. While poetry, fiction, etc., are written informally, the principle focus of the course is the expository essay. Approved for arts and sciences core curriculum: written communication.

**HONR 2250-3. Ethics of Ambition.** Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in a dangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries. Same as FARR 2660. Approved for arts and sciences core curriculum: ideals and values.

**HONR 2251-3. Introduction to the Bible.** Studies the major works, figures, and genres of the Bible and attempts to understand what they meant to their own time and why they became so important to Western civilization and contemporary America. Prereq., overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: historical context.

**HONR 2500-3. Open Topics.** Variety of new courses at the 2000 level. See honors program announcements for specific contents. Prereq., GPA 3.30 or higher.

**HONR 2610-1. Leadership Practicum: KHP Flock Leaders.** Required for students who are selected as flock leaders for the Kittredge honors residence program. Teaches skills and techniques to enable them to lead a small group in the unique environment of a residential honors program. May be repeated up to 2 total credit hours. Prereq., consent of Kittredge honors program director.

**HONR 2810-3. Practical Statistics.** A survey of the basic statistics common to the social and natural sciences from the basic principles of probability through multiple sample designs. The emphasis is on hypothesis testing, creating, and reasoning from numeric information. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**HONR 2860-3. The Figure of Socrates.** Investigates why Socrates intrigued great writers like Aristophanes, Plato, Xenophon, and Aristotle and why, through his life and execution by the Athenian democracy, he still influences Western ethics, politics, and education and is central to cultural literacy. Prereq., overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: literature and the arts.

**HONR 3001-1. Honors Coseminar.** Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 10–15 students, coseminars are taken either for an additional 1 credit hour or in place of a recitation. Coseminars are designed to provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.

**HONR 3004-3. Women in Education.** Honors women in education and their legacy. Introduces women educators, beginning in the late 19th century, whose significant theories of education and work in teaching have had an impact on all of our lives, in history, and in society. Explores the educational theories and methods of several representative women educators and analyzes them through an investigation of their professional and personal lives. Same as WMST 3004. Approved for arts and sciences core curriculum: cultural and gender diversity. Prereq., overall GPA of 3.30 or higher.

**HONR 3220-3. Advanced Honors Writing Workshop.** Intensive practice of expository writing skills, particularly argumentation in longer forms. Course includes extensive practice in researching secondary sources, synthesizing large bodies of information, structuring cogent arguments for diverse sources, etc. Prereqs., junior or senior standing or instructor consent, and overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: written communication.

**HONR 3270-3. Journey Motif in Women's Literature.** Investigates the application of the theme of the journey to developmental narratives by analyzing modern British and American writings by women. Applies methods from

psychology, feminist studies, gay studies, cultural studies to concepts of development, regression, progress, escape. Prereq., overall GPA of 3.30 or higher. Approved for arts and sciences core curriculum: critical thinking.

**HONR 3810-3. Privilege and Modern Social Construction.** This course examines social constructions that lead to productive interactions between and among American social communities. Using case studies and humanistic accounts, students analyze the lived experiences of a unique group or successful citizens who routinely evidence productive practices of multicultural engagement. Through interactions with policy makers and community practitioners, students design and enact activities that allow them to reconstruct their personal patterns of privilege practices of their peer groups in various settings. Prereq., HONR 1810 or demonstrated academic study of race, class, and gender.

**HONR 4000-3. Open Topics.** Variety of new courses at the 4000 level, see Honors Program announcements for specific contents. Prereq., junior or senior standing or instructor consent, and overall GPA of 3.30 or higher.

**HONR 4025-3. Heroines and Heroic Tradition.** Given recent controversies about the roles of women in power, this course re-evaluates heroic traditions as the stories that ground our sense of public endeavor. What do we mean by heroic? What is a heroine? Are heroines different from heroes? Approved for arts and sciences core curriculum: cultural and gender diversity.

**HONR 4055-3. Discourse Analysis and Cultural Criticism.** Discourse analysis critically investigates the founding assumptions by which systems of meaning operate. Its practice is aimed at a rigorous, systematic analysis of both specific cultural issues and the dynamics by which structures of meaning may be maintained or transformed. Prereq., overall GPA of 3.30 or higher. Coreq., HONR 4056. Approved for arts and sciences core curriculum: critical thinking.

**HONR 4056 (1-3). Service Practicum: Discourse Analysis and Cultural Criticism.** Help communities in need, with credit hours varying according to time commitment. The practicum provides experiential and intellectual understanding of the discourses and dynamics that maintain major cultural hierarchies of values and of resource distribution. Coreq., HONR 4055.

**HONR 4155-3. Problems of Ancient and Modern Democracy.** Democracy, like science and comedy, is an essential aspect of contemporary societies and modern life that began in ancient Greece. Students read, discuss, and give oral and written reports on classic texts and the problems and challenges of contemporary democracies. Prereqs., junior or senior standing, and a meeting with an advisor. Approved for arts and sciences core curriculum: ideals and values.

## Humanities

*See Comparative Literature and Humanities.*

## Kinesiology and Applied Physiology

*See Integrative Physiology.*

## Korean

*See East Asian Languages and Civilizations.*

## Integrative Physiology

*IPHY courses have been renumbered under IPHY and EBIO course numbers. Credit will not be granted for a course taken under its former number and its current number.*

**IPHY 1010-3. Introduction to Integrative Physiology.** Introduces the sub-disciplines central to integrative physiology including anatomy and physiology and their adaptability to physiological and pathological stress. Coreq., one semester general biology. Formerly KAPH 1010.

**IPHY 1950-3. Introduction to Scientific Writing in Integrative Physiology.** Provides an overview of writing skills and strategies, emphasizing those most important to the sciences, especially kinesiology and physiology. Focuses on fundamental skills, objective analysis, and scientific persuasion, with attention to clear organization and style, academic and scientific mechanics, and distinctions between audiences. Meets MAPS requirement for English. Formerly KAPH 1950. Approved for arts and sciences core curriculum: written communication.

**IPHY 2010 (1-3). Seminar in Integrative Physiology.** Introduces a small group of lower-division students to current research topics in kinesiology. Emphasizes relevant applications to real-world situations. May be repeated up to 6 total credit hours when topics vary. Prereq., KAPH 1010 or IPHY 1010. Formerly KAPH 2010.

**IPHY 2600-2. Introduction to Research Methods.** Provides skills necessary for interpreting research in integrative physiology. Current designs, methods and applications will be used to develop the skills necessary to understand, utilize and critique research using examples from professional literature. Prereqs., KAPH 1010 or IPHY 1010. Restricted to KINE or IPHY majors. Similar to KAPH 2700. Students may get credit for either KAPH 2600 or KAPH 2700 or IPHY 2600 but not for all three. Formerly KAPH 2600.

**IPHY 2800-3. Introduction to Statistics.** Examines the application of statistics to research relevant to kinesiology and applied physiology. Includes instruction and hands-on experience with related computer programs and interpretation of the results of their use. Prereq., KAPH 1010 or IPHY 1010, IPHY 2600 recommended. Restricted to majors. Formerly KAPH 2800.

**IPHY 2910 (1-3). Practicum in Integrative Physiology.** Offers practical experience in organized situations with direct supervision. May be repeated up to 3 total credit hours. Prereq., instructor consent. Formerly KAPH 2910.

**IPHY 3010 (1-2). Teaching in Integrated Physiology.** Provides an opportunity to assist in teaching specific laboratory sections in IPHY under direct faculty supervision. Students must make arrangements with the faculty member responsible for the course in which they plan to assist. May be repeated up to 4 total credit hours. Prereq., junior standing and instructor consent.

**IPHY 3060-4. Cellular Physiology.** Lect. and lab. Introduces the biology of plants and animals at molecular, cellular, and organismal levels of integration, emphasizing the complementarities of structure and function and mechanisms of homeostasis. Labs emphasize skills and techniques useful in advanced courses in biology and in independent research. Labs use animals and/or animal tissues. Prereq., one year general biology. Formerly KAPH/EPOB 2060.

**IPHY 3130-3. Environmental Animal Physiology.** Broad consideration of biochemical, physiological, and behavioral adaptations of vertebrate animals to various environments and strategies for allocation of energetic expenditures in relation to environmental demands. Prereq., one year general biology. Formerly KAPH/EPOB 3130.

**IPHY 3410-5. Introduction to Human Anatomy.** Lect. and lab. Introduces basics of human anatomy. Uses animals and animal tissue. Prereqs., EBIO 1210 and 1220. Formerly EPOB 3420.

**IPHY 3420-3. Nutrition, Health, and Performance.** Highlights basic principles of nutrition and their relation to health. Prereq., junior standing (prenursing students see department). Formerly KAPH 3420. Approved for arts and sciences core curriculum: natural science.

**IPHY 3430-5. Human Physiology.** Lect., lab., and rec. Introduces human physiology primarily for students in pharmacy and allied health programs. Uses animals and animal tissue. Prereqs., EBIO 1210, 1220, CHEM 1071, 1131, or 1171. Recommended prereq., IPHY 3410. Formerly EPOB 3403.

**IPHY 3450-5. Comparative Animal Physiology.** Lect., lab, and rec. Introduces principles of animal physiology and responses to environmental change. Uses animals and/or animal tissues. Prereqs., EBIO 1210–1240 or equivalent. Formerly KAPH 3450, EPOB 3700.

**IPHY 3460-5. Comparative Vertebrate Anatomy.** Lect. and lab. Introduces major components of the vertebrate body and how they are organized into a whole organism, emphasizing function, evolution, and diversity of these basic features. Laboratories involve dissection of representative groups and demonstrations. Uses animals and/or animal tissues. Prereqs., EBIO 1210–1240 or equivalent. Formerly EPOB 3720.

**IPHY 3600-3. Immunology.** Understanding the immune system is important in both physiology and medicine. The immune system is a multi-cellular system that functions to protect us from disease. This course will introduce concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense. Prereqs., IPHY 1010 and one year of general biology. Restricted to majors.

**IPHY 3660-3. Dynamics of Motor Learning.** Focuses on information processing approaches and dynamical systems theory as explanations for human motor learning and the coordination of movement. Various topics are discussed from

both perspectives including practice organization, attainment of elite performance, and the production of novel movements. Formerly KAPH 3660. Approved for arts and sciences core curriculum: natural sciences.

**IPHY 3700-3. Scientific Writing in Integrative Physiology.** Course units cover writing preparation techniques, elements of style/format, and organizational skills. Lectures and assignments emphasize critical reading and analysis of kinesiology literature. Students write and revise conceptual and laboratory/research papers. Prereq. or coreq., at least one upper-division IPHY core course. Restricted to majors. Formerly KAPH 3700. Approved for arts and sciences core curriculum: written communication.

**IPHY 3730-3. Brain and Behavior.** Investigates how the brain controls vertebrate behavior. After an introduction to basic neural mechanisms underlying the regulation of complex behavior, specific biological topics will be discussed, such as sexual behavior, photoperiodism, territorial behavior, bird-song, etc. Prereq., one year general biology. Formerly KAPH/EPOB 3730.

**IPHY 4010 (1-3). Seminar in Integrative Physiology.** Introduces a small group of students to current research topics in kinesiology, evaluation of current research, and discussion of critical issues. May be repeated up to 6 total credit hours when topics vary. Prereq., IPHY 1010, 2800. Formerly KAPH 4010.

**IPHY 4100-2. Colloquium in Integrative Physiology.** General research seminar experience for upper-division majors. Emphasis on integrating research topics from all areas of integrative physiology, and promoting faculty-student research interaction. Emphasis also on developing fundamental research skills and science-based critical thinking. May be repeated up to 6 total credit hours. Prereq., IPHY 1010 and 2800. Restricted to juniors and senior majors. Same as IPHY 5100. Formerly KAPH 4100.

**IPHY 4440-3. Endocrinology.** Introduces mammalian endocrine system. Course provides a thorough analysis and integration of chemical communication by hormones, paracrines, and semiochemicals. Prereq., IPHY 3430 or 3450. Same as IPHY 5440. Formerly KAPH 4440/5440 and EPOB 4440/5440.

**IPHY 4470-3. Biology of Human Reproduction.** Lect. Anatomy and physiology of human reproduction, including gender determination, embryology, puberty, menstrual cycle, pregnancy, lactation, menopause, sexual behavior, sexual abnormalities and contraception. Open to nonmajors. Prereqs., EBIO 1210–1240. Formerly KAPH 4470 and EPOB 4720.

**IPHY 4480-3. Comparative Reproduction** Lect. Focuses on comparative anatomy and physiology of reproductive system and the evolution of reproductive behavior in vertebrates and invertebrates. Topics include courtship, mating, fertilization, estrous and menstrual cycles, and environmental control of seasonal reproduction. Prereq., EBIO 1210–1240. recommended prereq., IPHY 3430. Formerly KAPH 4480 and EPOB 4480.

**IPHY 4500-4. Histology: Cells and Tissues.** Lect. and lab. Analysis of vertebrate histology and preparation of vertebrate tissues for light microscopic examination. Especially useful to students of vertebrate anatomy, development, and physiology. Uses animals and/or animal tissue. Prereq., IPHY 3430 or 3450. Same as IPHY 5500. Formerly KAPH 4500/5500 and EPOB 4700/5700.

**IPHY 4540-5. Biomechanics.** Applies the principles of physics and physiology to the analysis of human movement. Quantitative analysis of the forces, torques, mechanical energy, power impulses and momentum associated with human movement. Mechanical properties of muscles, tendons, ligaments and bones. Prereqs., IPHY 1010, 2800, 3410, PHYS 2010, MATH 1300, or 1310, or APPM 1350. Restricted to majors. Formerly KAPH 4540.

**IPHY 4560-3. Quantitative Analysis in Integrative Physiology.** Introduction to and practice of various measurements techniques associated with the assessment of kinesiological parameters. Prereqs., IPHY 1010, 2800, and junior standing. Restricted to majors. Formerly KAPH 4560. Approved for arts and sciences core curriculum: critical thinking.

**IPHY 4650-5. Exercise Physiology.** Examines physiological adjustments that occur in selected organ systems with acute and chronic exercise. Topics center on the physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations. Prereqs., IPHY 1010, 2800, and 3430. Prereq. or coreq., IPHY 3410. Restricted to junior and senior majors. Formerly KAPH 4650.

**IPHY 4660-3. Critical Thinking in Integrative Physiology.** Covers specific exercise physiology topics in areas such as animal physiology, endothelial function, neurobiology, exercise immunology and exercise physiology. May be repeated up to 6 total credit hours. Prereq., 13 hours of IPHY course work.

Restricted to junior/senior majors. Formerly KAPH 4660. Approved for arts and sciences core curriculum: critical thinking.

**IPHY 4690-4. Clinical Aspects of Exercise.** Covers general principles of exercise testing including electrocardiography and exercise prescription. Pathophysiology of coronary heart disease, diabetes mellitus, and hypertension are also covered. Prereq. or coreq., IPHY 4650. Formerly KAPH 4690.

**IPHY 4720-4. Neurophysiology.** Describes how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. Prereqs., IPHY 1010, 2800. Prereq. or coreq., IPHY 3410. Restricted to majors. Formerly KAPH 4720.

**IPHY 4730-3. Motor Control.** Examines the central and peripheral neural structures responsible for the control and coordination of human movement. Theories of motor control are also investigated from a behavioral and biomechanical view. Concepts in reflexive and voluntary movement control are emphasized. Prereq., junior standing. Same as IPHY 5730. Formerly KAPH 4730.

**IPHY 4740-3. Theory of Motor Skill Learning.** Offers a critical analysis of motor learning theories, including Adam's closed loop theory, Schmidt's schema theory, and the influence of contextual interference on learning and performance. Also covers feedback and practice organization. Projects and presentations required. Prereq., junior standing. Same as IPHY 5740. Formerly KAPH 4740.

**IPHY 4750-4. Psychological Kinesiology.** Examines theoretical concepts and current research concerning psychological phenomena as they relate to motor performance, exercise, and sport. Topics include a scientific approach to studying movement behavior, arousal, anxiety, personality, group dynamics, modeling, efficacy, and exercise adherence. Prereqs., IPHY 1010 and 2800. Restricted to majors. Formerly KAPH 4750.

**IPHY 4760-3. Critical Thinking in Motor Behavior.** Focuses on critical analysis of research in the area of motor behavior (motor control/learning and sport and exercise psychology). Students participate in group discussions, individual presentations, and written arguments. Prereq., IPHY 4720 or 4750. Formerly IPHY 4760. Approved for arts and sciences core curriculum: critical thinking.

**IPHY 4770-4. Mind–Body Health.** Examines the bidirectional interaction between the psychological state (the mind) and physiological functions (the body.) Topics include the bidirectional impact of several states of the mind on health and the importance of physical activity in preventing the negative impact of these mental states on health. Prereqs., IPHY 1010, 2800, and 3410. Coreq., IPHY 3430. Restricted to junior/senior majors. Formerly KAPH 4770.

**IPHY 4860 (1-3). Independent Study: Undergraduate.** Students may register for more than one section per term. May be repeated up to 8 total credit hours. Formerly KAPH 4860.

**IPHY 4870 (1-3). Honors Thesis.** Prereq., IPHY 2800 and 3700. Formerly KAPH 4870.

**IPHY 4930 (1-6). Internship.** Provides an opportunity for field/laboratory work in a variety of different settings. Prereq., junior or senior status and completion of at least two of the major core classes. Consult with faculty for approval. May be repeated up to 6 total credit hours. Formerly KAPH 4930.

**IPHY 5100-2. Colloquium in Integrative Physiology.** Same as IPHY 4100. Formerly KAPH 5100.

**IPHY 5440-3. Endocrinology.** Same as IPHY 4440. Formerly KAPH 4440/5440 and EPOB 4440/5440.

**IPHY 5500-4. Histology: Cells and Tissues.** Same as IPHY 4500. Formerly KAPH 4500/5500 and EPOB 4700/5700.

**IPHY 5550-3. Biochemical Basis of Exercise.** Examines the underlying biochemical mechanisms that are responsible for the physiological adaptations to short- and long-term dynamic exercise. Prereq., one year of chemistry. Prereq. or coreq., IPHY 4650 or instructor consent. Formerly KAPH 5550.

**IPHY 5640-3. Clinical and Exercise Electrocardiography.** Lectures and laboratory practice in recognition and evaluation of normal and pathological electrical activity of the heart as demonstrated by the electrocardiogram. For graduate students who monitor laboratory physiological testing and/or prescriptive exercise programs in laboratory settings. Prereqs., IPHY 3430 and 4650. Formerly KAPH 5640.

**IPHY 5700-3. Exercise and Sport Psychology.** Examines psychological factors as they relate to motor performance, exercise, and sport. Current theoretical concepts and research are examined. Projects and presentations are required. Prereq., IPHY 4750 or equivalent. Formerly KAPH 5700.

**IPHY 5730-3. Motor Control.** Same as IPHY 4730. Formerly KAPH 5730.

**IPHY 5740-3. Theory of Motor Skill Learning.** Same as IPHY 4740. Formerly KAPH 5740.

**IPHY 5790-3. Psychological Basis for Human Performance.** Advanced course dealing in-depth with specialized topics relevant to motor performance, exercise, and sport. Critical analysis of theories and research. Prereq., IPHY 4720 or 4750 and 5750. Formerly KAPH 5790.

**IPHY 5800-5. Advanced Statistics and Research Methods in Kinesiology.** Focuses on how descriptive, correlational, and inferential statistics apply to kinesiological data. Provides instruction and experience in using related computer programs and examines the many considerations involved in kinesiological research methods. Prereq., IPHY 2800. Formerly KAPH 5800.

**IPHY 5830-3. Writing for the Research Scientist.** Promotes understanding of the rhetorical goals, structure, design, and language for effective scientific texts, emphasizing research reports and grant proposals. Supports students in executing advanced cognitive processes in planning, drafting, and revising. Involves instructor-guided procedural facilitation and peer-review workshops based on students' current writing projects in courses and laboratory research. Prereq., basic proficiency in English. Restricted to graduate students. Formerly KAPH 5830.

**IPHY 5840 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours. Formerly KAPH 5840.

**IPHY 6010 (1-3). Seminar.** Presents special topics in integrative physiology. Formerly KAPH 6010.

**IPHY 6020 (1-3). Seminar.** Presents special topics in integrative physiology. May be repeated up to 7 total credit hours. Formerly KAPH 6020.

**IPHY 6100 (1-3). Independent Study—Doctoral.** Mentor-supervised academic experience designed to develop and enhance the professional/research skills of the doctoral candidates from the department. Formerly KAPH 6100.

**IPHY 6610-3. Controversies in Exercise Physiology.** Discusses controversial topics in exercise physiology and biochemistry. Critically analyzes the physiological mechanisms, significance, and responses of each topic. Students participate in scientific debates and article critiques. Prereq., IPHY 4650. Formerly KAPH 4650.

**IPHY 6620-3. Current Topics in Exercise Physiology.** Presents and evaluates relevant issues in the field of exercise physiology; conducted in a seminar format. May be repeated up to 9 total credit hours. Prereq., IPHY 4650. Formerly KAPH 6620.

**IPHY 6640-3. Systemic Cardiovascular Regulations.** Focusing on systemic control of the cardiovascular system at rest and in response to acute and chronic physiological states such as exercise. Primary emphasis is on the human cardiovascular system in health, chronic disease, and normal aging. Prereqs., IPHY 3410, 3430, and 4650. Formerly KAPH 6640.

**IPHY 6650-3. Cellular Cardiovascular Physiology.** Focuses on the cellular control of cardiac and smooth muscle contraction, at rest and in response to acute and chronic exercise. Addresses certain pathophysiological and physiological adaptive mechanisms. Prereq., IPHY 4650. Formerly KAPH 6650.

**IPHY 6660-3. Locomotion Energetics and Biomechanics.** Critiques and discusses both classic and cutting edge scientific research in the area of terrestrial locomotion. Recommended prereqs., IPHY 4540, 4650 and graduate standing in IPHY or EBIO. Formerly KAPH 6660.

**IPHY 6670-2. Hypothesis Testing in Locomotion Biomechanics.** Focuses on the scientific process including formulating and testing hypotheses in studies of locomotion. Students analyze primary articles to determine whether the studies tested hypotheses and to generate new hypotheses that logically follow from previous studies. Formerly KAPH 6670.

**IPHY 6830-3. Professional Skills for the Research Scientist.** Focuses on delineation of research problems, types of research, design of experiments, specific research procedures and tools, and instruction in preparation of proposals, research papers, and theses. Formerly KAPH 6830.

**IPHY 6840 (1-3). Research Project.** Involves a scholarly investigation of a selected topic using literature and/or experimental techniques. Advisor required. May be repeated up to 7 total credit hours. Formerly KAPH 6840.

**IPHY 6940-3. Master's Degree Candidate** Formerly KAPH 6940.

**IPHY 6950 (1-6). Master's Thesis.** Formerly KAPH 6950.



**IPHY 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Formerly KAPH 8990.

## International Affairs

**IAFS 1000-4. Global Issues and International Affairs.** Introduces the student to the international affairs program. The course examines political and economic development in several countries in many different world regions. Examines both historical trends and development as well as current political and economic issues. Approved for arts and sciences core curriculum: contemporary societies.

**IAFS 3000-3. Special Topics in International Affairs.** Senior level umbrella seminar spanning a variety of topics relevant to the study of international affairs. Subjects addressed under this heading vary according to student interest and faculty availability. May be repeated up to 6 total credit hours. Restricted to juniors and seniors.

**IAFS 4500-3. The Post-Cold War World.** Capstone course for international affairs majors. Examines the ways in which the end of the Cold War affected world politics. Studies how peoples, governments, and nongovernmental organizations faced new social, political, and economic challenges as issues of military confrontation and the danger of nuclear war between the superpowers faded. Includes discussion, oral reports, critical book reviews, and research papers. Prereqs., IAFS 1000 and junior standing. Approved for arts and sciences core curriculum: critical thinking.

**IAFS 4800-3. Honors Seminar in International Affairs.** Directed research course tailored to the particular research interests of the students enrolled. Devoted to research methodology and the development of students' research. Prereq., 3.50 GPA. Approved for arts and sciences core curriculum: critical thinking.

**IAFS 4810-3. Honors in International Affairs.** Continuation of IAFS 4800. Students complete original research begun in the fall and write and defend their honors thesis. They meet regularly with the instructor. Prereq., IAFS 4800.

**IAFS 4900 (3-6). Independent Study in International Affairs.** Provides an opportunity to earn academic credit for learning outside the formal class structure. Students interested in doing in-depth research propose a research project to a faculty sponsor and then work closely with that person to produce a piece of original research. Prereq., upper-division standing, GPA of 3.00 or better, grade of C or better in all lower-division courses, and at least 6 upper-division courses.

**IAFS 4930 (3-6). Internship in International Affairs.** Working individually under the guidance of a public or private organization, students are assigned to projects selected for their academic suitability. Written assignments occur throughout the semester. Prereq., departmental approval.

## INVST Community Studies

**INVS 1000 (3-4). Responding to Social and Environmental Problems through Service Learning.** By integrating theory with required community service, students explore how problems are shaped by cultural values and how alternative value paradigms affect the definition of problems. Students examine different approaches to solving problems and begin to envision new possibilities. Approved for arts and sciences core curriculum: ideals and values.

**INVS 3000 (3-4). Innovative Approaches to Contemporary Issues through Service Learning.** Explores creative approaches for solving complex social and environmental issues. Students analyze the root causes of issues, explore theoretical and historical contexts, and develop understanding of effective and responsible approaches to change. This course has a requirement of community service. Approved for arts and sciences core curriculum: contemporary societies.

**INVS 3041-3. Self and Consciousness.** Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation. Prereqs., SOCY 1001 and either 2001, 3001, or 3011. Same as SOCY 3041.

**INVS 3100 (3-4). Multicultural Leadership: Theories, Principles and Practices.** Focuses on leadership theories and skills necessary for effectiveness in multicultural settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change through comparative analyses of Western

and non-Western theories and practices. Community service required. Approved for arts and sciences core curriculum: cultural and gender diversity.

**INVS 3302-3. Facilitating Peaceful Community Change.** Students gain knowledge and skills that enable them to become effective facilitators of community goals. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply concepts to life experiences and to examine themselves as potential change agents. Theory and summer experience are integrated. Prereq., admission to INVST. Coreq., INVS 3912. Same as WMST 3302.

**INVS 3912-1. The Practice of Facilitating Peaceful Community Change.** Explores and integrates topics and skills related to facilitating peaceful community change with service activities of INVST Intern Plus. Through an experiential format, students learn to be more effective organizers and facilitators of community initiatives. Prereq., admission to INVST. Coreq., INVS 3302.

**INVS 4033-3. Implementing Social Change.** Students examine how changes are initiated within organizations and communities. They learn methods of responsible and effective leadership, conduct sector analyses of organizations and communities, and assess changes within them in terms of their function and structure. Students gain an understanding of the probable nature of relationships between social action and outcomes. Theory and summer experience are integrated. Prereq., INVS 3302; coreq., INVS 4034.

**INVS 4034-1. The Practice of Implementing Social Change.** Integrates the concepts that are discussed in the course, solving community problems with the INVS service-learning projects in the community. Prereq., INVS 3912; coreq., INVS 4033.

**INVS 4041-3. The Creative Self.** Experimental approach to the creative process that fosters experimentation outside of conventional patterns of thinking and expression, and explores the use of imagination and creative thinking in problem-solving, writing, and art. Prereqs., SOCY 1001 and either 2001, 3001 or 3011. Same as SOCY 4041.

**INVS 4732-3. Critical Thinking in Development.** Requires students to critically evaluate explanations, presented in assigned or optional readings or in student papers, on the success or failure of development and policy proposals for facilitating development. Prereqs., ECON 2010 and 2020, PSCI 2012 or IAFS 1000, and one upper-division PSCI course. Coreq., INVS 4734. Same as PSCI 4732 and similar to PSCI 4012. Approved for arts and sciences core curriculum: critical thinking or contemporary societies.

**INVS 4734-1. The Practice of Critical Thinking in Development.** Explores and integrates topics and skills related to critical thinking in development with service activities of INVST Community SOL Projects. Students also have the opportunity to explore their professional development as community leaders. Prereq., INVS 4034. Coreq., INVS 4732.

**INVS 4914-3. Democracy and Nonviolent Social Movements.** Explores theories of democracy and development engendered and tested by movements for nonviolent social change in different settings. Focuses on means and ends, spirituality, leadership, decision making, civil society, cooperative economics, ecology, and decentralized power. Coreq., INVS 4915. Same as SOCY 4115.

**INVS 4915-1. The Practice of Democracy and Nonviolent Social Movements.** Apply the principles of nonviolent, grass-roots, democratic movements with special consideration of leadership, decision making, means and ends, and the nature of civil society to create service project to focus on a social issue at the local, national, or international level. Prereq., INVS 4734; coreq., INVS 4914.

**INVS 4999-3. Teaching Social Justice.** INVS students participate in a service-learning practicum under the supervision of an INVS instructor. They explore teaching strategies for implementing concrete educational goals. Focusing on the issues of social justice and social change, they learn how to encourage higher levels of creativity and analysis among students. Prereqs., INVS 3302, 3912, 4033, 4034, 4732, 4914, 4915, and 4734. Must have completed 16 hours required INVS course work with minimum grade B-.

## Latin American Studies

**LAMS 1000-3. Introduction to Latin American Studies.** Introduction to Latin American society and culture taught by faculty from several different fields. Consistent themes in history, geography, literature, and music are explored. Approved for arts and sciences core curriculum: cultural and gender diversity.

**LAMS 4815-3. Senior Seminar—Latin American Studies.**

## Lesbian, Gay, Bisexual, and Transgender Studies

### LGBT 2000-3. Introduction to Lesbian, Gay, Bisexual, and Transgender Studies.

Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay, and transgender communities. Same as WMST 2030. Approved for arts and sciences core curriculum: cultural and gender diversity.

### LGBT 2707-3. Introduction to Lesbian, Bisexual, and Gay Literature.

Offers students at sophomore and junior levels an introduction to some of the forms, concerns, and genres of contemporary lesbian, bisexual, and gay writing in English. Prereq., sophomore standing. Same as ENGL 2707.

**LGBT 3796-3. Queer Theory.** Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, and gay literature. Examines relationships among aesthetic, cultural, and political agendas, and literary and visual texts of the 20th century. Prereq., sophomore standing. Same as ENGL 3796.

**LGBT 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of homosexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as ENGL/WMST 4287.

## Library Research

**LIBR 2000-3. Research Strategies on the Electronic Campus.** Critical examination and practical exploration of computer technologies, digital communication, and electronic information systems and services for new students. Restricted to freshmen and sophomores only.

**LIBR 3010-3. Methods of Electronic Library Research.** Exploration of the structure, organization, retrieval, and evaluation of electronic information sources through the formulation of search strategies useful for undergraduate research.

**LIBR 3900 (1-3). Independent Library Research.** In-depth library research project for upper-division students. Prereq., instructor consent.

**LIBR 4900 (1-3). Independent Library Research.** In-depth library research project for upper-division students. Prereq., instructor consent.

## Linguistics

**LING 1000-3. Language in U.S. Society.** Nontechnical exploration of the ways that language is used in America. Emphasizes language as a social institution and how values and goals of both public institutions and private groups shape and are shaped by language and its use. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**LING 1010-3. The Study of Words.** Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically. Same as CLAS 1010.

**LING 1500-3. Understanding Grammar.** Presents fundamentals of grammar in the Western tradition. Emphasizes making concepts and uses of grammar (as exemplified in English and closely related foreign languages) understandable to the nonspecialist.

**LING 1900-1. Service Learning Practicum: Adult Literacy.** Practicum for selected students in LING 1000. Provides practical experience of the impact of illiteracy on individuals, families, and the community at large. Coregistration in service learning recitation is required. Coreq., LING 1000.

**LING 2000-3. Introduction to Linguistics.** Introduces the study of languages as structural systems. Principles of sound patterns, word formation, meaning, and sentence structure. Gives attention to language acquisition, psycholinguistics, language families, dialects, historical change in languages, and different language types. Meets MAPS requirement for social science: general.

**LING 2400-3. Language and Gender.** Familiarizes students with the effects of gender on language use; discusses popular beliefs and scholarly theories

about language and communication. Provides students with tools for exploring the role of language and gender. Approved for arts and sciences core curriculum: cultural and gender diversity.

**LING 3005-3. Cognitive Science.** Same as PSYC 3005, PHIL 3310, and CSCI 3702.

**LING 3100-3. Language Sound Structures.** Introduces the sounds of languages and their organization into phonological structures. Prereq., LING 2000 or equivalent.

**LING 3220-3. American Indian Languages in their Social and Cultural Context.** A sampling of the many languages and cultures found in America before Columbus. Emphasizes those living in what eventually became the United States, but also gives attention to the languages and higher civilizations of Latin America. Prereq., junior standing. Approved for arts and sciences core curriculum: cultural and gender diversity.

**LING 3430-3. Semantics.** Theoretical and practical study of meaning in natural language. Considers both semantic theories and semantic phenomena from diverse languages. Does not treat techniques for improving the use of language.

**LING 3500-3. Language and the Public Interest.** Studies language in public and private use, concentrating on semantic devices as found in language of political propaganda, advertising, business, and government, as well as everyday use of language between people.

**LING 3545-3. World Language Policies.** Examines the economic and sociopolitical impact of choosing English vs. other languages in the U.S. Introduces the study of language policies, rights, and planning in other countries, including the worldwide use of English in social, business, and legal contexts.

**LING 3800 (1-4). Special Topics in Linguistics.** Intensive study of a selected area or problem in linguistics. May be repeated up to 9 total credit hours.

**LING 3810-1. Undergraduate Seminar Linguistic Research.** Faculty in linguistics and closely allied departments and final-year PhD students present their current research in linguistics. Regular attendance, active participation, and some readings required. May be repeated once for credit.

**LING 4040-3. Linguistics for TESEAL.** Introduces linguistics for students in the Department of East Asian Language and Civilizations' TESEAL track. Lecture is same as LING 2000, but recitation on assignments focus on East Asian languages. May not be taken by linguistics majors (undergraduate or graduate). Coreq., EALC 5950.

**LING 4100-3. Perspectives on Language.** Provides extended critical examination of a few selected issues, chosen each term for their general interest and relevance, e.g., the relation between language and thought, or human language vs. animal languages, and computer languages. Prereqs., LING 2000 or equivalent, and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**LING 4220-3. Language and Mind.** Studies processes of perceiving speech and interpreting it as meaningful and of expressing communicative intentions as utterances. Emphasizes roles of the brain and of perceptual and motor systems. Writing, gestural, and animal communicative systems are also treated. Prereqs., LING 2000 and PSYC 1001, or instructor consent. Same as PSYC 4220.

**LING 4420-3. Morphology and Syntax.** Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages. Prereq., LING 2000 or equivalent. Same as LING 5420.

**LING 4560-3. Language Development.** Emphasizes acquisition of language by young children; development in later years and into adulthood is also treated. Particular attention given to roles of environment and of neurophysiological endowment in learning to communicate with words, sentences, and narratives. Prereqs., LING 2000 and PSYC 1001. Same as SLHS 4560 and PSYC 4560.

**LING 4610-3. English Structure for Teachers of English to Speakers of Other Languages.** Description of morphological and syntactic categories and structures of English. Prereq., LING 2000. Same as LING 5610.

**LING 4800-3. Language and Culture.** Principles of language structure and how language and culture interrelate; how language and language use are affected by culture; and how culture may be affected by use of, or contact with, particular languages. Prereq., junior standing. Same as ANTH 4800.

**LING 4830-3. Honors Thesis.** Required for students who elect departmental honors. Students write an honors thesis based on independent research under the direction of a faculty member. May be repeated up to 7 total credit hours.

**LING 4900 (1-3) Independent Study.** May be repeated up to 7 total credit hours.

**LING 5030-3. Linguistic Phonetics.** Introduces practical and theoretical aspects of phonetics. Provides training in recognition and production of speech sounds, and instruction on fundamentals of articulatory, acoustic, and auditory phonetics.

**LING 5200-3. Introduction to Computational Corpus Linguistics.** Covers computer methods for doing linguistics with on-line corpora. Includes extensive introduction (with lab) to the PERL programming language, UNIX corpus tools, Concordance/ KWIC programs, syntactic treebanks, and corpora for discourse and phonetics research. Segment on corpus design covers SGML tools and theoretical issues in transcription. Prereq., graduate standing or instructor consent.

**LING 5300-3. Research in Psycholinguistics.** After a general introduction to issues and research methods in psycholinguistics (language production and comprehension, language and cognition, language acquisition), several major current research topics, such as models of speech production, and theories of brain specialization for language, are explored. Prereq., at least one graduate-level course in linguistics, psychology, or computer science. Same as PSYC 5300.

**LING 5410-3. Phonology.** Studies sound systems of language. Introduces both principles of organization of sound systems and major kinds of phonological structures found worldwide. Provides extensive practice in applying phonological principles to data analysis. Prereq., LING 5030 or instructor consent.

**LING 5420-3. Morphology and Syntax.** Same as LING 4420.

**LING 5430-3. Semantics and Pragmatics.** Explores fundamental concepts of semantics and pragmatics, including theories of communication and meaning, representation, conversational implications, speech acts, and discourse structure. Prereq., LING 5420 or instructor consent.

**LING 5450-3. Syntactic Analysis.** Introduces the major constructs used by formal theories of syntax to capture the relationship between meaning and syntactic form and uses data from diverse languages to explore the universality of these constructs. Prereq., graduate standing.

**LING 5570-3. Introduction to Diachronic Linguistics.** Familiarizes students with terminology, methods, and theories dealing with phenomena of language change through time. Prereq., LING 5410 or instructor consent.

**LING 5610-3. English Structure for Teachers of English to Speakers of Other Languages.** Prereq., graduate standing. Same as LING 4610.

**LING 5832-3. Natural Language Processing.** Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs. Prereq., graduate standing or instructor consent. Same as CSCI 5832.

**LING 5900 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**LING 5950-1. Perspectives on East Asian Languages.** Readings and discussion of issues in contrastive linguistics, cultural differences, linguistic analysis, and methodological issues related to the teaching of English to speakers of East Asian languages. May be repeated up to 6 total credit hours.

**LING 6000-3. Linguistics for Cognitive Science.** Surveys linguistics for doctoral students, especially those in the cognitive science disciplines. Covers the phenomena studied by linguists (sound systems, grammar, meaning and function, language use, and language change) and the theoretical approaches linguists take to these phenomena. Not open to graduate students in linguistics. Prereq., graduate standing or instructor consent.

**LING 6200-3. Issues and Methods in Cognitive Science.** Same as CSCI 6402, EDUC 6504, PHIL 6310, and PSYC 6200.

**LING 6300-3. Topics in Language Use.** Discusses current issues and research in a selected area related to language use and function. Sample topics include conversational interaction, language policy, language content, and sociolinguistic variation.

**LING 6510-3. Language Structures.** Surveys the structure of one or more languages, emphasizing understanding how parts of the language interact. Designed to supplement courses in which parts of languages are used to illustrate theoretical claims. Prereqs., LING 5410 and 5420.

**LING 6520-3. Topics in Comparative Linguistics.** Students compare and contrast selected structures of languages treated from a typological, genetic, or areal perspective. No special prior knowledge of the subject language is required. Prereqs., LING 5410, 5420, and 5570, or equivalent.

**LING 6560-3. Language Acquisition.** Theories and research methods in first-language acquisition of phonology, morphology, syntax, semantics, and pragmatics. Prereqs., LING 5410, 5420, and 5430, or instructor consent.

**LING 6940 (1-3). Master's Degree Candidate.**

**LING 6950 (1-6). Master's Thesis.**

**LING 7000-3. Methods of Typological Research 1.** Research practicum that provides experience in discovering generalizations about language from observations over a sample of individual languages. Students practice the steps in such research from formulation of research questions to preliminary sketch of results under close faculty supervision. Prereqs., LING 5410, 5420, and 5570; or equivalent.

**LING 7100-3. Field Methods 1.** Introduces the process of discovering structure of a language from data obtained directly from its speakers. Emphasizes effectiveness in the field context, rapid recognition of structural features, and preliminary formulation using computational tools. Prereqs., LING 5410 and 5420, or equivalent.

**LING 7110-3. Field Methods 2.** Continuation of LING 7100. Students continue field investigation of the same language, further applying the techniques introduced in LING 7100, but they are expected to undertake a deeper analysis of one aspect of the language structure. Prereq., LING 7100.

**LING 7200-3. Computational Methods in Linguistics.** Computational speech and text corpora analysis (search tools, statistics, script writing), foundations of linguistics theory (regular and context-free grammars, the Chomsky hierarchy), and an overview of common algorithms (transduction, parsing, connectionism). Prereqs., CSCI 1200 or basic computer programming ability.

**LING 7250-3. Research Methods in Language Development.** Covers advanced methods of conducting research in language development and acquired disorders. Students design a research project that includes elicitation tasks, transcription, and data coding and analysis. Child language data archives and computer-based analysis programs are explored. Prereqs., SLHS 4560, LING 4560 or PSYC 4560, or instructor consent. Same as SLHS 7250.

**LING 7410-3. Phonological Theory.** Phonetic and morphophonological representations: distinctive features, segments, prosodic structures, morphological structures. Phonological processes and their interaction. Naturalness conditions. Prereq., LING 5410 or equivalent.

**LING 7415-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as PSYC 7415, PHIL 7415, CSCI 7412, and EDUC 6506.

**LING 7420-3. Syntactic Theory.** Covers various topics in syntactic theory. May be repeated up to 9 total credit hours with instructor consent. Prereq., LING 5420 or equivalent.

**LING 7425-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as CSCI 7422, EDUC 6516, PHIL 7425, and PSYC 7425.

**LING 7430-3. Semantic Theory.** Current developments in the theory of linguistic semantics. Topics include truth-conditional theories, generative linguistic theories, semantic theories of communicative competence, and integration of these theories in development of a combined theory of semantics and pragmatics. Prereq., LING 5430 or instructor consent.

**LING 7570-3. Advanced Diachronic Linguistics.** Presents theories of language change. Discusses mechanisms of language change, its trajectories over linguistic categories and items, and its relation to theories of grammar and of language variation. Prereqs., LING 5410, 5420, and 5570, or equivalent.

**LING 7762 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Prereq., graduate standing. Same as CSCI 7762, EDUC 6505, PHIL 7310, and PSYC 7765.

**LING 7800-3. Open Topics in Linguistics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. Contact the department office for information. Prereq., instructor consent.

**LING 7900 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**LING 8410-3. Seminar: Advanced Phonology.** Advanced topics in phonological theory. Prereq., LING 7410 or instructor consent.

**LING 8420-3. Seminar: Advanced Syntax.** Advanced topics in syntactic theory. Prereq., LING 7420 or instructor consent.

**LING 8430-3. Seminar: Topics in Semantic Theory.** Devoted to particular topic in semantic theory, such as place and nature of the lexicon in linguistic theory, a particular semantically based theory of general linguistics (e.g., Montague grammar), or some aspect of lexicology (e.g., dictionaries). Prereq., LING 7430 or instructor consent.

**LING 8540-3. Seminar: Language Variation.** Selected topics on the systematic variation of language. Relative emphasis on contextual, geographical, stylistic, and social variation differs from offering to offering. Prereq., instructor consent.

**LING 8560-3. Seminar: Issues in Language Acquisition.** In-depth exploration of current issues in language acquisition, through readings and through analyses of audio- and videotapes of young children. Course topics vary; sample topics are syllable structure, development of morphological markers, and development of locative structures. Prereq., LING 7560 or instructor consent.

**LING 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

### *English as a Second Language*

**ESLG courses are taught by the International English Center and administered by Continuing Education.**

**ESLG 1110-3. Spoken English for Foreign Students.** Oral drills with goal of promoting fluency and listening comprehension. Does not fulfill humanities or major requirements.

**ESLG 1120-3. Advanced Spoken English for Foreign Students.** Continued practice in speaking and listening comprehension, with attention to grammar and pronunciation as well as meaning and appropriateness. Does not fulfill humanities or major requirements.

**ESLG 1210-3. Written Composition for Foreign Students.** Distinction between spoken and written English emphasizing grammar and vocabulary of the latter. Does not fulfill humanities or major requirements.

**ESLG 1220-3. Advanced Written Composition for Foreign Students.** Continued work on grammar and vocabulary but with greater focus on the mechanics of writing and organization of material for longer connected discourse. Does not fulfill humanities or major requirements. Prereq., ESLG 1210 or instructor consent.

**ESLG 1310-3. Intermediate Applied English Structure for Foreign Students.** Instruction and practice at the nonbeginning level in colloquial and written American English. Intended for foreign students requiring additional study to become competent in English for most university needs. Does not fulfill humanities or major requirements.

**ESLG 1320-3. Advanced Applied English Structure for Foreign Students.** Instruction and practice at the advanced level in colloquial and written American English. Intended for foreign students needing additional study of English to function to the best of their ability in a university. Does not fulfill humanities or major requirements.

## Hebrew

**HEBR 3840-3. Independent Study.** Prereqs., HEBR 1010, 1020, 2110, and 2120.

**HEBR 3850-3. Independent Study.** Prereqs., HEBR 1010, 1020, 2110, 2120, and 3840.

## Mathematics

*After completing one semester of calculus with a grade of C (2.00) or better, no math major may receive credit in any mathematics course numbered below 1300. No student may obtain more than 9 hours of credit in mathematics courses numbered below 1300. A grade of C- or above is required for all prerequisite courses.*

**MATH 1012-3. Quantitative Reasoning and Mathematical Skills.** Promotes mathematical literacy among liberal arts students. Teaches basic mathematics, logic, and problem-solving skills in the context of higher level mathematics, science, technology, and/or society. This is not a traditional math class, but is designed to stimulate interest in and appreciation of mathematics and quantitative reasoning as valuable tools for comprehending the world in which we live. Same as QRMS 1010. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1110-3. The Spirit and Uses of Mathematics 1.** For liberal arts students and prospective elementary teachers. Includes a study of problem-solving techniques in mathematics, the uses and role of mathematics in our society, and the structure of our familiar number systems. Additional topics are chosen from number theory, ancient numeration systems, computer science, modern geometry and algebra, and elementary logic. Prereq., one year of high school algebra and one year of plane geometry. The combination MATH 1110 and 1120 is approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1120-3. The Spirit and Uses of Mathematics 2.** Continuation of MATH 1110. Prereq., one year of high school algebra and one year of plane geometry. The combination MATH 1110 and 1120 is approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1130-3. Mathematics from the Visual Arts.** Introduces mathematical concepts through the study of visual arts. In practicum and lectures, students study the symmetry groups of patterns, shibori-like paper cuttings, origami, and mandalas. Also studied are Euler's characteristics, perspective, golden ratio, computer art, and fractals. Same as QRMS 1130. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1150-4. Precalculus Mathematics.** Develops techniques and concepts prerequisite to calculus through the study of trigonometric, exponential, logarithmic, polynomial, and other functions. Prereq., one and a half years of high school algebra. Students having credit for college algebra and trigonometry may not receive additional credit for MATH 1150. Students with credit for college algebra receive only 2 additional hours credit for MATH 1150. Similar to MATH 1000, 1010, 1020, 1001, 1011, 1021, 1030, and 1040. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1300-5. Analytic Geometry and Calculus 1.** Topics include limits, derivatives of algebraic and trigonometric functions, applications of the derivative, integration and application of the definite integral. Students with credit in MATH 1080, 1090, and 1100 receive only 2 credit hours in MATH 1300. Students with credit in MATH 1300 may not receive credit in MATH 1081, MATH 1310, APPM 1350, or ECON 1088. Prereqs., two years high school algebra; one year geometry; and 1/2 year trigonometry or MATH 1150. Similar to MATH 1080, 1081, 1090, 1100, 1310, APPM 1350, and ECON 1088. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1310-5. Calculus 1 with Biology Applications.** The topics, prerequisites, and credit restrictions are the same as for MATH 1300, but a greater emphasis is placed on synthesizing the geometric, numerical, and algebraic aspects of each concept and on exploring "real world" applications of calculus. Especially recommended for biology majors. Student with credit in MATH 1310 may not receive credit in MATH 1080, 1081, 1090, 1100, 1300, APPM 1350, or ECON 1088. Prereq., 2 years high school algebra; 1 year geometry; and 1/2 year trigonometry or MATH 1150. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1410-3. Mathematics for Secondary Educators.** Assists students in meeting state mathematics certification requirements. Topics include problem

solving, number systems, geometry and measurement, probability and statistics. Enrollment is restricted to students already admitted to or intending to apply for admission to the secondary teacher education program. Prereqs., one year high school algebra, one year geometry. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 2300-5. Analytic Geometry and Calculus 2.** Continuation of MATH 1300. Topics include transcendental functions, methods of integration, polar coordinates, conic sections, improper integrals, and infinite series. Prereq., Calculus 1. Students with credit in MATH 2300 may not receive credit in either MATH 1320 or APPM 1360.

**MATH 2380-3. Mathematics for the Environment.** An interdisciplinary course where analysis of real phenomena such as acid rain, population growth, and road-killed rabbits in Nevada leads to consideration of various fundamental concepts in mathematics. One-third of the course consists of individual projects chosen by students. Prereq., proficiency in high school mathematics. Same as QRMS 2380. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 2400-4. Analytic Geometry and Calculus 3.** A continuation of Calculus 2. Topics include vectors, three-dimensional analytic geometry, partial differentiation and multiple integrals, and vector analysis. Prereq., Calculus 2. Students with credit in MATH 2400 may not receive credit for MATH 2420 or APPM 2350.

**MATH 2420-4. Honors Calculus 3.** A more challenging continuation of Calculus 2. Includes complex power series and touches on more advanced topics than the nonhonors class. Includes differential equations and vector analysis. Prereq., MATH 2300 or equivalent. Similar to MATH 2400 and APPM 2350.

**MATH 2510-3. Introduction to Statistics.** Elementary statistical measures. Introduces statistical distributions, statistical inference, and hypothesis testing. Prereq., two years of high school algebra. Students may not receive credit for both MATH 2510 and MATH 4570/5570.

**MATH 3000-3. Introduction to Abstract Mathematics.** Bridges the gap between lower-division mathematics courses and the more abstract and theoretical upper-division courses. Topics vary but often include informal logic, set theory, relations and functions, axiomatic systems with examples from algebra or geometry, and number systems. Prereq., Calculus 2. Approved for arts and sciences core curriculum: critical thinking.

**MATH 3110-3. Introduction to Theory of Numbers.** Studies the set of integers, focusing on divisibility, congruences, arithmetic functions, sums of squares, quadratic residues and reciprocity, and elementary results on distributions of primes. Prereq., Calculus 3. Offered each spring.

**MATH 3130-3. Introduction to Linear Algebra.** Examines basic properties of systems of linear equations, vector spaces, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, and eigenvectors. Prereq., Calculus 3. Students may not receive credit for both MATH 3130 and APPM 2360 or APPM 3310.

**MATH 3140-3. Abstract Algebra 1.** Studies the elementary theory of groups, rings, fields, polynomials, group and ring homomorphisms, and isomorphisms. Prereq., MATH 3000, 3110, 3130, or 3200.

**MATH 3170-3. Combinatorics 1.** Covers basic methods and results in combinatorial theory. Includes numeration methods, elementary properties of functions and relations, and graph theory. Emphasizes applications. Prereq., Calculus 2.

**MATH 3200-3. Introduction to Topology.** Helps prepare students for MATH 4310 through studying the underlying structure of a space, with particular attention to open and closed sets and continuous functions. Includes basic set theory, metric spaces, Hausdorff spaces, general topological spaces, continuity, limits, homomorphisms, connectedness, and compactness. Prereq., Calculus 3. Approved for the arts and sciences core curriculum: critical thinking.

**MATH 3210-3. Euclidean and Non-Euclidean Geometries.** Axiomatic systems. Foundations of Euclidean and Lobachevskian geometries. Prereq., Calculus 3.

**MATH 4000-3. Foundations of Mathematics.** Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation. Prereq., one upper-division mathematics course.

**MATH 4120-3. Introduction to Operations Research.** Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation, and

network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits. Prereqs., MATH 3130 or APPM 3310. Same as MATH 5120 and APPM 4120.

**MATH 4140-3. Abstract Algebra 2.** Covers group actions, Sylow theory, Field theory, and some Galois theory. Prereq., MATH 3140.

**MATH 4230-3. Geometry of Curves and Surfaces.** Introduces the modern differential geometry of plane curves, space curves, and surfaces in space. Computers are used, but no prior knowledge of computer programming is required. Prereqs., Calculus 3 and MATH 3130.

**MATH 4270-3. Computer Geometry.** Involves synthetic and analytic projective geometry, especially as applied to depicting mathematical phenomena. Topics may include tangents, envelopes, splines, quadric surfaces, conformal mappings, singular points of surfaces, level curves, vector fields, and polyhedra. Prereqs., Calculus 3, MATH 3130, and CSCI 1200.

**MATH 4310-3. Introduction to Analysis.** Acquaints students with calculus of one variable. Topics include the real number system, continuity, differentiation, sequences and series, convergence, uniform convergence, Taylor's theorem, and integration. Prereqs., Calculus 3, and MATH 3000 or 3200. MATH 3130 highly recommended.

**MATH 4320-3. Multivariable Analysis.** Instructs students in calculus of several variables. Topics include continuity, differentiation and integration, implicit function theorem, inverse function theorem, and if time permits, Fourier series. Prereqs., MATH 4310, and MATH 3130 or APPM 2360.

**MATH 4330-3. Fourier Analysis.** The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth, and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics. Prereq., MATH 3130. Same as MATH 5330.

**MATH 4430-3. Ordinary Differential Equations.** Involves an elementary systematic introduction to first-order scalar differential equations,  $n$ th order linear differential equations, and  $n$ -dimensional linear systems of first-order differential equations. Additional topics are chosen from equations with regular singular points, Laplace transforms, phase plane techniques, basic existence and uniqueness, and numerical solutions. Prereqs., Calculus 3, and MATH 3130 or APPM 2360, with a minimum grade of C. Similar to APPM 2360.

**MATH 4440-3. Mathematics of Coding and Cryptography.** Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed; prepares students for the more advanced ECEN 5032 and 5682. Prereq., MATH 3130. Same as MATH 5440.

**MATH 4450-3. Introduction to Complex Variables.** Theory of functions of one complex variable, including integrals, power series, residues, conformal mapping, and special functions. Prereq., Calculus 3.

**MATH 4470-3. Introduction to Partial Differential Equations 1.** Studies initial and boundary value problems for the wave, heat, and Laplace equations. Also highlights separation of variables method, eigenvalue problems, Fourier series, and orthogonal systems. Prereq., APPM 2360 or MATH 4430.

**MATH 4480-3. Introduction to Partial Differential Equations 2.** Involves a numerical analysis of partial differential equations, including finite difference methods, finite element methods, and finite spectral methods. Also considers the mathematical settings and analyses of these methods. Examines model problems such as heat equation, convection/diffusion equations, and first-order hyperbolic systems. Prereq., MATH 4470 or equivalent. Same as MATH 5480.

**MATH 4510-3. Introduction to Probability Theory.** Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains. Prereq., Calculus 3. Credit may not be received for both MATH 4510 and APPM 3570 or for both MATH 4510 and ECEN 3810.

**MATH 4520-3. Introduction to Mathematical Statistics.** Examines point and confidence interval estimation. Principles of maximum likelihood sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis. Analyzes variance distribution-free methods. Prereq., MATH 4510 or APPM 3570. Same as MATH 5520 and APPM 4520.

**MATH 4540-3. Introduction to Time Series.** Stresses basic properties, linear extrapolation, and filtering of stationary random functions. Topics also include spectral analysis and estimation of the power spectrum using computers. Prereqs., MATH 4510/APPM 3570 and MATH 4520/APPM 4520. Same as MATH 5540 and APPM 4540.

**MATH 4650-3. Intermediate Numerical Analysis 1.** Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Prereqs., APPM 3310 or MATH 3130, and knowledge of a programming language. Same as APPM 4650.

**MATH 4660-3. Intermediate Numerical Analysis 2.** Topics include solution of algebraic and transcendental equations, and linear and nonlinear systems of equations. Highlights interpolation, integration, solution of ordinary differential equations, least squares, sources of error and error analysis, computer implementation of numerical methods, matrix eigenvalue problems, and summation of infinite series. See also MATH 4650. Prereq., MATH 4650. Same as APPM 4660.

**MATH 4730-3. Set Theory.** Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic, and other topics chosen by the instructor. Prereq., Calculus 3 or MATH 3000.

**MATH 4800-3. History of Mathematics.** Encompasses a selection of topics in the history of mathematics from earliest times to present, emphasizing Greek mathematics, development of calculus in the 17th century, and history of algebra, analysis, and geometry in the 19th and 20th centuries. Prereq., two upper-division courses in mathematics. Same as MATH 5800.

**MATH 4890 (1-3). Honors Independent Study.** Offered for students doing a thesis for departmental honors.

**MATH 4900 (1-3). Independent Study.**

## Graduate Courses

**MATH 5000-3. Foundations of Mathematics.** Focuses on foundations used in other graduate courses and for specialization in foundations. Includes equivalence relations, orderings, ordinal and cardinal numbers and arithmetic, axiom of choice; first-order logic, models, truth, compactness and completeness theorems, nonstandard analysis, and infinitesimals; and formulation of Goedel's incompleteness theorem. Prereqs., MATH 3130, 3140, and 4310. Undergraduates must have approval of the instructor.

**MATH 5030-3. Intermediate Mathematical Physics 1.** Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Prereqs., MATH 4310 and 4320. Undergraduates must have approval of the instructor. Same as PHYS 5030.

**MATH 5040-3. Intermediate Mathematical Physics 2.** Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Prereq., MATH 5030. Undergraduates must have approval of the instructor. Same as PHYS 5040.

**MATH 5120-3. Introduction to Operations Research.** Prereq., MATH 3130 or APPM 3310. Same as MATH 4120, APPM 5120.

**MATH 5150-3. Linear Algebra.** Highlights vector spaces, linear transformations, eigenvalues and eigenvectors, and canonical forms. Prereq., MATH 3130. Undergraduates must have approval of the instructor.

**MATH 5310-3. Basic Real Analysis 1.** Focuses on metric spaces, mapping of metric spaces, study of functions of one real variable using metric space ideas, and integration and differentiation of functions of one real variable in the Lebesgue framework. Prereqs., MATH 3130, 4310, and 4320, or instructor consent.

**MATH 5320-3. Basic Real Analysis 2.** Covers application of metric space facts to functions of several real variables, integration and differentiation of functions of several real variables in the Lebesgue framework, integration of differential forms and on manifolds, elementary functional analysis and elementary point-set topology. Prereqs., MATH 3130 and 5310, or instructor consent.

**MATH 5330-3. Fourier Analysis.** Undergraduates must have approval of the instructor. Recommended prereq., MATH 5310. Same as MATH 4330.

**MATH 5430-3. Ordinary Differential Equations.** Introduces theory and applications of ordinary differential equations, including existence and uniqueness theorems, qualitative behavior, series solutions, and numerical methods, for scalar equations and systems. Prereqs., MATH 3130 and 4310. Undergraduates must have approval of the instructor.

**MATH 5440-3. Mathematics of Coding and Cryptography.** Undergraduates must have approval of the instructor. Same as MATH 4440.

**MATH 5470-3. Partial Differential Equations 1.** Same as MATH 4470.

**MATH 5480-3. Partial Differential Equations 2.** Prereq., MATH 4470, 5470, APPM 5470, or equivalent. Undergraduates must have approval of the instructor. Same as MATH 4480.

**MATH 5520-3. Introduction to Mathematical Statistics.** Same as MATH 4520 and APPM 5520.

**MATH 5540-3. Introduction to Time Series.** Prereqs., MATH 4510/APPM 3570 and MATH 4520/APPM 4520. Same as MATH 4540/APPM 5540.

**MATH 5600-3. Numerical Analysis 1.** Solution of nonlinear algebraic equations, interpolation, approximation theory, and numerical integration. Prereqs., APPM 3130 or MATH 3130, and experience with a scientific programming language. Same as APPM 5600.

**MATH 5610-3. Numerical Analysis 2.** Solution of linear systems, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Prereq., MATH 5600 or APPM 5600. Same as APPM 5610.

**MATH 5800-3. History of Mathematics.** This course does not count toward a graduate degree in mathematics. Undergraduates must have approval of the instructor. Same as MATH 4800.

**MATH 6110-3. Introduction to Number Theory.** Examines divisibility properties of integers, congruencies, diophantine equations, arithmetic functions, quadratic residues, distribution of primes, and algebraic number fields. Prereq., MATH 3140. Undergraduates must have approval of the instructor.

**MATH 6130-3. Modern Algebra 1.** Studies groups, rings and ideals, fields, polynomials, and Galois theory. See also MATH 6140. Prereq., MATH 3140. Undergraduates must have approval of the instructor.

**MATH 6140-3. Modern Algebra 2.** Studies groups, rings and ideals, fields, polynomials, and Galois theory. See also MATH 6130. Prereq., MATH 6130. Undergraduates must have approval of the instructor.

**MATH 6150-3. Commutative Algebra.** Introduces topics used in number theory and algebraic geometry, including radicals of ideals, exact sequences of modules, tensor products, Ext, Tor, localization, primary decomposition of ideals, and Noetherian rings. Prereq., MATH 6140. Undergraduates must have approval of the instructor.

**MATH 6170-3. Algebraic Geometry.** Introduces algebraic geometry, including affine and projective varieties, rational maps and morphisms, and differentials and divisors. Additional topics might include Bezout's Theorem, the Riemann-Roch Theorem, elliptic curves, and sheaves and schemes. Prereq., MATH 6140. Undergraduates must have approval of the instructor.

**MATH 6180-3. Algebraic Number Theory.** Introduces number fields and completions, norms, discriminants and differentials, finiteness of the ideal class group, Dirichlet's unit theorem, decomposition of prime ideals in extension fields, decomposition, and ramification groups. Prereqs., MATH 6110 and 6140. Undergraduates must have approval of the instructor.

**MATH 6190-3. Analytic Number Theory.** Acquaints students with the Riemann Zeta-function and its meromorphic continuation, characters and Dirichlet series, Dirichlet's theorem on primes in arithmetic progression, zero-free regions of the zeta function, and the prime number theory. Prereqs., MATH 6110 and 6350. Undergraduates must have approval of the instructor.

**MATH 6210-3. Introduction to Topology 1.** Introduces elements of general topology, algebraic topology, and differentiable manifolds. See also MATH 6220. Prereqs., MATH 3130, 3140, 4310, and 4320. Undergraduates must have approval of the instructor.

**MATH 6220-3. Introduction to Topology 2.** Introduces elements of general topology, algebraic topology, and differentiable manifolds. See also MATH 6210. Prereq., MATH 6210. Undergraduates must have approval of the instructor.

**MATH 6230-3. Introduction to Differential Geometry 1.** Instructs students on fundamental concepts such as manifolds, differential forms, de Rham cohomology, Riemannian metrics, connections and curvatures, fiber bundles, complex manifolds, characteristic classes, and applications to physics. Prereqs., MATH 3130 and 4320. Undergraduates must have instructor consent.

**MATH 6240-3. Introduction to Differential Geometry 2.** Continuation of MATH 6230. Undergraduates must have instructor consent.

**MATH 6260-3. Geometry of Quantum Fields and Strings.** Focuses on differential geometric techniques in quantum field and string theories. Topics include spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory, and nonperturbative aspects in field and string theories. Prereq., MATH 6230, PHYS 5250, or instructor consent. Recommended prereqs., MATH 6240 and PHYS 7280. Same as PHYS 6260.

**MATH 6310-3. Introduction to Real Analysis 1.** Covers metric spaces, measure theory, general theory of integration and differentiation, and continuous and Lebesgue function spaces. See also MATH 6320. Prereqs., MATH 4310 and 4320. Undergraduates must have approval of the instructor.

**MATH 6320-3. Introduction to Real Analysis 2.** Covers metric spaces, measure theory, general theory of integration and differentiation, and continuous and Lebesgue function spaces. See also MATH 6310. Prereq., MATH 6310. Undergraduates must have approval of the instructor.

**MATH 6350-3. Functions of a Complex Variable 1.** Focuses on complex numbers and complex plane. Includes Cauchy-Riemann equations, complex integration, Cauchy integral theory, infinite series and products, residue theory, conformal mapping, analytic continuation, singularities, elementary special functions. See also MATH 6360. Prereq., MATH 4310. Undergraduates must have approval of the instructor.

**MATH 6360-3. Functions of a Complex Variable 2.** Focuses on complex numbers and complex plane. Includes Cauchy-Riemann equations, complex integration, Cauchy integral theory, infinite series and products, residue theory, conformal mapping, analytic continuation, singularities, elementary special functions. See also MATH 6350. Prereq., MATH 6350. Undergraduates must have approval of the instructor.

**MATH 6520-3. Mathematical Statistics.** Focuses on mathematical theory of statistics covering distribution theory, estimation and testing of hypotheses, multivariate analysis, and nonparametric inference, all with emphasis on theory. Prereq., MATH 5520 or APPM 5520. Undergraduates must have approval of the instructor. Same as APPM 6520.

**MATH 6540-3. Time Series Analysis.** Basic properties, linear extrapolation, and filtering of stationary random functions. Spectral and cross-spectral analysis; estimation of the power spectrum using computers; nonstationary time series; comparison of various computer programs. Prereq., MATH 4510 or instructor consent. Same as APPM 6540.

**MATH 6550-3. Introduction to Stochastic Processes.** Systematic study of Markov chains and some of the simpler Markov processes, including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Prereqs., MATH 4310, MATH 4510 or APPM 3570, or APPM 4560, or instructor consent. Same as MATH 6550.

**MATH 6730-3. Set Theory 1.** Presents cardinal and ordinal arithmetic, generalizations of Ramsey's theorem, and independence of the axiom of choice and of the generalized continuum hypothesis. See also MATH 6740. Prereqs., MATH 4710 and 4730, or instructor consent. Undergraduates must have approval of the instructor.

**MATH 6740-3. Set Theory 2.** Presents cardinal and ordinal arithmetic, generalizations of Ramsey's theorem, and independence of the axiom of choice and of the generalized continuum hypothesis. See also MATH 6730. Prereq., MATH 6730. Undergraduates must have approval of the instructor.

**MATH 6900 (1-3). Independent Study.** Undergraduates must have approval of the instructor. May be repeated up to 6 total credit hours.

**MATH 6940 (1-6). Master's Degree Candidate.** This course is for students preparing for the no-thesis option for a master's degree. The content is set by the students' advisors.

**MATH 6950 (1-6). Master's Thesis.**

**MATH 8250-3. Mathematical Theory of Relativity 1.** Focuses on Maxwell equations, Lorentz force, Minkowski space-time, Lorentz, Poincare, and conformal groups, metric manifolds, covariant differentiation, Einstein space-time, cosmologies, and unified field theories. Prereq., instructor consent. Undergraduates must have approval of the instructor.

**MATH 8270-3. Differential Topology.** Studies differentiable manifolds, tangent bundles, vector fields, and differential forms. Also emphasizes Frobenius theorem, Riemannian metrics, and selected topics. Prereqs., MATH 5150, 6210, 6220, 6310, and 6320. Undergraduates must have approval of the instructor.

**MATH 8330-3. Functional Analysis 1.** Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations, and spectral theorem for bounded self-adjoint operators), and Banach algebras (the Gelfand theory). See also MATH 8340. Prereqs., MATH 6310 and 6320. Undergraduates must have approval of the instructor.

**MATH 8340-3. Functional Analysis 1.** Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations, and spectral theorem for bounded self-adjoint operators), and Banach algebras (the Gelfand theory). See also MATH 8330. Prereq., MATH 8330. Undergraduates must have approval of the instructor.

**MATH 8370-3. Harmonic Analysis 1.** Examines trigonometric series, periodic functions, diophantine approximation, and Fourier series. Also covers Bohr and Stepanoff almost periodic functions, positive definite functions, and the L1 and L2 theory of the Fourier integral. Applications to group theory and differential equations. See also MATH 8380. Prereq., MATH 5150 and 6320. Undergraduates must have approval of the instructor.

**MATH 8380-3. Harmonic Analysis 2.** Examines trigonometric series, periodic functions, diophantine approximation, and Fourier series. Also covers Bohr and Stepanoff almost periodic functions, positive definite functions, the L1 and L2 theory of the Fourier integral. Applications to group theory and differential equations. See also MATH 8370. Prereq., MATH 5150 and 6320. Undergraduates must have approval of the instructor.

**MATH 8410-3. Mathematical/Computational Fluid Dynamics 1.** Mathematical treatment of basic Navier-Sokes partial differential equations describing fluid dynamics, including the Euler and Stokes equations as approximations for high and low speed flows. Emphasizes both analytical considerations and computational methods. Prereq., instructor consent. Undergraduates must have approval of the instructor.

**MATH 8420-3. Mathematical/Computational Fluid Dynamics 2.** Mathematical treatment of basic Navier-Sokes partial differential equations describing fluid dynamics, including the Euler and Stokes equations as approximations for high and low speed flows. Emphasizes both analytical considerations and computational methods. Prereq., instructor consent. Undergraduates must have approval of the instructor.

**MATH 8900 (1-3). Independent Study.** Undergraduates must have approval of the instructor. May be repeated up to 6 total credit hours.

**MATH 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School portion of the catalog.

## Topics

**MATH 6534-3. Topics in Mathematical Probability.** Offers selected topics in probability such as sums of independent random variables, notions of convergence, characteristic functions, Central Limit Theorem, random walk, conditioning and martingales, Markov chains, and Brownian motion. Prereq., MATH 6310 or equivalent.

**MATH 8104-3. Modular Forms.** Introduces the upper-half plane and its geometry, modular forms, congruence subgroups, cusps, Fourier expansions, Theta series, Poincare series, Hecke operators, and relations to Dirichlet series. Prereqs., MATH 6130 and 6350.

**MATH 8114-3. Topics in Number Theory.** May include the theory of automorphic forms, elliptic curves, or any of a variety of advanced topics in analytic and algebraic number theory. Prereq., MATH 6110.

**MATH 8134-3. Diophantine Special Topics.** Introduces heights, Thue-Siegel-Roth Theorem, S-unit equations, and applications to Diophantine equations. Prereq., MATH 6115.

**MATH 8174-3. Topics in Algebra I.** Prereqs., MATH 6130 and 6140.

**MATH 8304-3. Topics in Analysis 1.** Presents advanced topics in analysis including Lie groups, Banach algebras, operator theory, ergodic theory, representation theory, etc. Prereqs., MATH 8330 and 8340, or instructor consent.

**MATH 8714-3. Topics in Logic 1 and 2.**

## Seminars

**MATH 5905-1. Mathematics Teacher Training.** Designed to train students to become effective teachers. Students teach a mathematics course, meeting weekly with faculty to discuss problems particular to the teaching of mathematics. Prereqs., graduate standing and experience as a teaching assistant.

**MATH 8815 (1-3). Ulam Seminar.**

## Mathematics Module Courses—One Credit

**MATH 1000-1. Solving Equations and Inequalities.** Includes linear, quadratic, more general polynomial, rational, and radical equalities; linear, polynomial, rational, and absolute value inequalities; and systems of linear and nonlinear equations. Also includes the Binomial Theorem. Students who elect to follow MATH 1000 with MATH 1010 and MATH 1020 receive the equivalent of a conventional 3-credit course in college algebra, such as MATH 1001 or 1011. Prereq., one year of high school algebra. Similar to MATH 1150.

**MATH 1010-1. Introduction to Functions and Graphing.** Includes graphing lines and circles and transformations of known graphs. Covers functional notation, properties of functions, combining functions, and inverse functions and their graphs. Also covers the second one-third of a conventional 3-credit course in college algebra. Prereq., MATH 1000. Similar to MATH 1001, 1011, and 1150.

**MATH 1020-1. Polynomial, Rational, Exponential, and Logarithmic Functions.** Introduces graphing such functions, solving exponential and logarithmic equations, and exponential modeling. Covers the final one-third of a conventional 3-credit course in college algebra. Prereq., MATH 1010. Similar to MATH 1001, 1011, and 1150.

**MATH 1030-1. Numerical Trigonometry.** Studies angles, trigonometric functions, numerical calculations, law of sines, law of cosines, and graphs of trigonometric functions. Students who elect to follow MATH 1030 with MATH 1040 receive the equivalent of a conventional 2 credit hour course in college trigonometry, such as MATH 1021 OR 1150. Prereq., MATH 1020 or one and a half years of high school algebra and one year of high school geometry.

**MATH 1040-1. Analytical Trigonometry.** Focuses on inverse trigonometric functions, trigonometric identities, and trigonometric equations. Covers the second half of a conventional 2 credit hour course in college trigonometry. Prereq., MATH 1030. Similar to MATH 1021 and 1150.

**MATH 1050-1. Linear Equations and Matrices.** Stresses lines and linear equations, matrix methods for solving systems of linear equations, matrix algebra, matrix inversion, and applications. Students who elect to follow MATH 1050 with MATH 1060 and MATH 1070 receive the equivalent of a 3 credit hour course in finite mathematics for business and social sciences such as MATH 1071. Prereq., MATH 1000 or one and a half years of high school algebra. Similar to MATH 1071.

**MATH 1060-1. Linear Programming.** Studies linear inequalities, geometric method of linear programming, simplex method of linear programming, and duality principle. MATH 1060 covers the middle one-third of a standard one-semester course in finite mathematics for business and social sciences. However, MATH 1060 by itself forms a self-contained short course in linear programming, suitable for students whose backgrounds and/or placement scores indicate that they are adequately prepared. Prereq., MATH 1050 or MATH 1010 or one and a half years of high school algebra. Similar to MATH 1071.

**MATH 1070-1. Combinatorics and Probability Theory.** Covers sets and counting, permutations, combinations, random experiments, sample spaces, and calculation of probabilities. MATH 1070 provides the final one-third of a standard one-semester course in finite mathematics for business and social sciences. However, MATH 1070 by itself forms a self-contained short course in the theory of probability, which could serve as a foundation for students

planning to take courses in statistics. Prereq., MATH 1000 or 1060 or one and a half years of high school algebra. Similar to MATH 1071.

**MATH 1080-1. Functions, Limits, and Derivatives.** Highlights functions, graphs, limits and continuity, definition of derivative, derivative formulas, higher order derivatives, and applications. Students who elect to follow MATH 1080 with MATH 1090 and MATH 1100 receive the equivalent of a conventional 3 credit hour course in calculus for business and social sciences such as MATH 1081. Prereq., MATH 1070 or MATH 1010 or two years of high school algebra. Similar to MATH 1081, MATH 1300, MATH 1310, APPM 1350, and ECON 1088.

**MATH 1090-1. Fundamentals of Differential Calculus.** Focuses on absolute extrema, concavity, first and second derivative tests, asymptotes, logarithmic and exponential functions, and applications. MATH 1090 forms the middle one-third of a standard one-semester course in calculus for business and social sciences. Prereq., MATH 1080 or one semester of high school calculus. Similar to MATH 1081, MATH 1300, MATH 1310, APPM 1350, and ECON 1088.

**MATH 1100-1. Fundamentals of Integral Calculus.** Focuses on the indefinite integral, methods of integration, differential equations, the definite integral, area under a graph, function of several variables, and applications. MATH 1100 forms the final one-third of a standard one-semester course in calculus for business and social sciences. Prereq., MATH 1090. Similar to MATH 1081, MATH 1300, MATH 1310, APPM 1350, and ECON 1088.

## Mathematics Module Courses—Multi-Credit

**MATH 1011-3. Fundamentals and Techniques of College Algebra.** Covers simplifying algebraic expressions, factoring linear and quadratic equations, inequalities, exponentials, logarithms, functions, and graphs, and systems of equations. Students may not receive credit for both MATH 1011, 1010, and 1020; MATH 1001, MATH 1150. Prereq., one year high school algebra or placement exam score for MATH 1000. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1021-2. Numerical and Analytical College Trigonometry.** Covers trigonometric functions, identities, solutions of triangles, addition and multiple angle formulas, inverse and trigonometric functions, and laws of sines and cosines. Students may not receive credit for both MATH 1021 and 1150 or 1030/1040. Prereqs., MATH 1011 or 1020, placement exam score for MATH 1030, or one and a half years of high school algebra and one year high school geometry.

**MATH 1071-3. Finite Mathematics for Social Science and Business.** Discusses systems of linear equations and introduces matrices, linear programming, and probability. Students may not receive credit for both MATH 1071 and 1050/1060/1070. Prereq., MATH 1011 or 1000, placement exam score for MATH 1020, or one and a half years of high school algebra.

**MATH 1081-3. Calculus for Social Science and Business.** Covers differential and integral calculus of algebraic, logarithmic, and exponential functions. Students may not receive credit for both MATH 1081 and MATH 1080, 1090, 1100, MATH 1300, MATH 1310, APPM 1350, and ECON 1088. Prereq., MATH 1011, 1071, 1010, or 1070 or placement exam score for MATH 1020 or two years high school algebra. Similar to MATH 1080, 1090, 1100, 1300, 1310, APPM 1350, and ECON 1088.

## Quantitative Reasoning and Mathematical Skills

**QRMS 1010-3. Quantitative Reasoning and Mathematical Skills.** Promotes mathematical literacy among liberal arts students. Teaches basic mathematics, logic, and problem-solving skills in the context of higher level mathematics, science, technology, and/or society. QRMS is not a traditional math class, but is designed to stimulate interest in and appreciation of mathematics and quantitative reasoning as valuable tools for comprehending the world in which we live. Same as MATH 1012. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**QRMS 1130-3. Mathematics from the Visual Arts.** Introduces mathematical concepts through the study of visual arts. In practicum and lectures, students study the symmetry groups of patterns, shibori-like paper cuttings, origami, and mandalas. Also studied are Euler's characteristics, perspective, golden ratio, computer art, and fractals. Same as MATH 1130. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.



**QRMS 2380-3. Mathematics for the Environment.** An interdisciplinary course where analysis of real phenomena such as acid rain, population growth, and road-killed rabbits in Nevada leads to consideration of various fundamental concepts in mathematics. One-third of the course consists of individual projects chosen by students. Prereqs., proficiency in high school mathematics. Same as MATH 2380. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

## Student Academic Service Center Courses

*These courses are not offered through the mathematics department. Each course is approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.*

**MATH 1001-3. College Algebra.** Provides an introduction to college mathematics. Can be a terminal course in mathematics or can be used as preparation for more advanced math modules and courses. Prereq., knowledge of basic algebraic concepts—i.e., those gained through at least one year of high school algebra. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills. Students may not receive credit for both MATH 1001 and any of the following: Math Modules 1000, 1010, and 1020, or MATH 1011 or 1150.

**MATH 1021-2. Numerical and Analytical College Trigonometry.** Covers trigonometric functions, identities, solutions of triangles, addition and multiple angle formulas, inverse and trigonometric functions, and laws of sines and cosines. Students may not receive credit for both MATH 1021 and 1150 or 1030/1040. Prereqs., MATH 1011 or 1020, placement exam score for MATH 1030, or one and a half years of high school algebra and one year high school geometry.

## Medieval and Early Modern Studies

**MEDV 4020-3. Medieval and Early Modern Studies: Texts and Contexts.** Focuses on communities in the Mediterranean basin and Europe (i.e., cloister, court, and city), discussing major literary texts and visual monuments associated with them and their historical context. Emphasizes tensions between tradition and innovation, Latin and vernacular, East and West, Christian and non-Christian (Jewish and Islam), sacred and secular, authority and freedom, and male and female. Prereqs., CLAS 1110 and 1120, or ENGL 2600 and 2610, or HIST 1010 and 1020, or HUMN 1010 or 1020, or MEDV 2020, or HIST 2020, or ARTH 2029; or instructor consent. Same as MEDV 5020.

**MEDV 4030-3. Medieval and Early Modern Studies: Special Topics.** Different topics offered by the faculty of the Medieval and Early Modern Studies Program in alternate semesters. Topics may include the literature of pilgrimage and travel, women and minorities, theatre, music, epic, medieval and early modern views of the classics, the Bible, and medieval and early modern theories of education. Prereqs., CLAS 1110 and 1120; or ENGL 2600 and 2610; or HIST 1010 and 1020; or HUMN 1010; or HUMN 1020; or MEDV 2020; or HIST 2020; or FINE 2029; or instructor consent. Same as MEDV 5030.

**MEDV 5020-3. Medieval and Early Modern Studies: Texts and Contexts.** Prereq., graduate standing in comparative literature, theatre, classics, or instructor consent. Recommended prereq., ability to use literary texts in their original language. Same as MEDV 4020.

**MEDV 5030-3. Medieval and Early Modern Studies: Special Topics.** Prereq., graduate standing in comparative literature, theatre, classics, or instructor consent. Recommended prereq., ability to use literary texts in their original language. Same as MEDV 4030.

## Molecular, Cellular, and Developmental Biology

**MCDB 1030-3. Plagues, People, and Microorganisms.** Discusses the biology, history, ecology, and social impact of human plagues, including AIDS, smallpox, polio, bubonic plague, tuberculosis, leprosy, the impact of the Irish potato blight, and emerging human pathogens. The biology of pathogens and the human immune responses are treated in detail. Discusses the impact of molecular biology on curtailing the impact of diseases. For nonmajors. Approved for arts and sciences core curriculum: natural science.

**MCDB 1041-3. Fundamentals of Human Genetics.** Covers the basic principles of genetics, human pedigree analysis, and how genetic diseases affect DNA, RNA, and proteins. Considers implications of this research for medicine and society. For nonmajors. Recommended prereq., good background in high school chemistry and biology. Approved for arts and sciences core curriculum: natural sciences.

**MCDB 1042-3. Biological Basis of Human Disease.** Discusses the molecular and cellular bases of non-infectious human diseases, such as cancer, heart disease, Alzheimer's, depression, osteoporosis, and diabetes. Provides a basis for understanding "molecular medicine," i.e., treatments and prevention strategies based on knowledge of the genes and molecules that are altered in the disease state. Prereq., MCDB 1041 or instructor consent. Recommended prereq., strong background in high school biology and chemistry. Approved for arts and sciences core curriculum: natural sciences non-sequence.

**MCDB 1111-4. Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life.** A web-based, in-class discussion and online laboratory course covering the fundamental properties of biologic systems. Focused on common evolutionary, ecological, molecular and cellular mechanisms, the course provides a thorough introduction to the biological sciences. Students may not receive credit for both MCDB 1111 and MCDB 1150 or 1151. Approved for arts and sciences core curriculum: natural science.

**MCDB 1150-3. Introduction to Cellular and Molecular Biology.** Covers biologically important macromolecules and biological processes, together with an introduction to cell structure, function, and physiology. Provides the foundation for advanced MCDB courses to majors, and a rigorous overview of modern biology to nonmajors. MCDB 1151 must be taken concurrently by MCDB and biochemistry majors and prehealth science students. Prereq., high school chemistry and algebra. Coreq., MCDB 1151 for majors. Students may not receive credit for both MCDB 1150 and 1111. Meets MAPS requirement for natural sciences: lab. Approved for arts and sciences core curriculum: natural science.

**MCDB 1151-1. Introduction to Cell and Molecular Biology Lab.** Offers one two-hour lab per week designed to acquaint students with research techniques and concepts in molecular and cellular biology. Topics include cell structure, function, physiology, and recombinant DNA. MCDB 1150 must be taken concurrently. Students may not receive credit for both MCDB 1111 and 1151. Meets MAPS requirement for natural sciences: lab. Approved for arts and sciences core curriculum: natural science.

**MCDB 2115-3. Life Science of Earth Systems.** Covers basic concepts in biology and scientific processes. This course is especially suited for future K-6 teachers. Characteristics of life, genetics, evolution, ecology and the human body are emphasized in a constructivist, student-centered, hands on format. Prereq., two high school science courses at college-prep level. Recommended prereq., ARSC 2110 or GEOL 2110. Same as ARSC 2115. Approved for arts and sciences core curriculum: natural science.

**MCDB 2150-3. Principles of Genetics.** Introduces the behavior of genes and chromosomes in eukaryotic and prokaryotic organisms. Covers three areas: transmission genetics, molecular genetics, and population genetics. Attention is given to genetic mapping, recombinant DNA procedures, and gene expression. MCDB 2151 must be taken by MCDB or biochemistry majors and prehealth science students concurrently or when next offered. Prereqs., MCDB 1150 or 1111 or EBIO 1210 or general biology. Approved for arts and sciences core curriculum: natural science.

**MCDB 2151-1. Principles of Genetics Laboratory.** One two-hour lab per week. Provides hands-on experience with principles introduced in MCDB 2150. Topics include mitosis, meiosis, classical genetics, complementation, mutagenesis, DNA replication, natural selection, and evolution. Prereqs., MCDB 1150 and 1151. Coreq., MCDB 2150. Approved for arts and sciences core curriculum: natural science.

**MCDB 2840 (1-3). Lower-Division Independent Study.** May be repeated for credit, but only 8 hours of MCDB 2840 plus MCDB 4840 can be counted toward graduation. Students with adequate prerequisites should take MCDB 4840. Prereqs., instructor consent and independent study contract. Coreq., MCDB 1150.

**MCDB 3100-3. Methods in Developmental Genetics.** Genetic methods for investigating how genes function in development are presented in weekly lecture discussions of articles from the literature. Correlated laboratory work on the widely used model organisms *Drosophila* (flies) and *Nematode* (worms) provides extensive practical experience. Prereqs., MCDB 2150/2151. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 3120-3. Cell Biology.** Introduces modern cell biology. Includes molecular basis of cellular organization and function, cellular membrane systems, intracellular organelles, mechanisms of energy transduction, the cytoskeleton, extracellular matrix, and functional organization of genetic material. Recommended for students planning careers in health sciences. MCDB 3140 must be taken concurrently or when next offered by MCDB and distributed studies majors. Prereq., MCDB 2150 or EPOB 3200. Coreq., CHEM 1131.

**MCDB 3140-2. Cell Biology Laboratory.** One four-hour lab per week. Provides experience with and exposure to modern cell biology laboratory techniques. Topics include microscopy, immunocytochemistry, Western blotting, Southern blotting, and flow cytometry. This course does not use vertebrate animals. Coreq., MCDB 3120.

**MCDB 3150-3. Biology of the Cancer Cell.** Highlights dimensions of the cancer problem; cancer as a genetic/cellular disease; chemicals, viruses, and radiation as causes of cancer; cancer and diet; cancer epidemiology; cancer risk factors; proto-oncogenes, oncogenes, and cancer suppressor genes; and prevention of cancer. Prereq., MCDB 2150 or EPOB 3200, or instructor consent. Approved for arts and sciences core curriculum: natural science.

**MCDB 3280-3. Molecular Cell Physiology.** Analyzes cellular mechanisms from a molecular perspective. Examines molecules as machines that are the basis of cellular mechanisms. Uses animal systems' physiology as examples. Prereqs., MCDB 3120 and CHEM 1131.

**MCDB 3330-3. Evolution and Creationism.** Intensive lecture/discussion course on the interrelationships among science, religion, and social policy. Includes historical and scientific development of evolution theory, social Darwinism/sociobiology, and the public perception of science. Does not count as an MCDB major's elective. Prereq., MCDB 1150 or instructor consent. Approved for arts and sciences core curriculum: natural science or critical thinking.

**MCDB 3350-3. Fertility, Sterility, and Early Mammalian Development.** Describes the production of germ cells, ovulation, fertilization, reproductive cycles, controls of reproduction, early development of the embryo, methods of contraception, and causes and treatments of sterility. Recommended for students planning careers in the health sciences. Prereq., MCDB 1150, EBIO 1210, or instructor consent.

**MCDB 3500-3. Molecular Biology.** Studies how molecular techniques are being used to characterize genes and their expression. Topics include mechanisms of DNA replication, mutation and repair, recombination, prokaryotic and eukaryotic gene expression, transposable genetic elements, current applications of recombinant DNA procedures, and identification of human genes. Prereqs., CHEM 1131, and either MCDB 2150 or EPOB 3200. Coreq., CHEM 3311 or 3351.

**MCDB 3650-3. Brain, Thought, and Action.** Examines the brain's role in thought, action, and consciousness by exploring issues such as relationship of cognition and localized brain function, functional neuroimaging, behavioral neurochemistry, learning and memory, animal consciousness, machine consciousness, artificial intelligence, and implications of modern physics. Prereqs., MCDB 1150 and 2150.

**MCDB 4110 (1-3). Special Topics.** Presentations of special topics in molecular, and/or cellular, and/or developmental biology, usually given by visiting faculty, alone or in conjunction with MCDB faculty. Prereq., instructor consent.

**MCDB 4130-3. Biological Electron Microscopy: Principles and Recent Advances.** Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, SEM, STEM, STM), specimen quantitation and reconstruction (stereo and 3-D), microanalysis, and electron diffraction. Specimen preparation treated only incidentally. Prereq., one of the following: MCDB 1150, EBIO 1220, MCDB 4500, PHYS 1120, or 2020, or instructor consent. Same as MCDB 5130 and PHYS 4130.

**MCDB 4140-3. Plant Molecular Biology and Biotechnology.** Introduces some of the frontiers in experimental plant research with applications in modern biotechnology, including genetics, hormonal control of growth, stress responses (heat, water, salt), host-pathogen systems (bacteria, fungi, viruses, viroids), plant defense mechanisms, plant cell tissue culture, and genetic engineering of plants. Prereqs., MCDB 3120 and 3500, or instructor consent. Same as MCDB 5140. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4300-3. Immunology.** Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, func-

tion, and malfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system. Prereqs., MCDB 3120, 3500.

**MCDB 4330-3. Bacterial Disease Mechanisms.** Explores molecular and cellular interactions between bacteria and their eukaryotic hosts that precipitate disease. Activities include critical reading of review and research articles, preparation of homework assignments based on readings, and student presentations of assigned papers. Prereqs., MCDB 2150, 3120, and 3500.

**MCDB 4350-3. Microbial Diversity and the Biosphere.** Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny. Prereqs., CHEM 1131 or 1171, general biology, or instructor consent. Recommended prereqs., EBIO 3400 and/or CHEM 3311. Same as MCDB 5350.

**MCDB 4410-3. Human Molecular Genetics.** Studies the human organism as a genetic system, including effect of mutation on protein structure and function, biochemical basis of human genetic disease, polymorphic gene loci, gene mapping and identification, gene cloning and characterization, and impact of human genetics on medicine and society. Prereq., MCDB 3500. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4426-3. Cell Signaling and Developmental Regulation.** Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required. Prereqs., MCDB 3120, 3500, and CHEM 4711, or instructor consent. Same as MCDB 5426. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4444-3. Cellular Basis of Disease.** Explores the cellular basis of disease. Discusses diseases arising from defects in intracellular targeting, cytoskeletal function, intracellular signaling, genomic instability, gene regulation, cell proliferation, and cell death. Involves student-organized presentations and classroom discussion. Prereq., MCDB 2150, 3120, and 3500. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4471-3. Mechanisms of Gene Regulation in Eukaryotes.** Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing, and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required. Prereq., MCDB 3500 or instructor consent. Same as MCDB 5471. Similar to MCDB 4470/5470. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4520-3. Bioinformatics and Genomics.** Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology, and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics, and pharmacogenomics. Prereqs., CHEM 4711, and CHEM 4731 or MCDB 3500. Same as MCDB 5520.

**MCDB 4600-3. Molecular Approaches to Human Diseases.** Studies basic research using molecular biology and its contribution to treatment of human diseases. Includes an overview of physiology, clinical presentation, basic research, and detailed analyses of molecular approaches taken to understand and treat human diseases. Prereqs., MCDB 2150, 3120, and 3500. Recommended prereq., MCDB 4620. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4650-3. Developmental Biology.** Analyzes development, emphasizing cellular, molecular, and genetic mechanisms. Topics include descriptive embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis, and developmental genetics. Prereq., MCDB 3120 and 3500, or instructor consent. Coreq., MCDB 4660. Students may receive credit for only one of MCDB 4620, MCDB 4650, EPOB 3650, and EPOB 4600.

**MCDB 4660-2. Developmental Biology Laboratory.** Lab for MCDB 4650. Studies live and prepared embryos from a variety of organisms, including amphibians, chickens, nematodes, and fruit flies. Topics include descriptive and experimental embryology, developmental genetics, and molecular biology methods applied to developing systems. Students may receive credit for only one of MCDB 4630, 4660, and EPOB 4620. Coreq., MCDB 4650 or EPOB 4600. Same as EPOB 4620. This course uses living vertebrate animals and/or tissues.

**MCDB 4680-3. Mechanisms of Aging.** Studies aging as a developmental process emphasizing genetic, cellular, and molecular mechanisms. Prereqs., MCDB 3120 and 3500. Same as MCDB 5680. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4750-3. Animal Virology.** Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Prereq., MCDB 3500 or instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4777-3. Molecular Neurobiology.** Introduces the functional anatomy of the nervous system, and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course. Prereqs., MCDB 3120 and 3500, or equivalent.

**MCDB 4790-3. Experimental Embryology.** Embryology is studied by considering experiments relevant to specific topics of early animal development. Emphasizes reading, interpretation, and discussion of research articles. Prereqs., MCDB 3120, and EPOB 3650 or MCDB 3500. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4810-3. Insane in the Membrane: The Biology and Biophysics of the Membrane.** Studies the biology and physics of the biomembrane. Topics include structure and mechanism of membrane proteins; membrane biogenesis; membrane protein folding and stability; membrane homeostasis; mechanisms of membrane fusion and fission; lipid trafficking. Prereq., CHEM 4711 or instructor consent. Same as MCDB 5810. Approved for arts and sciences core curriculum: critical thinking.

**MCDB 4840 (1-6). Upper-Division Independent Study.** May be repeated for credit, but only 8 hours of MCDB 2840 plus MCDB 4840 can be counted toward graduation. Prereqs., MCDB 2150, instructor consent, and independent study contract.

**MCDB 4970-3. Seminar on Physical Methods in Biology.** Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, EELS, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, PET, CAT), Fourier analysis, synchrotron radiation, EXAFS, neutron scattering, and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest. Prereqs., MCDB 1050 or 3120, and/or PHYS 1120 and 1140, or 3010 and 3020, or instructor consent. Same as MCDB 5970 and PHYS 4970.

**MCDB 4980-3. Honors Research.** Provides faculty-supervised research for students who have been approved by the departmental honors committee. Normally taken during the semester before completion of the honors thesis. Prereqs., MCDB 4840 or comparable research experience, and a GPA of 3.20 or better.

**MCDB 4990-3. Honors Thesis.** Involves the preparation and defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project. Prereqs., MCDB 4840, 4980, or comparable research experience, a GPA of 3.30 or better, and approval by the MCDB honors committee.

**MCDB 5130-3. Biological Electron Microscopy: Principles and Recent Advances.** Same as MCDB 4130 and PHYS 5130.

**MCDB 5140-3. Plant Molecular Biology and Biotechnology.** Same as MCDB 4140.

**MCDB 5210-3. Cell Structure and Function (Lecture and Discussion).** Instructor consent required.

**MCDB 5220-3. Molecular Genetics (Methods and Logic).** Instructor consent required.

**MCDB 5230-3. Gene Expression (Lecture and Discussion).** Instructor consent required.

**MCDB 5250-3. Topics in Developmental Genetics (Methods and Logic).** Instructor consent required.

**MCDB 5339-1. Cellular Adhesion, Cytoskeletal Organization, and Intercellular Signaling.** Discusses research papers in the areas of cellular adhesion, cytoskeletal organization, and intercellular signaling, with specific reference to vertebrate systems. Students are required to analyze and present in discussion at least one paper each semester. Students also are required to read all of the presented papers and participate in classroom discussion. Prereq., instructor consent.

**MCDB 5350-3. Microbial Diversity and the Biosphere.** Same as MCDB 4350.

**MCDB 5426-3. Cell Signaling and Developmental Regulation.** Same as MCDB 4426.

**MCDB 5471-3. Mechanisms of Gene Regulation in Eukaryotes.** Same as MCDB 4471.

**MCDB 5520-3. Bioinformatics and Geonomics.** Same as MCDB 4520.

**MCDB 5776-1. Scientific Ethics.** Prereq., CHEM 5771 or MCDB 5230 taken concurrently and instructor consent. Same as CHEM 5776.

**MCDB 5777-3. Molecular Neurobiology.** Same as MCDB 4777.

**MCDB 5780-2. Topics in Plant Cell Biology.** Highlights discussions and reports on research advances in biological membranes, plant cell secretion, assembly of plant cell walls, protein targeting, and plant cell transformation. May be repeated up to 7 total credit hours. Instructor consent required.

**MCDB 5810-3. Insane in the Membrane: The Biology and Biophysics of the Membrane.** Same as MCDB 4810.

**MCDB 5970-3. Seminar on Physical Methods in Biology.** Same as MCDB 4970 and PHYS 5970.

**MCDB 6000-3. Introduction to Laboratory Methods.** Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to plan and execute experiments in selected areas. Open only to MCDB graduate students. May be repeated up to 9 total credit hours.

**MCDB 6337-1. Cell Cycle Research.** Cell cycle regulation is a major biological issue relevant to a number of disease states, including cancer. Surveys the current literature in the cell cycle field. Students present current publications; class participation in discussion is expected. Prereqs., MCDB 5210 and 5230.

**MCDB 6338-1. Current Topics in Developmental Genetics and Signal Transduction.** Students present and discuss current research papers in the areas of developmental biology and cell signaling. Goals are to improve skills in critical evaluation and presentation of research results as well as to keep up with current literature. Students must present and lead discussions of at least one paper; all students are expected to read papers in advance. Prereq., instructor consent.

**MCDB 6440 (1-3). Special Topics in MCD Biology.** Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors. May be repeated up to 4 total credit hours.

**MCDB 6940-3. Master's Degree Candidate.**

**MCDB 6950 (1-6). Master's Thesis.** Students seeking a master's degree should consult a departmental advisor. Plan I or Plan II is offered.

**MCDB 7790 (1-3). Graduate Seminar.**

**MCDB 7840 (1-6). Graduate Independent Study.** Instructor consent and independent study contract required. May be repeated up to 7 total credit hours.

**MCDB 7910-1. Seminar Practicum.** Designed for graduate students to give oral presentations on their thesis research, field questions, respond to critiques, and present background information. May be repeated up to 3 total credit hours.

**MCDB 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Museum and Field Studies

### Independent Study

**MUSM 4840 (1-3). Independent Study.**

**MUSM 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Same as MUSM 5900.

**MUSM 5900 (1-6). Graduate Independent Study.** Same as MUSM 4900.

### Museum Studies

**MUSM 4010-3. Museums and Society.** Investigates the museum as an institution in society; history of museums and changing roles and methods in society; administrative structure; museum profession; methodology of museum collec-

tions, exhibitions, and education. Designed for students interested in museums or museum careers.

**MUSM 4030-3. Museum Education.** Surveys and discusses the educational role of museums and informal learning centers. Issues include current trends, learning theories and styles, learning from objects, education programs, diverse audiences, museum/school partnerships, and the role of education in exhibit development. Prereq., instructor consent. Same as MUSM 5030.

**MUSM 4494-3. Field Research: Basic Methods and New Technologies.** Students are exposed to a wide variety of field methods in disciplines specific to natural history museums, with field exercises in zoology, archaeology, paleontology, geology, botany, and entomology. Emphasizes the collection and analysis of spatial and geographic data. Prereq., instructor consent. Same as MUSM 5494.

**MUSM 5011 (3-4). Introduction to Museum Studies.** For majors in anthropology, biology, art and art history, geological sciences, history or other museum-related subjects. Provides background in history and literature of museums, their objectives and methods, laboratory exercises in curatorship, exhibition theory, and administration. Prereq., instructor consent.

**MUSM 5021 (2-3). Selected Museum Topics.**

**MUSM 5030-3. Museum Education.** Same as MUSM 4030.

**MUSM 5031-3. Museums and the Public: Exhibit Development.** Covers elements of exhibition development and design, up to production and evaluation of exhibit prototypes. The team approach is emphasized. Prereqs., graduate standing and instructor consent.

**MUSM 5041-3. Museum Administration.** Covers theory of organizations and how it applies to museums, application of small business management and nonprofit organizations to museums, marketing and development, and grant writing and funding strategies. Prereq., graduate standing and instructor consent.

**MUSM 5051-3. Museum Collections Management.** Deals specifically with curation and data management. Topics include acquisition practices and problems; organization, management, use and preventive conservation of collections; and computer data management of collections. Prereqs., MUSM 5011, demonstration of appropriate level of computer literacy (facility with computers must be demonstrated or the student must complete an appropriate computer science course), and instructor consent.

**MUSM 5061-3. Introduction to Scientific Illustration.** Intended for students with little to no art background. Focus is on the accurate rendering of scientific subjects for publication and for public display. Course begins with basic drawing skills and sharpening of visual perception. Students progress to be able to produce realistic renderings of subjects. Students are exposed to a variety of black and white and color techniques and the standards for presenting illustrations for a variety of audiences. Course concludes with computer illustration tools and techniques.

**MUSM 5494-3. Field Research: Basic Methods and New Technologies.** Same as MUSM 4494.

**MUSM 6110 (1-3). Seminar in Museum Issues.** Offers a weekly seminar for museum and field study students that addresses one new topic each semester relevant to museum operations such as archival administration, museums, multiculturalism, repatriation, and others. Prereqs., MUSM 4011/5011, graduate standing, and instructor consent.

**MUSM 6140-1. Advanced Topics and Trends.** Discusses current topics and/or trends in the museum profession. Topics change annually to reflect current topics and trends and the most current museum issues. Prereq., graduate standing and instructor consent. Recommended prereq., MUSM 5011 and 5051.

**MUSM 6930 (2-4). Museum Internship.** Provides experience in museums of different sizes, audiences, and subjects, including history, natural history, art, and children's museums. Each student is supervised individually by a faculty member as well as the appropriate person in the cooperating museum. Prereq., instructor consent.

**MUSM 6940 (1-3). Master's Degree Candidate.**

**MUSM 6950 (1-6). Master's Thesis in Museum and Field Studies.** A thesis, which may be of a research, expository, critical or creative type, is required of every master's degree candidate under the thesis option. Prereqs., MUSM 5011 and 5051, and one of the following: MUSM 5030, 5031, or 5041.

**MUSM 6960 (1-4). Master's Project or Paper in Museum and Field Studies.** A project or paper in the student's discipline and related to some aspect of museum

studies is required of every master's degree candidate under the non-thesis-option plan. Prereqs., MUSM 5011 and 5051. Students in collections/field track also need MUSM 5030, 5031, OR 5041.

## Anthropology

**MUSM 4462 (2-6). Museum Field Methods in Anthropology.** Archaeological field techniques including excavation, mapping, recording, photography, interpretation, and field laboratory. May be repeated up to 6 total credit hours. Same as MUSM 5462.

**MUSM 4912-3. Museum Practicum in Anthropology.** Students take part in curatorial procedures of the anthropology section of the museum: conservation, cataloguing, collection management, and administration. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5912.

**MUSM 5462 (2-6). Museum Field Methods in Anthropology.** Same as MUSM 4462.

**MUSM 5912-3. Museum Practicum in Anthropology.** Same as MUSM 4912.

## Botany

**MUSM 4473-3. Museum Field Methods in Botany.** Emphasizes field techniques for observation, analysis, and identification of vascular plants, collection, preservation, and date recording for museum specimens. Prereq., instructor consent. Same as MUSM 5473.

**MUSM 4913-3. Museum Practicum in Botany.** Students take part in curatorial procedures of the botany section of the museum: specimen preparation, labeling, identification, cataloguing, conservation, and collection management. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5913.

**MUSM 5473-3. Museum Field Methods in Botany.** Same as MUSM 4473.

**MUSM 5913-3. Museum Practicum in Botany.** Same as MUSM 4913.

## Geology

**MUSM 4484-3. Museum Field Methods in Geology.** Paleontological and paleogeological field techniques including collecting; recording of geographic, stratigraphic, and quarry information; preservation; and interpretation, including applicable readings. Designed for individuals who have some background in geology but little or no prior field experience. Same as MUSM 5484. Summer only.

**MUSM 4914-3. Museum Practicum in Geology.** Students take part in curatorial procedures of the geology section of the museum: field collection, specimen preparation, cataloguing, collection management, and a survey of current laws as they apply to specimens. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5914.

**MUSM 5484-3. Museum Field Methods in Geology.** Same as MUSM 4484.

**MUSM 5914-3. Museum Practicum in Geology.** Same as MUSM 4914.

## Zoology

**MUSM 4795-3. Museum Field Methods in Zoology.** Methods for observing, identifying, collecting, and preserving varieties of animal species. Course includes lectures, labs, and field trips to native lake, stream, marsh, forest, and mountain habitats. Students assemble a zoological collection. Same as MUSM 5795.

**MUSM 4915 (1-3). Museum Practicum in Zoology.** Students take part in basic curatorial procedures of the zoology section of the museum: relaxing, fixing, positioning, preserving, cataloguing, storing, and shipping. Also introduces students to the animal kingdom. Prereq., instructor consent. Same as MUSM 5915.

**MUSM 5795-3. Museum Field Methods in Zoology.** Same as MUSM 4795.

**MUSM 5915 (1-3). Museum Practicum in Zoology.** Same as MUSM 4915.

## Entomology

**MUSM 4916-3. Museum Practicum in Entomology.** Students take part in curatorial procedures of the entomology section of the museum: field collection, specimen preparation, labeling, identification, rearing techniques, and exhibit

preparation. Prereq., 5011, or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5916.

**MUSM 5916-3. Museum Practicum in Entomology.** Same as MUSM 4916.

## Museology

**MUSM 4917 (1-3). Museum Practicum in Techniques.** Students participate in museum public education functions that may include researching, planning, developing, and producing exhibits, traveling trunks, booklets, and other materials. May involve writing labels, molding and casting, conservation, and restoration. May be repeated up to 6 total credit hours. Same as MUSM 5917.

**MUSM 5917 (1-3). Museum Practicum in Techniques 1.** Same as MUSM 4917.

## Music

*The following courses offered in the College of Music are accepted for arts and sciences core curriculum credit. See College of Music section for full course descriptions.*

**EMUS 1832-3. Appreciation of Music.** Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 2752-3. Music in American Culture.** Approved for arts and sciences core curriculum: United States context.

**EMUS 2762-3. Music and Drama.** Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 2772-3. World Musics.** Approved for arts and sciences core curriculum: cultural and gender diversity.

**EMUS 2862-3. American Film Musical, 1926–1954.** Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 3822-3. Music Literature 1.** Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 3832-3. Music Literature 2.** Approved for arts and sciences core curriculum: literature and the arts.

## Neuroscience

*See Department of Psychology.*

## Peace and Conflict Studies

**PACS 2500-3. Introduction to Peace and Conflict Studies.** Introduces the field of peace and conflict studies. Examines causes and dynamics of conflict and violence (interpersonal to global), peace institutions and research, peace movements, nonviolence, and careers in conflict resolution and peacemaking.

**PACS 3800 (1-3). Topics in Peace and Conflict Studies.** Content varies depending on instructor. May provide an overview of the field, cover scientific, philosophical, or historical approaches, or analyze a specific substantive topic.

**PACS 4500-3. Senior Seminar in Peace and Conflict Studies.** Examines specific theoretical perspectives in peace and conflict studies and conducts in-depth research projects using a case-study approach. Emphasizes using critical thinking skills in writing and class discussion. Case study examples include: U.S. violence, peacemaking/keeping in ethnonationalist conflicts, environmental conflict resolution. Prereq., PACS 2500 or instructor consent. Approved for arts and sciences core curriculum: critical thinking.

## Philosophy

*All courses at the 3000-level require at least 6 hours of philosophy and sophomore standing, unless otherwise indicated. All courses at the 4000-level require at least 12 hours of philosophy and junior standing, unless otherwise indicated.*

**PHIL 1000-3. Introduction to Philosophy.** Introduces fundamental topics of philosophy, e.g., knowledge, truth, universals, self, the mind-body problem, time, God, and value. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1010-3. Introduction to Western Philosophy: Ancient.** Develops three related themes: the emergence in antiquity of a peculiarly scientific mode of thinking; the place of religious belief within this developing scientific world view; and the force of ethical speculation within the culture and political climates of ancient Greece and Rome. PHIL 1010 and 1020 may be taken in either order. Same as CLAS 1030. Approved for arts and sciences core curriculum: historical context.

**PHIL 1020-3. Introduction to Western Philosophy: Modern.** Introduces several philosophical texts and doctrines of 17th and 18th century Europe. Gives special attention to the connection between philosophical ideas and the wider historical milieu—social, political, and literary. PHIL 1010 and 1020 may be taken in either order. Approved for arts and sciences core curriculum: historical context.

**PHIL 1100-3. Ethics.** Introductory study of major philosophies on the nature of the good for humanity, principles of evaluation, and moral choice as they apply to contemporary moral problems. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1200-3. Philosophy and Society.** Introduces philosophical thought through critical analysis of our own society, its institutions, and principles. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: United States context or ideals and values.

**PHIL 1400-3. Philosophy and the Sciences.** Considers philosophical topics and concepts related to the natural sciences, such as science and pseudo-science; scientific method; the nature of explanation, theory, confirmation, and falsification; effect of science on basic concepts like mind, freedom, time, and causality; ethics of experimentation; and the relation of science to society. Approved for arts and sciences core curriculum: natural science.

**PHIL 1440-3. Introductory Logic.** Introductory study of definition, informal fallacies, and the principles and standards of correct reasoning. Provides practice in analyzing, evaluating, and constructing frequently encountered types of arguments. Does not fulfill major requirement in logic.

**PHIL 1600-3. Philosophy and Religion.** Philosophical introduction to some of the central concepts and beliefs of religious traditions, focusing particularly on the question of the existence of God and on the relation between religious beliefs and moral beliefs. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1700-3. Philosophy and the Arts.** Considers philosophic questions involved in the analysis and assessment of artistic experiences and of the objects with which the arts, including the literary arts, are concerned.

**PHIL 1750-3. Philosophy through Literature.** Introduces philosophy through literature. Selected novels, plays, and short stories that exemplify traditional problems in philosophy are read and discussed.

**PHIL 1800-3. Open Topics/Philosophy.** May be repeated up to 7 total credit hours.

**PHIL 2140-3. Environmental Justice.** Traditional and contemporary theories of justice are employed in order to critically analyze social and political issues that have important environmental dimensions. Assesses the relationship of justice and equity to the presuppositions of national and global environmental issues and policies.

**PHIL 2200-3. Major Social Theories.** Introductory study of major philosophies of the past in relation to political, economic, and social issues. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 2220-3. Philosophy and Law.** Considers philosophical issues related to law in general and the U.S. system in particular. Topics to be covered may address such questions as the following: What is the nature of law? What kinds of acts should the law prohibit (e.g., abortion, drug use, pornography, cloning)? Is there a moral obligation to obey the law? Can civil disobedience be justified? Is there a justification for punishing people for breaking the law? Is capital punishment, in particular, morally justified? Approved for arts and sciences core curriculum: United States context.

**PHIL 2290-3. Philosophy and Women.** Explores different approaches to the study of women. Same as WMST 2290. Approved for arts and sciences core curriculum: cultural and gender diversity.

**PHIL 2390-3. Philosophy and Psychology.** Interdisciplinary course on issues where philosophy and psychology meet; for example, topics such as selfhood, motivation, psychotherapy, freedom, and human behavior are examined. Selected readings in philosophy and psychology are required.

**PHIL 2440-3. Symbolic Logic.** First course in mathematical logic. Topics include sentential logic, the logic of quantification, and some of the basic concepts and results of metalogic (interpretations, validity, and soundness). Restricted to PHIL majors.

**PHIL 2610-3. From Paganism to Christianity.** Offers a cultural history of Greek and Roman religion. Students read ancient text in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. Same as CLAS 2610. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 2800-3. Open Topics/Philosophy.**

**PHIL 2840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq., sophomore standing.

**PHIL 3000-3. History of Ancient Philosophy.** A survey of selected figures in ancient Greek and Roman philosophy, and in medieval philosophy. Philosophers studied may include the pre-Socratics, Plato, Aristotle, the Hellenistic philosophers, and such figures as Aquinas and Occam. Pays attention to the larger cultural context that influenced these philosophers and was, in turn, influenced by them. Prereqs., 6 hours of philosophy course work. Restricted to sophomore philosophy students or upper-division students. Approved for arts and science core curriculum: historical context.

**PHIL 3010-3. History of Modern Philosophy.** Introduces modern philosophy, focusing on the period from Descartes through Kant. In addition to careful analysis of philosophical arguments, attention is paid to the way in which philosophers responded to and participated in major developments in the 17th and 18th century, such as the scientific revolution. Prereq., 6 hours of philosophy course work. Restricted to sophomore philosophy majors and upper-division students. Approved for arts and sciences core curriculum: historical context.

**PHIL 3100-3. Ethical Theory.** Studies major issues and theories in ethics. Prereq., 6 hours of philosophy course work. Prereq. or coreq., PHIL 3480. Restricted to sophomore philosophy majors and upper-division students. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3110-3. Feminist Practical Ethics.** Explores a variety of personal and public policy issues in the light of the basic feminist commitment to opposing women's subordination. Provides a sense of how a principled commitment to feminism may influence or be influenced by prevailing interpretation of contemporary ideals and values, and gives an opportunity for developing skills of critical analysis. Prereq., WMST 2000 or 2290. Same as WMST 3110. Approved for arts and sciences core curriculum: ideals and values or critical thinking.

**PHIL 3140-3. Environmental Ethics.** Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment. Prereq., junior standing, or PHIL 1100, 1200, 2200, 3100, or 3200. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3160-3. Bioethics.** Analysis of ethical problems involved in such issues as abortion, euthanasia, organ transplants, eugenics, treatment of the patient as a person, and the institutional nature of the health care delivery system. Prereq., 6 hours of philosophy course work. Restricted to juniors and seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3180-3. Critical Thinking: Contemporary Topics.** Looks at a selected topic such as nuclear disarmament, racial and sexual discrimination, animal rights, or abortion and euthanasia by examining issues through the lens of critical philosophical analysis. Reviews the reasoning behind espoused positions and the logical connections and argument forms they contain. Prereq., 6 hours of philosophy course work. Restricted to juniors and seniors. Approved for arts and sciences core curriculum: critical thinking.

**PHIL 3190 (3-4). War and Morality.** Focuses on moral issues raised by war as a human institution. What are the justifications, limits, and alternatives? Does the advent of nuclear weapons change the nature of war? Prereq., 6 hours of philosophy course work. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3200-3. Social and Political Philosophy.** Systematic discussion and analysis of such philosophic ideas as community, freedom, political power, and violence. Prereq., 6 hours of philosophy course work. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3260-3. Philosophy and the International Order.** Considers philosophical topics concerning the international economic, political, and legal systems.

Topics that may be considered include the nature of international law, war and peace, humanitarian intervention, international justice, world hunger, and human rights. Prereq., upper-division standing and 6 hours PHIL course work. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3280-3. Philosophy and Education.** Offers a classroom focus on classic and contemporary theories in the philosophy of education, attention to teaching techniques specific to the discipline of philosophy, and a practicum involving hands-on teaching experience at area schools or at the summer philosophy institute. Prereqs., instructor consent. Restricted to students with 6 hours of philosophy.

**PHIL 3310-3. Cognitive Science.** An interdisciplinary introduction to cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Prereq., two of the following four courses: PSYC 2145, LING 2000, CSCI 1300, PHIL 2440. Same as PSYC/LING 3005 and CSCI 3702.

**PHIL 3340-3. Epistemology.** Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition. Prereq., 12 credit hours of philosophy, including PHIL 2440 and 3010. PHIL 3480 highly recommended.

**PHIL 3410-3. History of Science: Ancients to Newton.** Surveys the history of science up to Newton, including the emergence of scientific modes of thinking from religious and philosophical roots in the Near East and Greece to the development of these modes in the Middle Ages and Renaissance. Culminates with Isaac Newton and the 17th century scientific revolution. Prereq., 6 hours of philosophy course work. Approved for arts and sciences core curriculum: historical context or natural science.

**PHIL 3430-3. History of Science: Newton to Einstein.** The history of physical and biological science, from the epoch-making achievements of Charles Darwin in biology to the dawn of the 20th century revolutions in physics, chemistry, and genetics. Deals with the success of the mechanical philosophy of nature and its problems. Prereq., 6 hours of philosophy course work. Approved for arts and sciences core curriculum: historical context or natural science.

**PHIL 3480-3. Critical Thinking/Writing in Philosophy.** Focuses upon the fundamental skills, methods, concepts, and distinctions that are essential for the study of philosophy. The basic skills covered include the writing of philosophy papers, the reading of articles, and the extraction and evaluation of arguments. Prereq., 6 hours of philosophy course work. Prereq. or coreq., PHIL 2440. Restricted to PHIL majors. Approved for arts and sciences core curriculum: critical thinking or written communication.

**PHIL 3600-3. Philosophy of Religion.** Philosophical discussion of fundamental issues in religion, such as existence of God, religious experience, faith and reason, evil, immortality, and religious language. Prereq., 6 hours of philosophy course work. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3700-3. Aesthetic Theory.** Introduces major theories of aesthetics and contemporary discussions of problems, e.g., the nature of art and the problem of evaluations in art. Prereq., 6 hours of philosophy course work.

**PHIL 3800-3. Open Topics in Philosophy.** Variety of new courses at the 3000 level. See current departmental announcements for specific content. May be repeated up to 7 total credit hours. Prereq., 6 hours of philosophy course work.

**PHIL 3840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq., 6 hours of philosophy course work.

**PHIL 3930 (1-3). Internship in Social Policy.** Under the guidance of an official in a governmental or non-governmental organization, students are assigned to projects selected for their academic suitability as well as for value to the sponsoring organization. Prior approval of department required. Prereq., 9 hours in moral or political philosophy course work. Recommended prereqs., PHIL 1200, 2200, and 3200.

**PHIL 4010-3. Single Philosopher.** Intensive study of one systematic philosophy with attention to the scope, methods, and integrity accomplished by it. May be repeated up to 12 total credit hours. Prereq., 12 hours of philosophy course work.

**PHIL 4020-3. Topics in the History of Philosophy.** Examines a specific philosophical problem over an extended historical period. Prereq., 12 hours of philosophy course work.

**PHIL 4030-3. Medieval Philosophy.** Introduces philosophy from the late Roman era to the 14th century. Philosophers studied may include Augustine, Boethius, Aquinas, and Ockham. Topics range over religion, ethics, mind, and metaphysics. Prereq., 12 hours of philosophy course work.

**PHIL 4040-3. Studies in 20th Century Philosophy.** Studies two or three major philosophies prominent during the last century. Prereq., 12 hours of philosophy course work.

**PHIL 4070-3. Existentialist Philosophy.** Examines central figures and texts in the existential tradition, from Kierkegaard and Nietzsche to Heidegger and Sartre. Prereq., 12 hours of philosophy course work.

**PHIL 4080-3. Introduction to Phenomenology.** Examines the work of Edmund Husserl and subsequent phenomenologists (e.g., Heidegger, Sartre, Merleau-Ponty). Prereq., 12 hours of philosophy course work. Restricted to juniors and seniors.

**PHIL 4090-3. Kierkegaard.** Primarily an analysis of selected texts of Søren Kierkegaard. Specific topics considered include Kierkegaard's notions of Christianity, faith, the Paradox, truth, reason, and history. Prereq., 12 hours of philosophy course work. Restricted to juniors and seniors. Same as PHIL 5090.

**PHIL 4110-3. Contemporary Moral Theory.** Provides an in-depth look at some recent work in moral theory. Topics covered, varying from year to year, include: consequentialism and its critics; virtue theory; moral psychology; impartiality and the personal point of view. Prereqs., 12 hours philosophy course work, including PHIL 3100; and junior standing. Same as PHIL 5110.

**PHIL 4200-3. Contemporary Political Philosophy.** Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Disorkin); libertarianism (Nozick); communitarianism (Sandel, MacIntyre); and feminism (Jaggar). Topics and readings vary with the instructor. Repeatable for credit. Prereqs., PHIL 2200, 3200, and 12 hours philosophy course work. Restricted to juniors and seniors. Same as PHIL 5200.

**PHIL 4210-3. Ancient Political Thought.** Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Same as CLAS 4041, HIST 4041, and PSCI 4094.

**PHIL 4250-3. Marxism.** Historical and systematic study of principal themes of Marxist thought, from its Hegelian origins to its contemporary varieties, emphasizing the works of Marx and Engels. Prereq., 12 hours of philosophy course work.

**PHIL 4260-3. Philosophy of Law.** Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty. Prereq., junior or senior standing and 12 hours in philosophy. Same as PHIL 5260.

**PHIL 4300-3. Philosophy of Mind.** Discusses problems in the philosophy of mind, including the mind-body problem, knowledge of other minds, compatibility of free will and determinism, and such concepts as action, intention, desire, enjoyment, memory, imagination, dreaming, and knowledge. Prereqs., PHIL 2440, 3010, 3340, and 3480. Same as PHIL 5300.

**PHIL 4360-3. Metaphysics.** Traditional and contemporary theories of the basic categories of reality and the human relationship to it, including universals, substance, identity, change, mind and body, free will, and modality. Prereqs., PHIL 2440, 3010, 3340, and 3480.

**PHIL 4400-3. Philosophy of Science.** Prereqs., 12 hours PHIL course work including PHIL 2440 or equivalent, and junior standing. Same as PHIL 5400.

**PHIL 4440-3. Mathematical Logic.** Introduces the fundamental concepts and procedures of mathematical logic. Prereq., 12 hours PHIL course work, including PHIL 2440 or equivalent; and junior standing. Same as PHIL 5440.

**PHIL 4450-3. History and Philosophy of Physics.** Investigates the role of experiment in physics. Uses case studies in the history and philosophy of physics and in scientific methodology. Prereqs., PHYS 1020 or 1120 or 2020 or instructor consent, 12 hours PHIL course work, and junior standing. Same as PHIL 5450 and PHYS 4450. Approved for arts and sciences core curriculum: critical thinking.

**PHIL 4490-3. Philosophy of Language.** Examines theories and problems regarding the nature of language and its relation to reality. Concepts discussed include sense, reference, conventions, intentions, and their relation to science and social life. Relevant literature includes readings in Frege, Russell, Quine, Putnam, Kripke, and Chomsky. Prereq., PHIL 2440, 12 credit hours of philosophy, and junior standing. Same as PHIL 5490.

**PHIL 4600-1. Theology Forum Seminar.** Discusses a variety of theological and philosophical topics. Some reading, much discussion, occasional guest speak-

ers. Students may enroll for repeated credit with permission of instructor to a total of 3 hours. Prereqs., 12 hours of philosophy course work.

**PHIL 4730-3. Philosophy and Literature.** Examines various relations between philosophy and literature, ranging from the direct incorporation of philosophical doctrine into literature to literature as a distinctive way of practicing philosophy. Prereqs., 12 credit hours of philosophy and junior standing.

**PHIL 4800-3. Open Topics in Philosophy.** A variety of new courses at the 4000 level. See current departmental announcements for specific content. May be repeated up to 7 total credit hours. Prereqs., 12 credit hours of philosophy and junior standing.

**PHIL 4830-3. Senior Seminar in Philosophy.** Critical in-depth examination of a selected philosophical topic. Prereq., 15 hours in philosophy and junior or senior status, or instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**PHIL 4840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq. 12 hours of philosophy course work.

**PHIL 4950-3. Honors Thesis.** May be repeated up to 7 total credit hours. Prereq., 12 hours of philosophy course work.

**PHIL 5010-3. Single Philosopher.** Same as PHIL 4010. May be repeated up to 12 total credit hours.

**PHIL 5020-3. Topics in the History of Philosophy.** May be repeated up to 7 total credit hours.

**PHIL 5030-1. Greek Philosophical Texts.** Selected readings in classical philosophy, with a focus on achieving fluency in reading philosophical Greek.

**PHIL 5040-1. Latin Philosophical Texts.** Selected readings in classical and medieval authors, in the original language. The focus is on achieving fluency in reading philosophical Latin.

**PHIL 5090-3. Kierkegaard.** Same as PHIL 4090.

**PHIL 5091-3. Philosophy of St. Thomas Aquinas.** May be repeated up to 7 total credit hours.

**PHIL 5100-3. Ethics.** Presents representative positions in normative ethics and metaethics. May be repeated up to 7 total credit hours.

**PHIL 5110-3. Contemporary Moral Theory.** Same as PHIL 4110.

**PHIL 5200-3. Contemporary Political Philosophy.** Same as PHIL 4200.

**PHIL 5210-3. Philosophy and Social Policy.** Studies philosophical approaches to social and political issues such as abortion, bioethics, environmental preservation, human rights, and reverse discrimination. Gives attention to strengths and weaknesses of philosophical treatments of these issues. May be repeated up to 7 total credit hours.

**PHIL 5230-3. Bioethics and Public Policy.** Examines public policy implications of contemporary biological, genetic, biomedical, and behavioral science in light of ethics and human values. Considers theoretical and practical grounds for moral assessment of scientific research and possible applications of technology. May be repeated up to 7 total credit hours.

**PHIL 5240-3. Seminar in Environmental Philosophy.** Philosophical examination of several different approaches to environmental problems: economic, juridical, political, and ecological. Discusses specific environmental problems, focusing on their moral dimensions, e.g., wilderness preservation, animal rights, and land use and urban planning. May be repeated up to 7 total credit hours.

**PHIL 5260-3. Philosophy of Law.** Same as PHIL 4260.

**PHIL 5290 (1-3). Topics in Values and Social Policy.** Deals with topics in the area of philosophy and public policy and is often interdisciplinary in focus. Topics vary from one semester to another. May be repeated up to 7 total credit hours.

**PHIL 5300-3. Philosophy of Mind.** Same as PHIL 4300.

**PHIL 5340-3. Epistemology.** Covers a selection of the following problems: the analysis of knowledge, theories of justification, skepticism, perceptual knowledge, theories of sense experience, other minds, knowledge of the past, the problem of induction, theories of justification, and a priori knowledge.

**PHIL 5350-3. Analytic Philosophy.** Surveys representative philosophers, methods, or problems in the 20th century analytic tradition. May be repeated up to 7 total credit hours.

**PHIL 5360-3. Metaphysics.**

**PHIL 5400-3. Philosophy of Science.** Same as PHIL 4400.

**PHIL 5440-3. Mathematical Logic.** Same as PHIL 4440.

**PHIL 5450-3. History and Philosophy of Physics.** Same as PHIL 4450 and PHYS 5450.

**PHIL 5490-3. Philosophy of Language.** Same as PHIL 4490.

**PHIL 5600-3. Philosophy of Religion.** Studies topics falling under philosophy of religion, such as proofs for God's existence, religious language, mysticism, psychology of religion, modern theological movements, miracles, and study of individual theologians. May be repeated up to 7 total credit hours.

**PHIL 5700-3. Aesthetics.** Analyzes the principal topics of aesthetics, including such issues as formal structure of aesthetics, the nature of critical judgments, and the status of the work of art. May be repeated up to 7 total credit hours.

**PHIL 5800-3. Open Topics in Philosophy.** Variety of new courses at the 5000 level. See current departmental announcements for specific content. May be repeated up to 7 total credit hours.

**PHIL 5810 (1-3). Special Topics in Philosophy.** Instructor meets regularly with three or more students to discuss special topics in philosophy. May be repeated up to 6 total credit hours.

**PHIL 5840 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours.

**PHIL 6000 (3-4). Seminar in Ancient Philosophy.** Advanced topics in ancient philosophy. Examines selected classical texts or movements in an in-depth way. Topics vary, but may include: the Socratic dialogues; Plato's later metaphysics; Aristotle's ethical theory; Aristotle's metaphysics; Stoicism; Hellenistic philosophy; and Neo-Platonism. Prereqs., PHIL 3000 or equivalent. PHIL 5080 or 5081 recommended.

**PHIL 6040-3. Seminar: Phenomenology.** May be repeated up to 7 total credit hours.

**PHIL 6100-3. Seminar in Ethics.** Intensive study of selected topics in ethical theory.

**PHIL 6200-3. Seminar in Social and Political Philosophy.** Provides an in-depth look at some particular topic in social and political philosophy, such as rights, political freedom, political obligation, or democracy.

**PHIL 6300-3. Seminar in Philosophy of Mind.** Studies selected topics in philosophy of mind.

**PHIL 6310-3. Issues and Methods in Cognitive Science.** Prereqs., graduate standing, or at least one course at the 3000 level or higher in computer science, linguistics, philosophy, or psychology. No background in computer science is presumed. Same as CSCI 6402, EDUC 6504, LING 6200, and PSYC 6200.

**PHIL 6340-3. Seminar in Epistemology.** Studies some of the main topics of epistemology, such as skepticism, foundations of knowledge, perception, introspection, belief, certainty, and analytic-synthetic distinctions.

**PHIL 6380-3. Seminar in Metaphysics.** Traditional and contemporary theories of the basic categories used to describe nature and the human relationship to it, including such concepts as substance, identity, space and time, causality, determination, and systematic ontology.

**PHIL 6400-3. Seminar in Philosophy of Science.** Topics connected with development of nature of science; structure of scientific theories; testing of hypotheses. Theory of decisions in science and ethics. Basic conceptions and models of abstraction in the history of science.

**PHIL 6490-3. Seminar in Philosophy of Language.** Studies some of the main topics in the philosophy of language, such as meaning and theories of meaning, translation, speech acts, rules of language, references, relevance of psycholinguistics, language and thought, and language and ontology.

**PHIL 6940 (1-3). Master's Candidate for Degree.** May be repeated up to 7 total credit hours.

**PHIL 6950 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours.

**PHIL 6960 (1-6). Master's Research.** May be repeated up to 7 total credit hours.

**PHIL 7310 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as CSCI 7762, EDUC 6505, LING 7762, and PSYC 7765.

**PHIL 7415-2. Cognitive Science Research Practicum.** Independent interdisciplinary research project for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Prereq., CSCI 6402, EDUC 6504, LING 6200, PHIL 6310, or PSYC 6200. Recommended prereq., CSCI 7762, EDUC 6505, LING 7762, PHIL 7310, or PSYC 7762. Same as PSYC/LING 7415, CSCI 7412, and EDUC 6506.

**PHIL 7425-2. Cognitive Science Research Practicum 2.** Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as CSCI 7422, EDUC 6516, LING 7425, PSYC 7425.

**PHIL 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Physics

**PHYS 1000-3. Preparatory Physics.** Introduces basic physics, emphasizing an analytical approach that prepares students for PHYS 1110 or PHYS 2010. Prereq., one year of high school algebra or equivalent. Meets MAPS requirement in natural science: chemistry or physics.

**PHYS 1010-3. Physics of Everyday Life 1.** Intended primarily for nonscientists, this course covers physics encountered in everyday life. Topics include balls, scales, balloons, stoves, insulation, light bulbs, clocks, nuclear weapons, basics of flashlights, and microwave ovens. Prereq., high school algebra or equivalent. Meets MAPS requirements for natural sciences: chemistry or physics. However, this course should not be taken if the student has a MAPS deficiency in math. Approved for arts and sciences core curriculum: natural science or quantitative reasoning and mathematical skills.

**PHYS 1020-4. Physics of Everyday Life 2.** Intended primarily for nonscientists, this course is a continuation of PHYS 1010. Includes electrical power generation and distribution, electrical motors, radio, television, computers, copiers, lasers, fluorescent lights, cameras, and medical imaging. Prereqs., PHYS 1010 and high school algebra. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills or natural science.

**PHYS 1110-4. General Physics 1.** Three lect., one rec. per week, plus three evening exams in the semester. First semester of three-semester sequence for science and engineering students. Covers kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, simple harmonic motion, and introduction to thermodynamics. Coreq., APPM 1350 or MATH 1300. Similar to PHYS 1170. Approved for arts and sciences core curriculum: natural science.

**PHYS 1120-4. General Physics 2.** Three lect., one rec. per week, plus three evening exams in the semester. Second semester of three-semester introductory sequence for science and engineering students. Covers electricity and magnetism, wave motion, and optics. Normally is taken concurrently with PHYS 1140. Prereq., PHYS 1110. Coreq., MATH 2300 or APPM 1360. Similar to PHYS 1180. Approved for arts and sciences core curriculum: natural science.

**PHYS 1140-1. Experimental Physics 1.** Introduces experimental physics through laboratory observations of a wide range of phenomena. Course covers experiments on physical measurements, linear and rotational mechanics, harmonic motion, wave motion, sound and heat, electricity and magnetism, optics, and electromagnetic waves with the mathematical analysis of physical errors associated with the experimental process. One lect., one 2-hour lab per week. Prereq., PHYS 1110; prereq. or coreq., PHYS 1120. Approved for arts and sciences core curriculum: natural science.

**PHYS 1150-1. Experimental Physics 2.** For students in Physics Plan 3 teaching track only. Students complete another full set of PHYS 1140 experiments (seven different labs from those previously completed). Registration by special arrangements with the Department of Physics. Prereqs., PHYS 1110 and 1120. Same as PHYS 1140.

**PHYS 1170-4. Honors General Physics 1.** Covers the same general topics taught in PHYS 1110, however, material is presented in significantly greater depth and at a more sophisticated level than in the nonhonors sequence. The honors sequence PHYS 1170 and PHYS 1180 is highly recommended for well-prepared students who intend to major in physics, engineering, or related topics. Prereqs., one year high school physics, high school GPA higher than 3.50; MATH 2300 or APPM 1360; instructor consent; or AP physics C (mechanics)



with minimum exam score of 4 points. Similar to PHYS 1110. Approved for arts and sciences core curriculum: natural science.

**PHYS 1180-4. Honors General Physics 2.** Covers the same general topics taught in PHYS 1120; however, the material is presented in significantly greater depth and at a more sophisticated level than OR PHYS 1170. school physics, high school GPA higher than 3.50; MATH 2300 or APPM 1360; or instructor consent; or AP physics C (mechanics) with a minimum score of 4 points; and/or AP physics C (electricity and magnetism) with a minimum score of 4 points; or PHYS 1170. Similar to PHYS 1120. Approved for arts and sciences core curriculum: natural science.

**PHYS 1230-3. Light and Color for Nonscientists.** Discusses light, color, vision, and perception. Covers reflection, refraction, lenses, and applications to photography and other methods of light sensing. Other topics include lasers and holography. Course is geared toward nonscience majors. Meets MAPS requirements for natural science: chemistry or physics. Should not be taken by students with a math MAPS deficiency. Approved for arts and science core curriculum: natural science.

**PHYS 1240-3. Sound and Music.** Explores the physical processes that underlie the diversity of sound and musical phenomena. Topics covered include the physical nature of sound, the perception of sound, the perception of pitch and harmony, musical instruments, synthesizers and samplers, and room acoustics. Nonmathematical; geared toward nonscience majors. Meets MAPS requirement for natural science: chemistry or physics. Should not be taken by students with a math MAPS deficiency. Approved for arts and sciences core curriculum: natural science.

**PHYS 1600-4. Order, Chaos, and Complexity.** Develops the foundations to understand new ideas in science, focusing on fractals and chaos in complex interacting systems. Topics include the historical perspective of fractal geometry, complex nonlinear systems, and the nature of uncertainty. Same as GEOL 1600. Approved for arts and sciences core curriculum: natural science or quantitative reasoning and mathematical skills.

**PHYS 1700-3. Physics: Its History and Philosophy.** Includes various approaches to the philosophy of science and discusses the validity of experimental evidence and the relation of that evidence to theories of nature. These are illustrated using episodes from the history of physics. Prereq., high school algebra. Approved for arts and sciences core curriculum: natural science.

**PHYS 2010-5. General Physics 1.** Three demonstration lect., one two-hour lab/rec. per week, plus three evening exams in the semester. Covers mechanics, heat, and sound. Elementary but thorough presentation of fundamental facts and principles of physics. Natural science majors with a knowledge of calculus and others taking calculus are urged to take this course instead of PHYS 1110, 1120, or 1140. Course designed for premed students and students in the biological sciences. Prereq., ability to use high school algebra and trigonometry. Meets MAPS requirement for natural science. Approved for arts and sciences core curriculum: natural science.

**PHYS 2020-5. General Physics 2.** Three demonstration lect., one two-hour lab/rec. per week, plus three evening exams in the semester. Covers electricity and magnetism, light, and modern physics. Natural science majors with a knowledge of calculus and others taking calculus are urged to take this course instead of PHYS 1110, 1120, or 1140. Course designed for premed students and students in the biological sciences. Prereq., PHYS 2010. Approved for arts and sciences core curriculum: natural science.

**PHYS 2130-3. General Physics 3.** Third semester of introductory sequence for science and engineering students except physics majors and those studying computer applications in physics (for these, see PHYS 2170). Covers special relativity, quantum theory, atomic physics, solid state, and nuclear physics. Physics majors should take the PHYS 2140–2170 sequence instead of the PHYS 2130–2140 sequence. Prereqs., PHYS 1120, 1140, or ECEN 2250, 3400. Coreq., MATH 2400. Normally taken with PHYS 2150.

**PHYS 2140-3. Methods of Theoretical Physics.** Introduces mathematical techniques required for a quantitative understanding of phenomena of modern physics, including vector algebra and vector calculus, Fourier analysis, and some differential equations of physics. Computer applications in physics are also covered. Prereq., PHYS 1120; coreq., MATH 2400 or APPM 2350.

**PHYS 2150-1. Experimental Physics.** One lect., one 2-hour lab per week. Includes many experiments of modern physics, including atomic physics, solid state physics, electron diffraction, radioactivity, and quantum effects. Nor-

mally taken concurrently with PHYS 2130 or PHYS 2170 but students may take PHYS 2150 after taking PHYS 2130 or 2170. Prereqs., PHYS 1120 and 1140.

**PHYS 2160-1. Experimental Physics.** For students in Physics Plan 3 teaching track only. Students do another full set of PHYS 2150 experiments (seven different labs from those previously completed). Registration by special arrangements with the Department of Physics. Prereqs., PHYS 1120 and 1140. Same as PHYS 2150.

**PHYS 2170-3. Foundations of Modern Physics.** For physics majors in plans 1 and 2 and those studying computer applications in physics. Completes the three-semester sequence of general physics. Emphasizes developing skills for physics majors. Includes relativity, quantum mechanics, atomic structure. Normally taken with the laboratory PHYS 2150. Prereq., PHYS 2140. Coreq., MATH 2400 or APPM 2350.

**PHYS 2810 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. May be repeated up to 7 total credit hours.

**PHYS 2840 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. May be repeated up to 7 total credit hours.

**PHYS 2900-4. Science, Computer Images, and the Internet.** Computer classroom overview for nonspecialists of how quantitative scientific information is visualized using color images. Covers Internet basics; graphics are downloaded and processed. MacIntosh lab projects use Netscape, Photoshop, PowerPoint. Prereqs., QRMS 1010 or 2380, or equivalent skill level. Restricted to 18 students. Approved for arts and sciences core curriculum: natural science.

**PHYS 3000-3. Science and Public Policy.** For nonscience majors. Reading, discussions, debates, and lectures are used to study how science affects society economically, intellectually, and in terms of health and national security. Another focus is how government fosters and funds scientific activities. Recommended prereq., completion of core science requirement. Approved for arts and sciences core curriculum: critical thinking.

**PHYS 3050-3. Writing in Physics: Problem-Solving and Rhetoric.** Teaches strategies used in scientific writing with an emphasis on argument, reviews and reinforces essential writing skills, provides experience in writing both academic and professional communications in a style appropriate to the literature of physics. Prereqs., PHYS 2130 or 2170 and lower-division core writing requirement. Approved for arts and sciences core curriculum: written communication.

**PHYS 3070-3. Energy and the Environment.** Contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Included are some basic physical concepts and principles that often constrain choices. No background in physics is required. Approved for arts and sciences core curriculum: natural science. Same as ENV5 3070.

**PHYS 3210-3. Analytical Mechanics.** Covers Newtonian mechanics, including rigid body motion, coupled oscillators, central forces and scattering, and provides introduction to Lagrange's and Hamilton's equations. Prereqs., PHYS 1120, 2140, and APPM 2360, or equivalent.

**PHYS 3220-3. Quantum Mechanics and Atomic Physics 1.** Introduces quantum mechanics with wave, operator, and matrix computational techniques. Investigates solutions for harmonic oscillator, potential well, and systems with angular momentum. Develops a quantitative description of one-electron atoms in lowest order. Prereqs., PHYS 2140, 2130 or 2170, and 3210.

**PHYS 3310-3. Principles of Electricity and Magnetism 1.** Covers mathematical theory of electricity and magnetism, including electrostatics, magnetostatics, and polarized media, and provides an introduction to electromagnetic fields, waves, and special relativity. Prereqs., PHYS 2140 and 2130 or 2170.

**PHYS 3320-3. Principles of Electricity and Magnetism 2.** Continuation of PHYS 3310. Electromagnetic induction; magnetic energy; microscopic theory of magnetic properties; AC circuits; Maxwell's Equations; plane waves; waveguides and transmission lines; radiation from electric and magnetic dipoles and from an accelerated charge. Prereq., PHYS 3310.

**PHYS 3330-2. Junior Laboratory.** One lect. and one three-hour lab per week. Combines the use of electronics with appropriate transducers to examines phenomena in thermal and solid state physics, optical communication, and nuclear particle detection. Acquire basic skills in circuit building and in use of modern electronic research instruments. This knowledge is applied to various

experiments that students design and build. Concludes with a project whose results are presented by the student. Prereqs., PHYS 2150 and 2130 or 2170.

**PHYS 3340-3. Introductory Research in Optical Physics.** Two lect., one three-hour lab plus variable unsupervised labs each week. Students design and build their own experiments using a modular type of optical research kit. Experiments cover basic research methods in instrument design, laser physics, Fourier optics, holography, spectroscopy, and interferometry. Students learn how to plan major projects and evaluate critically the significance of results. Course concludes with a four-week major project. Prereq., PHYS 3330. Approved for arts and sciences core curriculum: critical thinking.

**PHYS 4110-3. Analytical Techniques for Materials Analysis.** Lecture and lab-based course covers the physical principles and applications of standard analytical techniques for materials such as X-ray diffraction, photoemission spectroscopy, Auger spectroscopy, Scanning Tunneling microscopy, Atomic Force microscopy, Scanning Electron microscopy, Transmission Electron microscopy, etc. Prereq., PHYS 3220 or instructor consent. Recommended prereq., PHYS 4340. Same as PHYS 5110.

**PHYS 4130-3. Biological Electron Microscopy: Principles and Recent Advances.** Prereq., EBIO 1220, or MCDB 1150, or MCDB 4500/5500, or PHYS 1120, or 2020, or instructor consent. Same as PHYS 5130 and MCDB 4130.

**PHYS 4150-3. Plasma Physics.** Discusses the fundamentals of plasma physics, including particle motion in electromagnetic fields, wave propagation, collisions, diffusion, and resistivity. Presents examples from space plasmas, astrophysical plasmas, laboratory fusion plasmas, and plasmas in accelerators. Prereqs., PHYS 1110–1120, and MATH 2400 or APPM 2350. Coreq., PHYS 3310.

**PHYS 4230-3. Thermodynamics and Statistical Mechanics.** Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamics systems; applications to simple systems. Examines relationship of statistical to thermodynamic points of view. Prereqs., PHYS 3220 and APPM 2360.

**PHYS 4340-3. Introduction to Solid State Physics.** Primarily for senior physics majors. Discusses crystal structure, lattice dynamics, band theory, semiconductors, and ferromagnetism. Prereq., PHYS 3220. Same as ECEN 4345.

**PHYS 4410-3. Quantum Mechanics and Atomic Physics 2.** Extends quantum mechanics to include perturbation theory and its applications to atomic fine structure, interactions with external forces, the periodic table, and dynamical processes including electromagnetic transition rates. Prereqs., PHYS 3220, 3320.

**PHYS 4420-3. Nuclear and Particle Physics.** Introduces structure of the atomic nucleus, spectroscopy of subnuclear particles, scattering, reactions, radioactive decay, fundamental interactions of quarks and leptons. Prereq., PHYS 4410. Approved for arts and sciences core curriculum: critical thinking.

**PHYS 4430-3. Introduction to Research in Modern Physics.** One lect., one lab per week to be taken with PHYS 4410. Experiments introduce students to realities of experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today. Prereqs., PHYS 3220 and 3320. Coreq., PHYS 4410. Same as PHYS 5430. Approved for arts and sciences core curriculum: critical thinking.

**PHYS 4450-3. History and Philosophy of Physics.** Investigates the role of experiment in physics; case studies in the history and philosophy of physics and in scientific methodology. Prereq., PHYS 1020 or 1120 or 2020 or instructor consent. Same as PHYS 5450, PHIL 4450. Approved for arts and sciences core curriculum: critical thinking.

**PHYS 4510-3. Optics.** Basic electromagnetic theory of light, using Maxwell's equations. Examples in geometrical optics; extensive applications in physical optics including diffraction and polarization. Spectra, including Zeeman effect and fluorescence. Recent advances in experimental techniques: microwaves, lasers, image converters. Prereq., PHYS 3320.

**PHYS 4610-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work is required. See also PHYS 4620 and PHYS 4630. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4620-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work is

required. See also PHYS 4610 and PHYS 4630. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4630-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work is required. See also PHYS 4610 and PHYS 4620. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4801-3. Computational Physics.** Introduction to finite-difference, spectral, and Monte Carlo methods with emphasis on current applications. Practical implications of stability, accuracy, sampling statistics and convergence. Topics include nonlinear dynamics, classical waves, Schrodinger's equation, diffusion, the Ising model, and molecular dynamics. Prereqs., PHYS 2170, PHYS 3210, CSCI 1200, or programming experience; or instructor consent. Recommended prereq., PHYS 4230. Same as PHYS 5001.

**PHYS 4810 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also PHYS 4820 and PHYS 4830. May be repeated up to 7 total credit hours.

**PHYS 4820 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also PHYS 4810 and PHYS 4830. May be repeated up to 7 total credit hours.

**PHYS 4830 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also PHYS 4810 and PHYS 4820. May be repeated up to 7 total credit hours.

**PHYS 4840 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4850. May be repeated up to 7 total credit hours.

**PHYS 4850 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4840. May be repeated up to 7 total credit hours.

**PHYS 4970-3. Seminar on Physical Methods in Biology.** Prereq., PHYS 1120 or 2020, and MCDB 1060 or 1150, or EBIO 1220, or instructor consent. Same as PHYS 5970 and MCDB 4970.

**PHYS 5000-1. Seminar in Plasma Physics.** Graduate seminar on current plasma physics research. Reviews the goals and techniques of research in areas of plasma physics (controlled fusion, numerical simulations, solar, and space physics). Discusses current topics and research literature in depth. May be repeated up to 4 total credit hours to meet candidacy requirement. Prereq., graduate standing or instructor consent.

**PHYS 5001-3. Computational Physics.** Same as PHYS 4801.

**PHYS 5030-3. Intermediate Mathematical Physics 1.** This course and its continuation, PHYS 5040, form a survey of classical mathematical physics. Studies complex variable theory and finite vector spaces, and includes topics in ordinary and partial differential equations, boundary value problems, potential theory, and Fourier analysis. Prereqs., MATH 4310 and 4320. Same as MATH 5030.

**PHYS 5040-3. Intermediate Mathematical Physics 2.** Continuation of PHYS 5030. Includes group theory, special functions, integral transforms, integral equations, and calculus of variations. Prereq., PHYS 5030. Same as MATH 5040.

**PHYS 5110-3. Analytical Techniques for Materials Analysis.** Same as PHYS 4110.

**PHYS 5130-3. Biological Electron Microscopy: Principles and Recent Advances.** Same as PHYS 4130 and MCDB 5130.

**PHYS 5141-3. Astrophysical and Space Plasmas.** Covers magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies. Prereq., graduate standing in astrophysical and planetary science or physics. Same as ASTR 5140.

**PHYS 5150-3. Introductory Plasma Physics.** Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications, and experimental plasma physics (laboratory). Prereq., PHYS 3310. Same as ASTR 5150.

**PHYS 5210-3. Theoretical Mechanics.** Variational principles, Lagrange's equations, Hamilton's equations, motion of rigid body, relativistic mechanics, transformation theory, continuum mechanics, small oscillations, Hamilton-Jacobi theory. Coreq., PHYS 5250.

**PHYS 5220-3. Nonlinear Dynamics.** Conservative systems: canonical perturbation theory, adiabatic invariants, surface of section, overlap criterion, orbit stability, quasilinear diffusion, renormalization analysis of transition to chaos. Bifurcation theory: center manifolds, normal forms, singularity theory. Dissipative systems: strange attractors, renormalization analysis of period doubling, intermittency. Prereq., PHYS 5210. Same as ATOC 5220.

**PHYS 5250-3. Introduction to Quantum Mechanics 1.** Quantum phenomena, Ehrenfest theorem and relation to classical physics, applications to one-dimensional problems, operator techniques, angular momentum and its representations, bound states and hydrogen atom, and Stern-Gerlach experiment and spin and spinor wave function. Prereqs., PHYS 3220 and 4410. Coreq., PHYS 5210.

**PHYS 5260-3. Introduction to Quantum Mechanics 2.** Symmetries and conservation laws, identical particle systems, approximation techniques (including time-dependent and time-independent perturbation theories and variational techniques) and their applications, scattering theory, radiative transitions, and helium atom. Prereq., PHYS 5250.

**PHYS 5430-3. Introduction to Research in Modern Physics.** Same as PHYS 4430.

**PHYS 5450-3. History and Philosophy of Physics.** Same as PHYS 4450 and PHIL 5450.

**PHYS 5520-3. Introduction to Magnetic Materials and Devices.** Addresses magnetic materials and devices with emphasis on systems of interest in sensor and data storage technologies. Laboratory experiments are included to cover thin-film deposition, materials characterization, and device design and fabrication. Prereq., instructor consent. Recommended prereqs., PHYS 3320 and 4230.

**PHYS 5606-3. Optics Laboratory.** Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers, and holograms, and experimentation of fiber optics and Fourier optics. Prereq., undergraduate optics course such as PHYS 4510. Same as ECEN 5606.

**PHYS 5770-3. Gravitational Theory (Theory of General Relativity).** Presents Einstein's relativistic theory of gravitation from geometric viewpoint; gives applications to astrophysical problems (gravitational waves, stellar collapse, etc.).

**PHYS 5840 (1-3). Selected Topics for Graduate Independent Study.** Subject matter to be arranged. May be repeated up to 7 total credit hours.

**PHYS 5970-3. Seminar: Physical Methods in Biology.** Same as PHYS 4970 and MCDB 5970.

**PHYS 6260-3. Geometry of Quantum Fields and Strings.** Focuses on differential geometric techniques in quantum field and string theories. Topics include spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory, and nonperturbative aspects in field and string theories. Prereq., MATH 6230, PHYS 5250, or instructor consent. Recommended prereqs., MATH 6240 and PHYS 7280. Same as MATH 6260.

**PHYS 6610-3. Earth and Planetary Physics 1.** Same as GEOL 6610 and ASTR 6610.

**PHYS 6620-3. Earth and Planetary Physics 2.** Same as GEOL 6620 and ASTR 6620.

**PHYS 6630-3. Earth and Planetary Physics 3.** Same as GEOL 6630 and ASTR 6630.

**PHYS 6650 (1-3). Seminar in Geophysics.** Same as GEOL 6650 and ASTR 6650.

**PHYS 6670-2. Geophysical Inverse Theory.** Prereqs., calculus, computer programming (any language). Same as GEOL 6670.

**PHYS 6940 (1-3). Master's Degree Candidate.**

**PHYS 6950 (1-6). Master's Thesis.** Approved problem in theoretical or experimental physics under the direction of staff members. Intended to introduce the student to procedures in research and development work. Work of an original nature expected.

**PHYS 7160-3. Intermediate Plasma Physics.** Continuation of PHYS 5150. Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation—ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory, and fluctuation phenomena. Prereq., PHYS 5150 or instructor consent. Same as ASTR 7160.

**PHYS 7230-3. Statistical Mechanics.** Classical and quantum statistical theory, including study of both equilibrium and nonequilibrium systems. Topics covered include kinetic theory, degenerate gases, macrocanonical and grand canonical ensembles, and irreversible processes. Prereq., PHYS 5250 and 5260.

**PHYS 7240-3. Advanced Statistical Mechanics.** Introduces current research topics in statistical mechanics. Topics vary from year to year and may include phase transitions, critical phenomena, nonequilibrium phenomena, dense fluids, dynamical systems, plasma physics, or quantum statistical mechanics. Prereq., PHYS 7230.

**PHYS 7270-3. Introduction to Quantum Mechanics 3.** Radiation theory; relativistic wave equations with simple applications; introduction to field theory and second quantization.

**PHYS 7280-3. Advanced Quantum Theory.** Quantum theory of fields, elementary particles, symmetry laws, and topics of special interest. Prereq., PHYS 7270 or instructor consent.

**PHYS 7310-3. Electromagnetic Theory 1.** Sophisticated approach to electrostatics, boundary value problems, magnetostatics, applications of Maxwell's equations to electromagnetic wave propagation, wave guides, and resonant cavities and magnetohydrodynamics. See also PHYS 7320. Prereq., PHYS 5030.

**PHYS 7320-3. Electromagnetic Theory 2.** This is a continuation of PHYS 7310. Topics include relativistic particle dynamics; radiation by moving charges; multipole fields; radiation damping and self-fields of a particle; collisions between charged particles and energy loss; radiative processes; and classical field theory. See also PHYS 7310. Prereq., PHYS 7310.

**PHYS 7440-3. Theory of the Solid State.** Stresses application to the solid state of physical concepts basic to much of modern physics, single-particle approximation, and the energy-band description of electron states in solids, pseudopotential theory applied to ordered and disordered systems, dynamical behavior of electrons in solids, lattice dynamics, Hartree-Fock and random-phase approximation in solids, many-body aspects of magnetism, and superconductivity.

**PHYS 7550-3. Atomic and Molecular Spectra.** Covers theory of atomic structure and spectra, including coupling of angular momenta, tensor operators, energy levels, fine and hyperfine structure, transition probabilities, Zeeman and Stark effects. Molecular spectra: electronic, vibrational, and rotational states. Rotation matrices, symmetric top.

**PHYS 7730-3. Theory of Elementary Particles.** Systematics of elementary particles; quantum numbers, Lorentz group and spin; the S-matrix and invariant amplitudes; analytical properties of amplitudes; dispersion relations; dynamical calculation of quantum numbers and masses; elementary particle spectroscopy; higher symmetries.

**PHYS 7810, 7820, and 7830 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. May be repeated up to 7 total credit hours.

**PHYS 7840, 7850, and 7860 (1-3). Selected Topics for Graduate Independent Study.** Subject matter to be arranged. May be repeated up to 7 total credit hours.

**PHYS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Political Science

### American

**PSCI 1101-3. The American Political System.** Emphasizes interrelations among levels and branches of government, formal and informal institutions, processes, and behavior. Meets MAPS requirement for social science: general or U.S. history. Approved for arts and sciences core curriculum: contemporary societies or United States context.

**PSCI 1111-1. Introduction to Political Science Research: American Politics.** Introduces students to some simple techniques political scientists use to evaluate evidence. Students learn how to formulate testable hypotheses, examine data for evidence of support of their hypotheses, and think about and test possible rival explanations.

**PSCI 1970-3. Legal Rights of Students.** Focuses on educational law and legal rights of students. Restricted to students in the Sewall Residential Academic Program.

**PSCI 2101-3. Introduction to Public Policy Analysis.** Studies policymaking processes in American government, factors shaping public decision, and issues and questions relevant to political inquiry.

**PSCI 2111-3. Introduction to Urban Studies.** Surveys different perspectives on urbanization and urban life from an interdisciplinary perspective, emphasizing the economic, spatial, and political dimensions of urban conditions and their planning and policy implications. Required for the certificate in urban studies.

**PSCI 2481-3. Introduction to the Legal Process.** Covers basic legal concepts and processes emphasizing the American system. Gives special attention to political functions of law. Recommended as preparation for PSCI 4241, 4251, and 4261. Prereq., PSCI 1101.

**PSCI 3011-3. The American Presidency.** Covers constitutional and institutional foundations and historical development of the presidency; roles, powers, selection, recent modifications, and institutionalization. Uses lectures and class discussion. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3031-3. Political Parties and Pressure Groups.** Highlights the practice of party politics in the United States, including the nature, structure, organization, and functions of political parties and pressure groups. Analyzes pressure politics and political behavior. Prereq., PSCI 1101.

**PSCI 3041-3. The American Congress.** Provides intensive examination of the role of Congress in American government, including congressional elections, representation, the organization of Congress, and congressional policy making. Examines larger context of congressional politics, including political parties, the president, and interest groups. Prereq., PSCI 1101.

**PSCI 3051-3. Public Opinion and Political Behavior.** Examines measurement of public opinion and evaluation of its impact on governmental policy formation, including survey research techniques and field work in opinion sampling. Prereq., PSCI 1101.

**PSCI 3061-3. State Government and Politics.** Examines politics in the American states from a comparative and historical perspective. Considers major political actors—interest groups, citizens (direct democracy), and political parties, as well as central institutions, in the state political arena. Also focuses on major state public policy concerns. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3071-3. Urban Politics.** Examines the structure of political, social, and economic influence in urban areas. Focuses on the relationship of the political system to governmental, social, and economic institutions and the contemporary policy processes in American cities. Prereq., PSCI 1101 or 2111. Approved for arts and sciences core curriculum: United States context.

**PSCI 3101-3. Black Politics.** Examines structure of political, social, and economic influence in urban areas. Focuses on the relationship of political processes to governmental, social, and economic institutions and contemporary policy processes in American cities. Prereq., PSCI 1101. Same as BLST 3101. Approved for arts and sciences core curriculum: cultural and gender diversity, or contemporary societies.

**PSCI 3171-3. Government and Capitalism in the United States.** Examines competing theoretical approaches to questions related to origins, development, and purposes of modern government in the United States; particular attention paid to impact of transformations in the underlying structure of the capitalist economy. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3191-3. National Security Organization and Policy Making.** Analyzes how the American governmental and political system is structured to define, select, and implement national security policies. Examines roles of the president, Congress, bureaucracy, interest groups, and other actors. Prereq., PSCI 1101.

**PSCI 3201-3. The Environment and Public Policy.** Considers constitutional, political, and geographic factors in development of public policy affecting the use of natural resources and management of the environment; organization, procedures, and programs for use of natural resources; and administration of environmental policies. Prereq., PSCI 1101.

**PSCI 3261-3. The Judicial System.** Examines principal actors in the legal system (police, lawyers, judges, citizens) and roles they play in the political

process. Also examines differential treatment of varying economic groups. Prereq., PSCI 1101.

**PSCI 3271-3. Law and Society: The Interaction between Legal Institutions and Human Behavior.** Examines relationship between human behavior and legal system, looking closely at the voluntary relationship between the citizen and the state, the use of law to balance economic liberty and equality, support for civil liberties, and procedural, distributive, and retributive justice. Recommended prereq., PSCI 1101.

**PSCI 4021-3. Legislatures and Legislation.** Focuses on the structure and organization of legislatures and process of statute lawmaking. Recommended prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 4111-3. Urban Problems and Public Policies.** Critically examines public policies designed to deal with major social, economic, and political problems facing contemporary American cities. Emphasizes evaluation of urban programs in welfare, education, crime, housing, and urban economic vitality. Prereq., PSCI 1101.

**PSCI 4131-3. Latinos and the U.S. Political System.** Examines the political status and activities of Mexican Americans and other Latino groups (Cuban Americans and Puerto Ricans) in the U.S. Also covers Latino political attitudes and behaviors; Latino efforts to influence the major national, state, and local institutions of the American government; and public policy concerns of Latinos. Recommended prereq., PSCI 1101. Same as CHST 4133. Approved for arts and sciences core curriculum: cultural and gender diversity.

**PSCI 4161-3. Political Rights and Political Morality.** Examines the place of rights in American politics. Analyzes the central role political morality plays in the resolution of conflicting and competing rights. Prereq., PSCI 1001.

**PSCI 4241-3. Constitutional Law 1.** Focuses on the nature and scope of American constitutional principles as developed by the U.S. Supreme Court: federalism, jurisdiction of the federal courts, separation of powers, the taxing power, and the commerce power. Involves the case method. Prereq., PSCI 1101 and junior or senior standing.

**PSCI 4251-3. Constitutional Law 2.** Continuation of PSCI 4241. Emphasizes war power, powers of the president, citizenship, the Bill of Rights, and the Civil War amendments. Involves the case method. Not open to freshmen. Prereq., PSCI 1101 or instructor consent.

**PSCI 4271-3. Sex Discrimination: Constitutional Issues.** Examines continuity and change in legal treatment of sex and gender. Using the case method, explores areas of the law including equal protection analysis, affirmative action, and privacy rights. Prereq., PSCI 1101. Same as WMST 4271. Approved for arts and sciences core curriculum: cultural and gender diversity.

**PSCI 4291-3. Sex Discrimination: Federal and State Law.** Examines continuity and change in legal treatment of sex and gender. Using the case method, focuses on family law, education equity, employment law, and gender-related criminal law. Prereq., PSCI 1101. Same as WMST 4291. Approved for arts and sciences core curriculum: cultural and gender diversity.

**PSCI 4341-3. Political Communication, Persuasion, and Public Policy.** Addresses the idea of political communication as a central aspect of policymaking and how the inability to develop persuasive political arguments in particular circumstances invites policy failure. Examines aspects of political communication as it applies to citizens, political decision makers, and specific public policies. Prereq., PSCI 1101 or instructor consent. Restricted to juniors and seniors.

**PSCI 4701-3. Symbolic Politics.** Introduces uses and abuses of symbols as instruments and indicators of political change. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4711-3. Selected Policy Problems.** Integrates general principles of policy inquiry with documents and other literature on specific problems in public policy, in order to evaluate courses of action. May be repeated up to 6 total credit hours on different topics. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4721-3. Rethinking American Politics.** Examines the political history and development of the United States of America. Looks at the particular policy choices we have made and examines the future political agenda. Prereq., junior or senior standing and PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4731-3. Progress and Problems in American Democracy.** Closely examines the various understandings of democracy, the arguments for and against

democracy, and the progress of and prospects for democratic politics in the United States. Particular attention is paid to economic, social, and political developments in the United States that affect popular sovereignty, political equality, and liberty. Prereqs., junior or senior standing and PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4751-3. The Politics of Ideas.** Examines theoretical arguments and case studies of interactions of ideas, interests, and institutions in policymaking. Analyzes processes through which ideas come to the public agenda, how institutional settings shape those ideas, and why some ideas and interests are more successful. Prereqs., junior or senior standing and PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4761-3. Rethinking Political Values.** Encourages intellectual discipline and critical thinking by examining pressing political values from multiple analytic perspectives. Enables students to participate in oral and written discussions. Prereqs., junior or senior standing and PSCI 1101. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4771-3. Civil Rights and Liberties in America.** Implementation of rights and liberties in America. Examines fundamental issues of free speech, press, association, and religion along with rights to due process and equal protection under the law. Prereq., junior or senior standing. Recommended prereq., PSCI 2481. Approved for arts and sciences core: critical thinking.

**PSCI 4841 (1-3). Independent Study in American Politics.** Subjects are chosen and arrangements are made to suit the needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. A special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 1101.

**PSCI 5011-3. Seminar: American Politics.** Core field seminar for students of American politics. Course work emphasizes the diversity of contemporary research on American political history, political institutions, and political behavior. Prereq., graduate student standing or instructor approval. Same as PSCI 7011.

**PSCI 5021-3. Latinos and U.S. Politics.** Examines in depth the theoretical and empirical literature assessing the political situation and activities of Latinos (Mexican Americans, Puerto Ricans, Cuban Americans, and others) in the U.S. Stresses original research. Prereq., graduate student standing or instructor approval. Same as PSCI 7021.

**PSCI 5031-3. Seminar: Political Attitudes and Behavior.** Provides an intensive examination of topics in political attitudes and behavior such as political participation, ideology, voting, and elite behavior. Reviews methodology of behavioral research and introduces ICPSR data archive and computer-based research. Prereq., graduate student standing or instructor approval. Same as PSCI 7031.

**PSCI 5041-3. Seminar: The Presidency.** Offers an intensive examination and preparation of research papers on historical, functional, and constitutional aspects of the presidency. Gives attention to literature on the presidential system and to analytical comparisons with other executive systems. Prereq., graduate student standing or instructor approval. Same as PSCI 7041.

**PSCI 5051-3. Seminar: The United States Congress.** Comprehensively examines literature and selected research topics concerning the United States Congress. Prereq., graduate student standing or instructor approval. Same as PSCI 7051.

**PSCI 5091-3. Politics of Social Movements.** Examines theoretical and empirical research on American social movements. Emphasizes the role of movements as political actors and their ability to bring about changes in public policy and national political institutions. Prereq., graduate student standing or instructor approval. Same as PSCI 7091.

**PSCI 5111-3. Seminar: American Political Institutions.** Intensive examination of the structure and rules of different political institutions in the United States. Explores both the changing approaches to the study of American political institutions as well as many of the major research topics on the presidency, Congress, the judiciary, and the bureaucracy. Prereq., graduate student standing or instructor approval. Same as PSCI 7111.

**PSCI 5121-3. Black Leadership and Public Policy.** Examines the writings of African American political leaders, public policy critics, and politicians who have influenced black politics and society since 1900. Explores the ideas and leadership of W.E.B. DuBois, E. Franklin Frazier, Martin Luther King Jr., and others. Prereq., graduate student standing or instructor approval. Same as PSCI 7121.

**PSCI 5141-3. The Political Economy of American Politics.** Intensive examination of pluralist, voter-centered, rational choice, and neo-Marxist literature on the American state. Prereq., graduate student standing or instructor approval. Same as PSCI 7141.

**PSCI 5151-3. American Subnational Politics and Government.** Provides a comprehensive overview of the issues and literature concerning American "subnational" politics. Considers three bodies of literature: American federalism and intergovernmental relations, state politics, and urban/local politics. Also examines a number of policy issues. Prereq., graduate student standing or instructor approval. Same as PSCI 7151.

**PSCI 5901 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated for a total of 7 credit hours. Same as PSCI 7901.

**PSCI 6901 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements are made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8901.

**PSCI 6951 (1-4). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7011-3. Seminar: American Politics.** Same as PSCI 5011.

**PSCI 7021-3. Latinos and U.S. Politics.** Same as PSCI 5021.

**PSCI 7031-3. Seminar: Political Attitudes and Behavior.** Same as PSCI 5031.

**PSCI 7041-3. Seminar: The Presidency.** Same as PSCI 5041.

**PSCI 7051-3. Seminar: The United States Congress.** Same as PSCI 5051.

**PSCI 7091-3. Politics of Social Movements.** Same as PSCI 5091.

**PSCI 7111-3. Seminar: American Political Institutions.** Same as PSCI 5111.

**PSCI 7121-3. Black Leadership and Public Policy.** Same as PSCI 5121.

**PSCI 7141-3. The Political Economy of American Politics.** Same as PSCI 5141.

**PSCI 7151-3. American Subnational Politics and Government.** Same as PSCI 5151.

**PSCI 7901 (1-3). Topics in Political Science.** Same as PSCI 5901.

**PSCI 8901 (1-3). Graduate Research Project.** Same as PSCI 6901.

**PSCI 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Comparative

**PSCI 2012-3. Introduction to Comparative Politics.** Most countries confront a variety of common political problems, including how to gain popular support, what kinds of political institutions are most appropriate, and how to distribute burdens and benefits to different segments of the population. Concentrates on learning how to compare different political systems and provides illustrative examples from several countries in both the industrialized and nonindustrialized world. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3032-3. Latin American Political Systems.** Stresses different perspectives on Latin American politics and understanding key political actors and processes. Country focus varies. Prereq., PSCI 2012, IAFS 1000, IAFS major, Latin American studies major, or instructor consent. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3042-3. Latin American Economic Development.** Stresses political and economic development in Latin America, as well as interactions with the international economy. Prereq., PSCI 2012, IAFS 1000, or instructor consent. Recommended prereq., PSCI 3032.

**PSCI 3062-3. Revolution and Political Violence.** Studies and evaluates alternative theoretical frameworks for the analysis of revolution and political violence. Theoretical material is firmly couched in case situations, such as ethnic class and colonial, urban, racial, and religious conflicts. Students may not re-

ceive credit for both PSCI 3062 and PSCI 3064. Prereq., PSCI 1101, PSCI 2012, or IAFS 1000.

**PSCI 3072-3. Government and Politics in Southeast Asia.** Surveys historical and contemporary forces shaping politics in Southeast Asia. Gives special attention to comparative political economy, including development strategies and transitions to democracy. Prereqs., PSCI 2012 or IAFS 1000.

**PSCI 3082-3. Political Systems of Sub-Saharan Africa.** Analyzes post-independence and post cold-war change in sub-Saharan Africa and provides intensive case studies of selected countries exemplifying each type with South Africa seen as a special case. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4002-3. Western European Politics.** Comparatively analyzes development of the political systems and processes of European democracies. Emphasizes contemporary institutions, decision making patterns, and policy issues. Special attention to challenges of welfare systems. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4012-3. Global Development.** Third world political, economic, and socio-cultural development in the context of international political and economic forces. Discusses the meaning of development, explanations of why it occurs in some countries and not in others, and policy proposals for facilitating it. Prereq., PSCI 2012, ECON 2020, IAFS 1000, or one upper-division PSCI course. Similar to PSCI 4732, INVS 4732. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4022-3. Chinese Foreign Policy.** History of China's external relations and theories of foreign policy decision making. Explores two vital bilateral relations (Sino-U.S. and Sino-Japanese) and several key issues (like Taiwan) in China's 21st century foreign policy. Recommended prereq., PSCI 2012.

**PSCI 4052-3. Chinese Politics.** Explores the politics of 20th century China to speculate on China's future in the 21st century. Begins with an extensive look at the political history of the People's Republic, before turning to social, cultural, economic, and political issues today. Concludes with an examination of Chinese foreign policy, with a focus on Sino-American relations. Prereq., PSCI 2012 or IAFS 1000.

**PSCI 4062-3. The Emerging Democracies of Central and Eastern Europe.** Studies developments in the former Soviet satellites and Yugoslavia, their governmental organizations, and their relation to the former Soviet Union and the West. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4092-3. Comparative Urban Politics.** Comparatively analyzes major urban systems in different political/economic setting and Third-World countries. Gives special attention to political and economic factors shaping urbanization processes and distinctive policy issues in these different settings. Prereqs., PSCI 1101 and 3071 recommended.

**PSCI 4102-3. The Government and Politics of Israel.** Studies historical and contemporary responses by Jews to conditions of diaspora and statehood. Emphasizes Israel's political culture, governmental structure and processes, and party politics. Also looks at problems of integration, defense, and relations with the diaspora Jewish community. Prereq., PSCI 2012 or IAFS 1000.

**PSCI 4122-3. The Military in Politics: Latin America and the U.S.** Analyzes the causes and consequences of military intervention in politics, contrasting patterns of civil-military relations, and the problem of democratic control of the armed forces. Focuses on the Latin American military, with secondary attention to U.S. military. Prereq., PSCI 2012 or IAFS 1000, and PSCI or ROTC major.

**PSCI 4252-3. Politics of Ethnicity and Nationalism.** Analyzes ethnic identity as a factor in contemporary politics. Deals extensively with the role of ethnic groups in political mobilization, the development of national collective consciousness, nation building, and international relations. Explores the influence of religion, language, history, culture and class on ethnic group formation and behavior.

**PSCI 4272-3. Capitalist Democracies in a Global World Economy.** Considers how political power is used to achieve economic ends and to shape the operations of market economies. Focuses on economic conflicts as political contests, and explores how politics shapes the course of economic development as well as the basis of social and political life. Prereq., PSCI 2012 or IAFS 1000. Recommended prereq., ECON 2020. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4282-3. Comparative Legal Systems.** Compares the criminal justice systems around the world in order to see how each functions and how each system re-

flects political and historical traditions, including the civil law tradition that dominates Europe and South America, the common law system that exists in the United States and in most English-speaking countries, and the criminal justice system in Japan. Prereq., PSCI 2012.

**PSCI 4732-3. Critical Thinking in Development.** Analyzes the same subject matter as PSCI 4012, requiring students to critically evaluate explanations of the success or failure of development and policy proposals for facilitating it that are presented in assigned or optional readings or in student papers. Prereqs., PSCI 2012 or IAFS 1000, ECON 2010 and 2020, and one upper-division PSCI course. Students may not receive credit for both PSCI 4012 and 4732. Same as INVS 4732. Approved for arts and sciences core curriculum: critical thinking or contemporary societies.

**PSCI 4752-3. Seminar: Central and Eastern European Studies.** Current political and economic developments and problems faced by the countries of Central and Eastern Europe (Poland, Czechoslovakia, Hungary, Yugoslavia, Bulgaria, Romania, Albania, Estonia, and Latvia). Prereq., PSCI 2012 and junior or senior standing or instructor approval. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4792-3. Issues in Latin American Politics.** Studies several Latin American countries in some depth including history and contemporary politics. Teaches students to listen to and evaluate different sides of political controversies, and critically evaluate arguments. Prereqs., PSCI 2012 or IAFS 1000, and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4842 (1-3). Independent Study in Comparative Politics.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2012 or IAFS 1000.

**PSCI 5012-3. Seminar: Comparative Political Systems.** Discusses current literature on comparative politics including theoretical and methodological issues. Prereq., graduate student standing or instructor approval. Same as PSCI 7012.

**PSCI 5022-3. Seminar in Political and Economic Development.** Covers domestic political and economic development in Latin America, Africa, and Asia, as well as interactions with the global economy. Includes defining, explaining, and prescribing policies for successful development, and comparing the experiences of developing and industrialized countries. Prereq., graduate student standing or instructor approval. Same as PSCI 7022.

**PSCI 5032-3. Seminar: Latin American Politics.** Stresses intensive study of the political process in Latin America with special emphasis on democratization. Prereq., graduate student standing or instructor approval. Same as PSCI 7032.

**PSCI 5042-3. Seminar: Comparative Politics of Western Europe.** Focuses on comparative analysis of changes in political institutions and processes and their impact on macroeconomic policies, e.g., growth, employment, redistribution, and welfare. Includes examination and writing of research papers on selected topics on industrial democracies, especially those of Western Europe. Prereq., graduate student standing or instructor approval.

**PSCI 5062-3. The Politics of Ethnicity.** Explores the political aspects of pluralism, ethnonationalism, separatism, and related phenomena. Examines theories of ethnic mobilization, conflict, and accommodation in the context of political development and nation building. Includes cross-polity comparisons and case studies of multiethnic societies in the developed and developing world. Prereq., at least one course in comparative politics and graduate student standing or instructor approval. Same as PSCI 7062.

**PSCI 5072-3. Seminar: Comparative Politics of Sub-Saharan Africa.** Stresses comparisons among African political systems as well as with other areas of the world, and on explanation of change. Includes writing and discussion of analytical literature reviews and research papers on various aspects of political change in sub-Saharan Africa. Prereq., graduate student standing or instructor approval. Same as PSCI 7072.

**PSCI 5082-3. Subordinate Protest and Democratization.** Considers traditional studies of democratic development and democratization. Topics covered include the definition of democracy, characteristics, dilemmas, and limitations; the classical European view of democratization; democratic and nondemocratic characteristics of different social classes; contributions to democracy

made by the popular classes; and transitions to democracy and subordinate groups and protest in the democratization process. Prereq., graduate student standing or instructor approval. Same as PSCI 7082.

**PSCI 5092-3. Comparative Human Rights and Repression.** Provides students with an understanding of human rights and repression in a comparative perspective. Deals extensively with conceptual issues, theoretical explanations, and diverse techniques of studying the subject. Prereq., graduate student standing or instructor approval. Same as PSCI 7092.

**PSCI 5112-3. Seminar: Comparative Political Parties and Interest Groups.** Critically examines topics relating to social forces, parties, and interest groups. Analyzes concepts, theories, and case studies with particular emphasis on Western political systems. Also examines party systems in comparison and the role of groups and the determinants of group politics. Prereq., graduate student standing or instructor approval. Same as PSCI 7112.

**PSCI 5142-3. The Political Economy of the Democratic Welfare State.** Advanced seminar that examines the structure of political and economic relations in several advanced democracies. Specifically examines a series of historical, institutional, and cultural theories that purport to explain these differences. Prereq., graduate student standing or instructor approval. Same as PSCI 7142.

**PSCI 5152-3. Seminar in Chinese Politics.** A comprehensive introduction to the study of Chinese politics is provided. It begins with China's revolutionary heritage, before turning to state-society relations in China today. Concludes with China's external relations. Will China be a status quo or a revisionist power in the 21st century? Prereq., graduate student standing or instructor approval. Same as PSCI 7152.

**PSCI 5902 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7902.

**PSCI 6902 (1-3). Graduate Research Topic.** Guides independent research on a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8902.

**PSCI 6952-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7012-3. Seminar: Comparative Political Systems.** Same as PSCI 5012.

**PSCI 7022-3. Seminar in Political and Economic Development.** Same as PSCI 5022.

**PSCI 7032-3. Seminar: Latin American Politics.** Same as PSCI 5032.

**PSCI 7062-3. The Politics of Ethnicity.** Same as PSCI 5062.

**PSCI 7072-3. Seminar: Comparative Politics of Sub-Saharan Africa.** Same as PSCI 5072.

**PSCI 7082-3. Subordinate Protest and Democratization.** Same as PSCI 5082.

**PSCI 7092-3. Comparative Human Rights and Repression.** Same as PSCI 5092.

**PSCI 7112-3. Seminar: Comparative Political Parties and Interest Groups.** Same as PSCI 5112.

**PSCI 7142-3. The Political Economy of the Democratic Welfare State.** Same as PSCI 5142.

**PSCI 7152-3. Seminar in Chinese Politics.** Same as PSCI 5152.

**PSCI 7902 (1-3). Topics in Political Science.** Same as PSCI 5902.

**PSCI 8902 (1-3). Graduate Research Topic.** Same as PSCI 6902.

**PSCI 8992 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## International Relations

**PSCI 2223-3. Introduction to International Relations.** Introduces the field of international relations, with general survey of the theories, histories, and problems of historical and contemporary relations among state and nonstate actors. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3123-3. War, Peace, and Strategic Defense.** Analyzes employment, or the threat of employing force, in securing American interests in the post-Cold War world. Gives special attention to utilities claimed for nuclear weapons, and al-

ternatively, to weapons control and disarmament. Prereq. PSCI 2223. Students may not receive credit for both PSCI 3121 and 3123.

**PSCI 3143-3. Problems in International Relations.** Analyzes the various theoretical and policy challenges facing the post-Cold War world, with an emphasis on examining alternative conceptions of and approaches to such challenges. Prereq., PSCI 2223. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3163-3. American Foreign Policy.** Examines foundations, assumptions, objectives, dynamics, and methods of U.S. foreign policy since WWII. Gives special attention to domestic and external problems of adapting U.S. policy to the changing world environment. Prereq., PSCI 2223. Approved for arts and sciences core curriculum: United States context.

**PSCI 3193-3. International Behavior.** Presents alternate theoretical frameworks for the explanation of international processes. Applies theories of conflict behavior and social organization to problems of war and peace. Prereq., PSCI 2223.

**PSCI 4173-3. International Organization.** Analyzes international organizations to determine whether they are an effective instrument for achieving peace and security and for the promotion of human welfare. Prereq., PSCI 2223.

**PSCI 4183-3. International Law.** Investigates the body of law that regulates relations between nation states and provides a framework for the solving of common problems. Explores its nature and effectiveness as well as its adaptability to a changing environment. Prereq., PSCI 2223.

**PSCI 4213-3. Europe in the International System.** Covers European and Atlantic regionalism. Discusses such communities as the Council of Europe, NATO, EFTA, and OECD, and provides a detailed examination of the European Union. Looks at theories of integration, problems of partnership and interdependence, rival nationalisms and strategic doctrines, and problems of the post-Cold War era. Prereq., PSCI 2223.

**PSCI 4703-3. Alternative World Futures.** Aims to help students think about the future of the world in a systematic way. Focuses on alternative projections and policies dealing with major problems. Prereq., PSCI 2223 and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4783-3. Global Issues.** Studies the principal issues confronting humanity that affect stability and survivability and their economic, social, and political implications. Prereq., PSCI 2012 or 2223. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4843 (1-3). Independent Study in International Relations.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2223.

**PSCI 5013-3. Seminar: International Relations.** Reviews salient literature on international relations, and subsequent presentation and critical discussion of analytical studies. Allows students wide latitude in substantive and methodological approaches. Emphasizes changing trends and efforts to understand the bases for cooperation and conflict. Prereq., graduate student standing or instructor approval. Same as PSCI 7013.

**PSCI 5043-3. Seminar: Problems of International Organizations.** Studies selected problems concerning administration and operation of public international organizations, including the United Nations and its specialized agencies. Considers decision making, executive leadership, internal organization, personnel policies, coordination of activities, and financing. Prereq., graduate student standing or instructor approval. Same as PSCI 7043.

**PSCI 5053-3. War and Peace.** Provides systematic treatment of theories, concepts, and data addressing the conditions and processes of international conflict, violence, and stability, with attention to historical and contemporary cases. Prereq., graduate student standing or instructor approval. Same as PSCI 7053.

**PSCI 5063-3. Psychological Approaches to International Relations.** Surveys the role of psychological processes in the formulation and conduct of foreign policy. Examples include attribution theory, cognition, decision making, and personality. Prereq., graduate student standing or instructor approval. Same as PSCI 7063.

**PSCI 5073-3. Seminar: Global Political Economy.** Introduces graduate students to concepts, theories, and data used to study the global system from a political-economic framework. Examines world systems analysis, regime change theory, and dependency theory with respect to operation of the exchange and power relationship within the contemporary world system. Prereq., graduate student standing or instructor approval. Same as PSCI 7073.

**PSCI 5113-3. Advanced Readings in International Relations.** Provides an advanced readings course for international relations graduate students. Acts as a capstone course for those preparing to take the PhD comprehensive exams, and is intended to provide in-depth knowledge about core areas of international relations scholarship. Prereq., graduate student standing or instructor approval. Same as PSCI 7113.

**PSCI 5223-3. Continuities and Changes in the Modern World Economy.** Introduces the topics of globalization and democratization from an interdisciplinary perspective. Examines major changes to the global political economy and explores their implications for local, national, regional, and international political and economic processes. Prereq., graduate student standing in PSCI, ECON, GEOG, or SOCY, or instructor approval. Same as PSCI 7223, GEOG 5222, or SOCY 5223.

**PSCI 5333-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as PSCI 7333, SOCY 5333, and GEOG 5332.

**PSCI 5903 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7903.

**PSCI 6903 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8903.

**PSCI 6953-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7013-3. Seminar: International Relations.** Same as PSCI 5013.

**PSCI 7043-3. Seminar: Problems of International Organization.** Same as PSCI 5043.

**PSCI 7053-3. War and Peace.** Same as PSCI 5053.

**PSCI 7063-3. Psychological Approaches to International Relations.** Same as PSCI 5063.

**PSCI 7073-3. Seminar: Global Political Economy.** Same as PSCI 5073.

**PSCI 7113-3. Advanced Readings in International Relations.** Prereq., PSCI 5013 or 7013. Same as PSCI 5113.

**PSCI 7223-3. Continuities and Changes in the Modern World Economy.** Prereq., graduate standing in PSCI, GEOG, SOCY, or ECON. Same as PSCI 5223 and ECON 8323.

**PSCI 7333-3. Globalization and Democratization: An Introduction.** Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as ECON 8333.

**PSCI 7903 (1-3). Topics in Political Science.** Same as PSCI 5903.

**PSCI 8903 (1-3). Graduate Research Topic.** Same as PSCI 6903.

**PSCI 8993 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Political Theory

**PSCI 2004-3. Survey of Western Political Thought.** Studies main political philosophies and political issues of Western culture, from antiquity to 20th century. Approved for arts and sciences core curriculum: ideals and values.

**PSCI 2074-3. Quantitative Research Methods.** Introduces quantitative research methods used in political science. Focuses on basic tools of analysis: data collection, processing, and evaluation, with special attention to survey techniques. Includes elite and case study analysis; aggregate, cluster, and content analysis; and the use of computers in political research. Prereq., PSCI 1101, 2223, or 2012. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**PSCI 3054-3. American Political Thought.** Highlights the development of American political theories and ideas from colonial period to present. Can also be taken for American field credit. Recommended prereq., PSCI 2004. Approved for arts and sciences core curriculum: United States context or ideals and values.

**PSCI 4024-3. Senior Seminar in Political Theory.** Intensively analyzes and discusses major theories and issues of both contemporary political thought and the history of political philosophy. The topic is announced by the instructor, but might include analysis of concepts (justice, human rights, democracy, etc.) or major theories. Emphasizes advanced discussion plus individual research. Prereq., PSCI 2004.

**PSCI 4094-3. Classical Greek Political Thought.** Studies the main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and the most important concepts and values of ancient political thought. Prereq., PSCI 2004, PHIL 3000, CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010. Same as CLAS 4041, HIST 4041, PHIL 4210.

**PSCI 4224-3. Rationality, Democracy, and Policy.** Focuses on the rational choice approach to understanding social decision making. Examines possibilities for choosing rational courses of social action and concrete problems of rational decision making. Prereqs., PSCI 1101 and 2012.

**PSCI 4704-3. Politics and Language.** Explores the use of language in politics. Examines in depth the political nature and meaning of language, including its significance, philosophy, and practice. Recommended prereq., junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4714-3. Liberalism and Its Critics.** Examines contemporary arguments for and against liberalism. Focuses on the analysis, evaluation, and understanding of the philosophical contributions to this debate. Gives special attention to the concepts of justice, freedom, equality, and individualism. Prereq., PSCI 2004 and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4734-3. Politics and Literature.** Broadly examines political topics as they are presented in important literary works and analyzes the possibilities involved in using the literary mode to present political teachings. Prereq., PSCI 2004 and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4844 (1-3). Independent Study in Political Theory.** Subjects and arrangements suit individual student needs. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2004.

**PSCI 5004-3. Seminar: Political Theory.** Allows for intensive research in and presentation of selected topics. Introduces students to the broad context within which political ideas arise. Deals with classical and modern thought. Prereq., graduate student standing or instructor approval. Same as PSCI 7004.

**PSCI 5024-3. Seminar: Selected Political Theories.** Familiarizes students with selected political philosophies or theories in classical or modern political thought. Prereq., graduate student standing or instructor approval. Same as PSCI 7024.

**PSCI 5904 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7904.

**PSCI 6904 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8904.

**PSCI 6954-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7004-3. Seminar: Political Theory.** Same as PSCI 5004.

**PSCI 7024-3. Seminar: Selected Political Theories.** Same as PSCI 5024.

**PSCI 7904 (1-3). Graduate Research Topic.** Same as PSCI 5904.

**PSCI 8904 (1-3). Graduate Research Topic.** Same as PSCI 6904.

**PSCI 8994 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.



## Empirical Theory and Research Methodology

**PSCI 5075-3. Introduction to Professional Political Science.** Introduces graduate students to intellectual foundations and historical development of political science; epistemologies, subfields, intellectual approaches, methodological strategies of the discipline; and ethics and norms of professional conduct. Prereq., graduate student standing or instructor approval. Same as PSCI 7075.

**PSCI 5085-4. Introduction to Political Science Data Analysis.** Provides intensive experience with quantitative techniques commonly employed in political science research; builds on a review of multivariate regression, inferential statistics, and causal modeling. Students undertake substantive research projects, requiring lab instruction in the use of the computer in quantitative applications of political science research. Prereq., graduate standing in social science or history. Same as PSCI 7085.

**PSCI 5095-3. Advanced Political Data Analysis.** Prereq., instructor consent. Same as PSCI 7095, GEOG 5095/7095.

**PSCI 5125-3. Seminar: Conflict Behavior—The Politics of Violence.** Surveys historical, theoretical, and empirical analyses of violent conflict behavior, including causes and consequences of riots, terrorism, revolution, international war, and intervention. Enrollment recommended in both semesters of the two-semester sequence. Prereq., graduate student standing or instructor approval. Same as PSCI 7125.

**PSCI 5145-3. Basic Formal Methods in Political Science.** Introduces the application and role of models in political science (domestic and international politics), in areas such as voting, committees, power, decision making, and war and peace. Models include applications of set theory, elementary probability, games, and systems analysis. Prereq., PSCI 5085, 5095, or instructor consent. Same as PSCI 7145.

**PSCI 5905 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7905.

**PSCI 6905 (1-3). Graduate Research Topic.** Offers the opportunity for independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8905.

**PSCI 6955-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7075-3. Introduction to Professional Political Science.** Same as PSCI 5075.

**PSCI 7085-4. Introduction to Political Science Data Analysis.** Prereq., graduate standing in social science or history. Same as PSCI 5085.

**PSCI 7095-3. Advanced Political Data Analysis.** Same as PSCI 5095, GEOG 5095/7095.

**PSCI 7125-3. Seminar: Conflict Behavior—The Politics of Violence.** Same as PSCI 5125.

**PSCI 7145-3. Basic Formal Methods in Political Science.** Same as PSCI 5145.

**PSCI 7905 (1-3). Topics in Political Science.** Same as PSCI 5905.

**PSCI 8905 (1-3). Graduate Research Topic.** Same as PSCI 6905.

**PSCI 8995 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Public Policy

**PSCI 5016-3. Introduction to the Policy Sciences.** Provides an introduction to the policy sciences as a distinctive tradition within the policy field. Emphasizes the use of conceptual tools to improve analysis of complex problems. Teaches problem solving framework that students apply to an issue of their choice. Prereq., graduate student standing or instructor approval. Same as PSCI 7016 and ENVS 5710.

**PSCI 5026-3. The Problem Orientation.** Teaches basic problem solving framework for policy analysis. Emphasizes applications to develop policy recommendations for issues selected by students. Includes group projects. Prereq., graduate school standing or instructor approval. Same as PSCI 7026, ENVS 5720.

**PSCI 5036-3. Introduction to Policy Sciences: The Decision Process.** Provides policy sciences frameworks for analyzing policy processes and designing political strategies to influence those processes in the direction of the preferred

alternative. Emphasizes applications to problems selected by students for term projects. Prereq., graduate student standing or instructor approval. Same as PSCI 7036, ENVS 5730.

**PSCI 5046-3. Seminar: Urban Public Policy.** Focuses on formulation, revision, and outcomes of public policy in American urban communities. Also uses some comparative Canadian and European literature. Prereq., graduate student standing or instructor approval. Same as PSCI 7046.

**PSCI 5056-3. Readings in Public Policy.** Explores diverse approaches to policy choice, change, and learning processes. Overviews literature on policy determinants and typologies, policy subsystems, innovation and diffusion, agenda setting, implementation, problem definition and social construction, policy design, institutional analysis, and policy and democratic values. Prereq., graduate student standing or instructor approval. Same as PSCI 7056.

**PSCI 5066-3. Argument, Persuasion, and Public Policy.** Addresses the issues revolving around the fact that the audiences for policy arguments are typically a number of somewhat autonomous policy communities and an inability to persuade relevant audiences invites failure and frustration. Consequently, the course examines a number of types of policies in terms of what seems to persuade and why. Prereq., graduate student standing or instructor approval. Same as PSCI 7066.

**PSCI 5106-3. International Political Communication.** Introduces graduate students to the field of international political communication. Explores the relation between emerging technology, political institutions, and persuasive rhetoric. Prereq., graduate student standing or instructor approval. Same as PSCI 7106.

**PSCI 5116-3. Context-Sensitive Research Methods.** Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies, and textual analyses. Prereq., graduate student standing or instructor approval. Same as PSCI 7116, ENVS 5740.

**PSCI 5906 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor or department chair. Does not count as seminar. May be repeated up to 7 total credit hours. Same as PSCI 7906.

**PSCI 6906 (1-3). Graduate Research Topic.** Provides the opportunity for independent research in topic of interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8906.

**PSCI 6956 (1-4). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7016-3. Introduction to the Policy Sciences.** Same as PSCI 5016.

**PSCI 7026-3. The Problem Orientation.** Same as PSCI 5026.

**PSCI 7036-3. Introduction to the Policy Sciences: The Decision Process.** Same as PSCI 5036.

**PSCI 7046-3. Seminar: Urban Public Policy.** Same as PSCI 5046.

**PSCI 7056-3. Readings in Public Policy.** Same as PSCI 5056.

**PSCI 7066-3. Argument, Persuasion, and Public Policy.** Same as PSCI 5066.

**PSCI 7106-3. International Political Communication.** Same as PSCI 5106.

**PSCI 7116-3. Context-Sensitive Research Methods.** Same as PSCI 5116.

**PSCI 7906 (1-3). Topics in Political Science.** Same as PSCI 5906.

**PSCI 8906 (1-3). Graduate Research Topic.** Same as PSCI 6906.

**PSCI 8996 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Law and Politics

**PSCI 5067-3. Seminar: American Constitutional Law.** Same as PSCI 7067.

**PSCI 5077-3. Seminar: Behavioral Study of Public Law.** Provides an intensive, critical examination of theoretical and substantive literature dealing with the behavior of the primary actors in the legal system—police, lawyers, judges, and citizens. Emphasizes empirical approach and quantitative methods. Requires research papers. Prereq., graduate student standing or instructor approval. Same as PSCI 7077.

**PSCI 5907 (1-3). Topics in Political Science.** Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7907.

**PSCI 6907 (1-3). Graduate Research Topic.** Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8907.

**PSCI 6957-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7077-3. Seminar: Behavioral Study of Public Law.** Same as PSCI 5077.

**PSCI 7907 (1-3). Topics in Political Science.** Same as PSCI 5907.

**PSCI 8907 (1-3). Graduate Research Topic.** Same as PSCI 6907.

**PSCI 8997 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## General

**PSCI 4008-3. Political Science Honors Thesis.** Involves writing an honors thesis. Prereq., PSCI 4718.

**PSCI 4028-3. Special Topics.** Offers subjects not covered by existing courses. Offered when the department approves a special topic. May be repeated up to 12 total credit hours for different topics.

**PSCI 4718-3. Honors Political Science Seminar.** Involves writing and discussion of selected topics in political science. Critically reviews the major methodological and conceptual features of the discipline. Students begin their honors papers in the seminar. Prereq., GPA of at least 3.50. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4848 (1-3). Independent Study.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours.

**PSCI 4938 (3-6). Internship in Government.** Working individually under the guidance of a public official, students are assigned to projects selected for their academic suitability and value to the official. Biweekly seminar is held by the instructor to evaluate experiences, discuss relevant readings, or present project papers. Since prior approval by both the instructor and the public official is required, prospective students should make their interest known before early registration. May be repeated up to 6 total credit hours. Only 3 hours of credit from PSCI 4938 can be used to fulfill the 6 credit hours required for upper-division course work in American Politics. Prereq., PSCI 1101.

**PSCI 5008-1. Teaching Political Science 1.** First of two courses designed to train graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline-specific education. Prereq., graduate standing or instructor approval. Same as PSCI 7008.

**PSCI 5108 (1-3). Special Topics.** Various topics not normally offered in the curriculum. Topics vary each semester. May be repeated up to 9 total credit hours. Same as PSCI 7108.

**PSCI 6908 (1-3). Graduate Research Topic.** Same as PSCI 8908.

**PSCI 6948 (1-3). Master's Degree Candidate.**

**PSCI 6998-3. Master's Degree Candidate.**

**PSCI 7008-1. Teaching Political Science 1.** Same as PSCI 5008.

**PSCI 7028-1. Teaching Political Science 2.** Second course designed to train graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline specific education. Prereqs., PSCI 7008 and completion of comprehensive examinations.

**PSCI 7108 (1-3). Special Topics.** Same as PSCI 5108.

**PSCI 7908 (1-3). Topics in Political Science.**

**PSCI 8908 (1-3). Graduate Research Topic.** Same as PSCI 6908.

**PSCI 8998 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Psychology

**PSYC 2700-3. Psychology of Contemporary American Women.** Surveys psychological theory and research concerning contemporary American women. Deals with such issues as masculine bias in American culture, sex difference in cognitive functioning and personality, psychological conflict for women between career and home, and specific areas pertaining to women's mental health. Prereq., PSYC 1001 or WMST 2000. Same as WMST 2700. Approved for arts and sciences core curriculum: cultural and gender diversity.

**PSYC 4220-3. Language and Mind.** Studies processes of perceiving speech, interpreting it as meaningful, and expressing intentions to communicate as utterances. Emphasizes roles of the brain and of perceptual and motor systems. Writing, gestural, and animal communicative systems also are treated. Prereqs., PSYC 1001 and LING 2000. Same as LING 4220.

**PSYC 4560-3. Language Development.** Examines the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives. Prereqs. or coreqs., PSYC 1001 and LING 2000. Same as LING 4560 and SLHS 4560.

**PSYC 4700-3. Women and Mental Health.** Examines mental health issues of women by focusing on theories of female personality development. Explores theory and research pertaining to women and psychopathology and to women as patients in traditional and nontraditional forms of treatment. Prereq., PSYC 2700, WMST 2000, or WMST 2700. Same as WMST 4700.

**PSYC 4740-3. Biology of Amphibians and Reptiles.** Focuses on comparative morphology, taxonomy, ecology, behavior, and geographic distribution of amphibians and reptiles. Prereqs., EBIO 1210, 1220, 1230, and 1240; or PSYC 1001, 2012. Same as PSYC 5740 and EBIO 4740.

**PSYC 5300-3. Research in Psycholinguistics.** After a general introduction to issues and research methods in psycholinguistics (language production and comprehension, language and cognition, language acquisition), several major current research topics, such as models of speech production, and theories of brain specialization for language, are explored. Prereq., instructor consent. Same as LING 5300.

**PSYC 5740-3. Biology of Amphibians and Reptiles.** Same as PSYC 4740, EBIO 5740.

**PSYC 6200-3. Issues and Methods in Cognitive Science.** Same as CSCI 6402, EDUC 6504, LING 6200, PHIL 6310.

## General

*Many of the following courses have controlled enrollment by application. Please check with the department office in Muenzinger D243 for further information.*

**PSYC 1001 (3-4). General Psychology.** Three hours lec. and one hour rec. per week. Surveys major topics in psychology: perceptions, development, personality, learning and memory, and biological bases of behavior. Students may participate as subjects for several hours in ongoing research. Meets MAPS requirement for social science: general.

**PSYC 2841 (1-3). Independent Study (Lower-Division).** May be repeated up to 6 total credit hours. Pass/fail only. Prereq., freshman or sophomore standing. Restricted to psychology majors.

**PSYC 3001-3. Honors Seminar 1.** Focuses on research design. Each student prepares an original, detailed research proposal, which can become the honors thesis. Open only to students who have been accepted into the psychology departmental honors program. Prereq., instructor consent.

**PSYC 3101-4. Statistics and Research Methods in Psychology.** Three hours of lecture and one two-hour lab per week. Introduces descriptive and inferential statistics and their roles in psychological research. Topics include correlation, regression, t-test, analysis of variance, and selected nonparametric statistics. Recommended prereq., MATH 1000 or equivalent.

**PSYC 4001-3. Honors Seminar 2.** Surveys contemporary issues, explores current controversies, and examines in detail selected topics in psychology. Open to juniors and seniors in the department's honors program. Prereq., instructor consent. Approved for arts and sciences core curriculum: critical thinking.

**PSYC 4011 (1-6). Senior Thesis.** Critically reviews some aspect of psychological literature, scholarly analysis of a major psychological issue, and/or empirical research project. See the psychology honors director for further information. May be repeated up to 6 total credit hours.

**PSYC 4511-3. History of Psychology.** Includes outline of development of psychological theories since the Greek philosophers, the story of experimental psychology and its problems, and schools of psychological thinking. Students read original sources in English and English translations. Restricted to juniors and seniors.

**PSYC 4521-3. Critical Thinking in Psychology.** Allows students to expand their powers as they think about psychological problems, or about how psychological knowledge and techniques can be applied to pressing political, economic, biological, quantitative, and social issues. Encourages intellectual discipline and critical thinking about concepts and ideas; enables students to participate in oral and written discussion. Restricted to psychology seniors. Approved for arts and sciences core curriculum: critical thinking.

**PSYC 4541 (1-6). Special Topics in Psychology.** Studies and analyzes special interest topics from the broad and diversified field of psychology. Particular section content is determined by instructor. May be repeated up to 6 total credit hours, provided the topics vary. Same as PSYC 5541.

**PSYC 4841 (1-6). Independent Study (Upper-Division).** Pass/fail only. May be repeated up to 8 total credit hours. Prereq., junior or senior standing. Restricted to psychology majors.

**PSYC 4911-3. Teaching of Psychology.** Students receive concrete experience in teaching general psychology under supervision of a psychology faculty member. Alternative pedagogical strategies are discussed. Students must submit an application to the undergraduate advising center.

**PSYC 4931-3. Field Placement Internship.** Offers valuable volunteer experience through a supervised field placement. Provides hands-on insight into the decisions and issues that confront professionals in psychology and related fields. Prereqs., completion of 15 or more hours of psychology course work. Restricted to psychology majors.

**PSYC 5541 (1-6). Special Topics in Psychology.** Same as PSYC 4541.

**PSYC 5741-4. General Statistics.** Surveys probability and statistics in psychology. Prereq., instructor consent.

**PSYC 5751-4. General Statistics.** Continuation of PSYC 5741. Prereq., instructor consent.

**PSYC 6841 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**PSYC 6851 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**PSYC 6911-3. Research Practicum.**

**PSYC 6941-3. Master's Degree Candidate.** May be repeated up to 7 total credit hours.

**PSYC 6951 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSYC 7051-2. Research Practicum.** Discusses ongoing, current research projects, and students formulate and complete an empirical study of their own. For cognitive and social psychology graduate students. Prereq., instructor consent.

**PSYC 7061-2. Research Practicum.** Continuation of PSYC 7051. Prereq., instructor consent.

**PSYC 7281-2. Mathematical Theories in Psychology.** Offers a seminar on topics in mathematical theories of psychology. Specific topics vary depending on interests of students and instructors. May be repeated up to 8 total credit hours. Prereq., instructor consent.

**PSYC 7291-3. Multivariate Analysis.** Familiarizes students with scientific concepts, matrix theory, and computer techniques of multivariate analyses for psychological research. Topics include cluster and factor analysis, multiple regression, and discriminant functions. Emphasizes research technology rather than mathematical theory. Prereq., instructor consent.

**PSYC 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Biological

**PSYC 2012-3. Biological Psychology 1.** Surveys biological bases of learning, motivation, emotion, sensory processes and perception, movement, comparative animal behavior, sexual and reproductive activity, instinctual behavior, neurobiology of language and thought, and neurophysiology and neuroanatomy in relation to behavior. Prereq., PSYC 1001. Approved for arts and sciences core curriculum: natural science non-sequence.

**PSYC 2022-3. Biological Psychology 2.** Continuation of PSYC 2012. Integrates knowledge and facts presented in PSYC 2012 into current topics in biopsychology. Course no longer taught after fall 2003, except through Continuing Education correspondence. Prereq., PSYC 2012.

**PSYC 3102-3. Behavioral Genetics.** Inheritance of behavioral characteristics. Prereq., PSYC 3101.

**PSYC 4052-4. Behavioral Neuroscience.** Intensive survey of the morphological, neurochemical, and physiological aspects of behavior. Prereqs., PSYC 2012-2022, or MCDB 1150-2150, or MCDB 1150 and EBIO 1220, or EBIO 1210-1220, or CHEM 1111-1131, or PHYS 1010-1020, or PHYS 2010-2020. Same as PSYC 5052.

**PSYC 4072-3. Clinical Neuroscience: A Clinical and Pathological Perspective.** Provides basic science background for understanding the mechanism of behavioral disturbances resulting from brain damage. Emphasizes pathological neuroanatomy, neurophysiology, and neuropharmacology, which is essential for understanding problems related to health and disease. Prereqs., one of the following sequences of courses: PSYC 2012 and 2022; EBIO 1210 and 1220; MCDB 1150 and 2150, or MCDB 1150 and EBIO 1220. Same as PSYC 5072.

**PSYC 4092-3. Hormones and Behavior.** Represents application of endocrinological concepts and techniques to problems of motivation and behavior. Prereqs., junior or senior standing. Same as PSYC 5092.

**PSYC 4112-3. Behavioral Genetics Laboratory.** Provides laboratory experience in behavioral genetics. Students train in one or more aspects of data collection and interpretation, read research papers, contribute nine hours per week to a research project in behavioral genetics, and write a report. Prereq., PSYC 3102 or 4102.

**PSYC 4122-3. Quantitative Genetics.** Surveys principles of genetics of quantitative characteristics. Topics include gene frequencies, effects of mutation, migration, and selection. Also looks at correlations among relatives, heritability, inbreeding, crossbreeding, and selective breeding. Prereq., PSYC 3101 and PSYC 3102 or 4102. Same as PSYC 5122.

**PSYC 4132-3. Behavioral Neuropharmacology.** Advanced course in neuroscience, considering chemical transmission in detail. Topics include endocrinology as well as the mechanism of action of psychoactive drugs, cellular neurochemistry, and special topics in neuroscience research. Explains how psychologists use drugs to study learning, attention, motivation, and abnormal behavior. Prereq., PSYC 4052 or 5052. Same as PSYC 5132.

**PSYC 4212-3. Gerontology: A Multidisciplinary Perspective.** Covers biological, psychological, and social issues in gerontology. Topics include brain changes with age, learning/memory changes with age, and social impact of increasingly older population distribution. Prereq., PSYC 2145, 2606, 4052, 4145, 4205, or 4406, or instructor consent. Same as PSYC 5212.

**PSYC 5042-3. Mammalian Neurophysiology.** Examines selected topics in neurophysiological basis of higher brain function in mammals. Central theme is how neurophysiological data can provide insight into the type of information processing involved in sensation, perception, cognition, and action. Prereq., PSYC 4052, EBIO 4205, or MCDB 4190, and instructor consent.

**PSYC 5052-4. Behavioral Neuroscience.** Same as PSYC 4052.

**PSYC 5062-4. Functional Neurochemistry.** Examines mechanisms of neuronal signaling in experimental literature in areas of transmitter synthesis, transport, secretion, turnover, reuptake, and postsynaptic effect. Other special topics included. Prereqs., PSYC 4052, MCDB 4190 or EBIO 4220, and instructor consent.

**PSYC 5072-3. Clinical Neuroscience.** Same as PSYC 4072.

**PSYC 5082-2. Seminar: Biological Psychology.** Special topics concerning biological bases of behavior. Prereqs., PSYC 4052 and instructor consent.

**PSYC 5092-3. Hormones and Behavior.** Same as PSYC 4092.

**PSYC 5102-3. Behavioral Genetics.** Prereq., instructor consent.

**PSYC 5112-3. Concepts in Behavioral Genetics.** Examines selected topics in greater detail than is possible in the comprehensive undergraduate course in behavioral genetics (PSYC 3102). Topics covered may include inheritance of behavioral characteristics from perspectives of pharmacogenetics, transmission genetics, biochemical genetics, and evolutionary genetics. May be repeated up to 9 total credit hours. Prereq., instructor consent.

**PSYC 5122-3. Quantitative Genetics.** Same as PSYC 4122.

**PSYC 5132-3. Behavioral Neuropharmacology.** Same as PSYC 4132.

**PSYC 5212-3. Gerontology: A Multidisciplinary Perspective.** Same as PSYC 4212.

**PSYC 5232-3. Molecular Genetics and Behavior.** Covers fundamental mechanisms of gene action, including DNA structure and regulation of gene expression. Discusses molecular techniques used to examine human genetic diseases. Emphasizes genetic diseases with behavioral and neurological abnormalities. Prereq., PSYC 5102 or instructor consent.

**PSYC 5242-3. Biometrical Methods in Behavioral Genetics.** Studies development of structural models appropriate to behavioral genetics and the estimation procedures necessary for their application. Prereq., instructor consent.

**PSYC 5262-3. Mammalian Neuroanatomy.** Covers microscopic anatomy and function of different brain regions. Emphasizes correlation between structure and function, particularly at cellular and synaptic level. Course includes brain dissection, description of neuroanatomical and neurohistological techniques, and an introduction to the ultrastructure of neurons. Prereqs., PSYC 4052, EBIO 4220, or MCDB 4190, and instructor consent.

**PSYC 7012 (1-3). Research in Behavioral Genetics.** Individual research projects. May be repeated up to 7 total credit hours.

**PSYC 7102-2. Seminar: Behavioral Genetics.** Intensive study of selected topics in behavioral genetics. Emphasizes recent research. Attention to both human and animal studies. May be repeated up to 8 total credit hours. Prereq., instructor consent.

## Clinical

**PSYC 2303-3. Psychology of Adjustment.** Surveys concepts bearing upon processes of normal psychological adjustment, with emphasis on using the concepts to understand common human problems in personal growth and relationships with others.

**PSYC 2643-3. Child and Adolescent Psychology.** Surveys major psychological processes of childhood and adolescence. Prereq., PSYC 1001.

**PSYC 3313-4. Psychopathology.** Three hours lec. and two hours rec. per week. Analyzes major theories of personality and behavioral disorders. Restricted to junior and senior PSYC majors. Prereq. PSYC 1001 or instructor consent. Students may receive credit for only one of PSYC 3313 or 4303.

**PSYC 4303-3. Abnormal Psychology.** Examines borderline disorders as extreme variations of the normal personality. Focuses on major functional and organic disorders, theories of mental disorders, and methods of psychotherapy. Students may receive credit for only one of PSYC 3313 or 4303. Prereq., PSYC 1001.

**PSYC 4443-4. Research Methods in Clinical Psychology.** Learn to evaluate research methods as they relate to etiology, assessment, and intervention of psychological disorders. Emphasizes the importance of using sound methodological strategies in both research and clinical settings. Three lectures, one lab per week. Prereqs., PSYC 1001, 3101, and 3313 or 4303.

**PSYC 4453-3. Developmental Psychopathology.** Provides an integration of child development, developmental psychopathology and clinical interventions for children. Focuses on the conceptual convergence between applied developmental psychology and child clinical psychology. Prereq., instructor consent. Same as PSYC 5453.

**PSYC 4713-3. Survey of Clinical Psychology.** Covers theories and practices relating to problems of ability and maladjustment. Diagnostic procedures and treatment methods with children and adults. Prereq., PSYC 3313 or 4303. Open to majors only.

**PSYC 4733-4. Psychological Testing and Assessment.** Provides an overview of issues central to testing and assessment of psychological constructs, including types of evaluation instruments currently in use in the field, their applications, and design. Prereqs., PSYC 1001 and 3101.

**PSYC 5423-3. Research Problems in Clinical Psychology.** Examines research issues relevant to the field of clinical psychology and mental health for the purpose of developing familiarity with substantive and methodological problems facing the field. Prereq., instructor consent.

**PSYC 5433-3. Adult Psychopathology.** Intensively surveys major theories, research findings, and behavioral characteristics associated with deviant reaction patterns. Prereq., instructor consent.

**PSYC 5453-3. Developmental Psychopathology.** Prereq., instructor consent. Same as PSYC 4453.

**PSYC 7653-3. Child Psychotherapy.** The second semester in this year-long course builds upon concepts in PSYC 5453 to explore the theoretical and empirical bases for understanding child psychopathology and intervention. Prereq., PSYC 5453 and instructor consent.

**PSYC 7673-3. Adult Psychotherapy.** Discusses selected topics in the field of psychotherapy, including content consideration and pertinent research. Topics vary from semester to semester. Prereq., instructor consent.

**PSYC 7683-4. Intellectual Assessment, with Practicum in Clinical Psychology.** Focuses on administering and interpreting objective test results commonly used in clinical psychology practice. Probable inventories used are MMPI, SCII, WISC, WAIS, plus other objective measures where relevant. Includes case study approach and direct clinical experience. Prereq., instructor consent.

**PSYC 7693-3. Personality Measurement.** Covers theory and practice primarily in areas of individual personality testing. Involves intensive field work and report writing. Prereq., instructor consent.

**PSYC 7703-3. Seminar: Clinical Psychology.** Offers selected topics in the area of clinical psychology. May be repeated up to 12 total credit hours. Prereq., instructor consent.

**PSYC 7713-3. Practicum in Clinical Psychology.** Provides direct clinical experience for PhD candidates in clinical psychology only. May be repeated up to 18 total credit hours.

**PSYC 7773-3. Professional Issues and Ethics in Prevention and Intervention.** Focuses on ideographic study of attitudes, values, and personality characteristics of individuals using data obtained from personal interviews. Covers theory and practice of various interviewing approaches. Open to PhD candidates in clinical psychology only.

## Developmental

**PSYC 4114-3. Educational Psychology and Adolescent Development.**

Examines the principles of educational and adolescent psychology and development that play a significant role in analyzing and understanding the complex processes in middle and secondary school classrooms. Course has both theoretical and practical dimensions. Same as EDUC 4112.

**PSYC 4684-3. Developmental Psychology.** In-depth consideration of human developmental processes across the life span. Includes coverage of the major topics in human development, such as physical, cognitive, social, and personality development. Prereq., PSYC 1001. Restricted to juniors and seniors.

## Experimental

**PSYC 2145-3. Cognition and Perception Core.** Introduces the study of cognitive processes of human beings: sensation, perception, attention, pattern recognition, memory, learning, language, visual thought, reasoning, problem solving, and decision making. Discusses applications to education, human factors, human computer interaction, law, and other areas of psychology. Recommended prereq., PSYC 1001.

**PSYC 3005-3. Cognitive Science.** Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications, and limitations of the computational model of mind. Prereqs., two of the following: PSYC 2145, LING 2000, CSCI 1300, and PHIL 2440. Same as LING 3005, PHIL 3310, and CSCI 3702.

**PSYC 3105-3. Experimental Methods in Psychology.** Provides an introduction to the use of experimental procedures in psychology. Students learn about the logic and design of experiments, the meaning of psychological data, how to

analyze and interpret data, and the role of theory in psychology. Prereqs., PSYC 1001 and 3101. Recommended prereq., PSYC 2145. Approved for arts and sciences core curriculum: critical thinking.

**PSYC 4145-4. Cognitive Psychology.** Advanced course in human cognitive processes. Focuses on attention pattern recognition. Memory, learning, language, visual thought, reasoning, problem solving, and decision making. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week; research project required. Prereqs., PSYC 1001, 2145, and 3101. Same as PSYC 5145.

**PSYC 4155-4. Cognitive Neuroscience/Neuropsychology.** An introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: motor control, object recognition, spatial processing, attention, language, memory and emotion. One lab, three lectures per week. Prereqs., PSYC 1001, 2012, 2145, and 3101.

**PSYC 4165-4. Psychology of Perception.** One lab, three lect. per week. Analyzes peripheral and central mechanisms involved in the transduction and interpretation of experience. Gives special attention to vision and audition; major theories in these areas are discussed in terms of research they have inspired. Prereqs., PSYC 1001 and 3101.

**PSYC 4175-4. Computational Cognitive Neuroscience.** Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week. Prereqs., PSYC 1001, 2012, 2145, and 3101. Same as PSYC 5175.

**PSYC 4205-4. Psychology of Learning.** One lab per week. Discusses conditions of learning in animals and humans as found in experimental literature. Prereqs., PSYC 1001 and 3101.

**PSYC 4385-3. Ethology and Comparative Psychology.** Discusses behavior of representative members of each animal phylum. Emphasizes ontogeny of behavior as well as phylogeny. Prereq., PSYC 1001 or EBIO 1210. Same as PSYC 5385.

**PSYC 5145-4. Cognitive Psychology.** Prereq., instructor consent. Same as PSYC 4145.

**PSYC 5175-4. Computational Cognitive Neuroscience.** Prereq., instructor consent. Same as PSYC 4175.

**PSYC 5185-3. Cognitive Processes in Reading.** Explores both normal and disabled reading development from cognitive, neurological, genetic, social, and educational perspectives.

**PSYC 5385-3. Ethology and Comparative Psychology.** Prereq., instructor consent. Same as PSYC 4385.

**PSYC 5665-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey to topics in experimental psychology. General areas are higher-level cognition, attention, and learning and memory. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 5685-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey of topics in experimental psychology. General areas are research methods in cognitive psychology, and low-level perception. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 5765-3. Issues and Methods in Cognitive Psychology.** Provides an advanced introduction to research in cognitive psychology, designed primarily for graduate psychology students. Includes basic experimental methodology and design, advanced topics in statistics, and methods for a special topic in cognitive psychology (topic varies). Prereq., graduate enrollment in psychology or extensive background in cognitive psychology and statistics, and instructor consent.

**PSYC 5815-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey of topics in experimental psychology. General areas are language and high-level thinking. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 7215-3. Seminar: Experimental Psychology.** Advanced seminar dealing with different specialized topics, at the discretion of the instructor, in different years. Topics chosen are within the broad range of experimental psychology. Prereq., instructor consent.

**PSYC 7315-2. Advanced Research Seminar on Human Memory.** Addresses topics in the experimental psychology of human memory. Content varies from semester to semester, depending on interests of faculty and students. A sample topic is the long-term retention of skills. Prereq., graduate standing in psychology or related disciplines.

**PSYC 7415-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences, e.g., psychology, computer science, linguistics, education, and philosophy. Prereq., CSCI 6402, EDUC 6504, LING 6200, PHIL 6310, or PSYC 6200. Recommended prereq., CSCI 7762, EDUC 6505, LING 7762, PHIL 7310, or PSYC 7762. Same as LING 7415, PHIL 7415, and CSCI 7412.

**PSYC 7425-2. Cognitive Science Research Practicum 2.** Continuation of PSYC 7415. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as CSCI 7422, EDUC 6516, LING 7425, and PHIL 7425.

**PSYC 7765 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as CSCI 7762, EDUC 6505, LING 7762, and PHIL 7310.

## Social

**PSYC 2406-3. Social Psychology of Ethnic Groups.** Focuses on social-psychological approaches to a study of American ethnic-minority groups, using both traditional and contemporary perspectives on race, ethnicity, and culture of the individual or groups being studied. Prereq., PSYC 1001.

**PSYC 2456-3. Social Psychology of Social Problems.** Examines social psychological aspects of a variety of issues, ranging from problems of poverty or minority status to topics such as prejudice, drug use, student protest, and patterns of sexual behavior.

**PSYC 2606-3. Social Psychology.** Covers general psychological principles underlying social behavior. Analyzes major social psychological theories, methods, and topics, including attitudes, conformity, aggression, attraction, social perception, helping behavior, and group relations. Prereq., PSYC 1001. Students may not receive credit for both PSYC 2606 and 4406. Approved for arts and sciences core curriculum: contemporary societies.

**PSYC 3006-3. Psychology of Money: Propaganda, Seigniorage, Cognition, and Personal Economic Decision Making.** Explores the various ways that money has influenced human affairs from the earliest use of metal coins through the contemporary emergence of electronic money. Lectures will be supplemented with exhibits drawn from the CU coin cabinet. Prereq., PSYC 1001. Same as PSYC 3000.

**PSYC 4136-4. Judgment and Decision Making.** One lab, three lectures per week. Introduces the study of judgment and decision making processes (estimation, prediction and diagnosis, choice under certainty, and risky decision making) and the methods that have been developed to improve these processes (statistical modeling, decision analysis, and expert systems). Prereqs., PSYC 1001, 2606 and 3101. Same as PSYC 5135.

**PSYC 4376-4. Research Methods in Social Psychology.** Designed primarily for psychology majors interested in learning about research methodology. Topics include research design, data collection and data analysis, and written research reports. Prereqs., PSYC 1001, 3101 and 2606 or 4406.

**PSYC 4456-3. Psychology of Personality.** Offers a psychological study of structure, organization, and development of the person as a whole. Analysis of major theories, methods, and research, including topics such as emotion, motivation, temperament, inner experience, identity and the self, personality change, and the influence of sociocultural context. Restricted to juniors and seniors.

**PSYC 4606-3. Advanced Topics in Social Psychology.** In-depth study of selected topics in social psychology. Particular section content each semester is determined by the instructor. May be repeated for a maximum of 6 credit hours, provided the topics vary. Prereqs., PSYC 1001, 2606 and 3101.

**PSYC 5136-4. Judgment and Decision Making.** Same as PSYC 4136.

**PSYC 5606-3. Proseminar: Social-Personality Psychology.** Provides a thorough introduction to methods and theories in social psychology concerned

with topics such as the self, social cognition, judgment and decision making, attitude formation and change, small group processes, inter-group relations, health and social psychology, and others. May be repeated up to 12 total credit hours. Prereq., instructor consent.

**PSYC 7536-2. Personality and Social Psychology.** Selected topics in the area of social-personality psychology. Students may register for more than one section of this course within the term and/or within their graduate career. These seminars may be on one of the following topics: stereotyping and person perception, social psychology and self, social psychology of problem behavior, health and social psychology, race and ethnic identity, or groups and small group organization. May be repeated up to 8 total credit hours. Prereq., instructor consent.

## Neuroscience

**NRSC 5100 (2-5). Introduction to Neuroscience I.** Provides an intensive introduction to the principles of neuroscience, initially covering the detailed neuroanatomy of human forebrain, hindbrain, and spinal cord. This is followed by neurophysiology with a concentration on the electrophysiology of neural systems. The basics of neuroanatomy and neurophysiology with a concentration on the electrophysiology are then applied to an examination of the structure and function of visual, auditory, and sensorimotor systems in animal and man.

**NRSC 5110-3. Introduction to Neuroscience II.** Provides an intensive interdisciplinary introduction to the principles of neuroscience. It is a sequel to NRSC 5100. Provides a detailed overview of neurochemistry, neurodevelopment, neuromotor control, neurogenetics, and cognitive neuroscience. Prereq., NRSC 5100.

**NRSC 6100-2. Advances in Neuroscience Seminar.** Designed for beginning graduate students interested in neuroscience. Students read, discuss, and evaluate the primary literature on a number of current topics in neuroscience as well as attend the seminar program in neuroscience. May be repeated up to 8 total credit hours.

## Religious Studies

**RLST 1620-3. Religious Dimension in Human Experience.** Studies religion as individual experience and social phenomenon. Examines varieties of religious language (symbol, myth, ritual, scripture) and of religious experience (Asian, Western, archaic). Approved for arts and sciences core curriculum: ideals and values.

**RLST 2210-1. Religion and Dance Studio.** Comparative study of the dances of two cultures (possibly varying), including instruction in elementary dance movement and the cultural, historical, and religious contexts of the dances. Complements RLST 2200. Coreq., RLST 2220. Same as RLST 2201.

**RLST 2220-3. Religion and Dance: Africa to America to Africa.** Religions in cultures around the world frequently engage in dance. By focusing on dances and forms of movement, religious beliefs and meanings can be seen and appreciated. Studies select religious cultures from around the world. Theory is developed to interrelate religion and dance. Similar to RLST 2200. Complements RLST 2230. Approved for arts and sciences core curriculum: literature and the arts or ideals and values.

**RLST 2230-3. Religion and Dance: India to Ballet.** Religions in cultures around the world frequently engage in dance. The study of dancing in cultures from India to Europe and America deepens understanding and appreciation of these peoples in their diversities and similarities. Similar to RLST 2200. Complements RLST 2220. Approved for arts and sciences core curriculum: literature and the arts.

**RLST 2400-3. Religion and Contemporary Society.** Studies the nature of contemporary American society from various theoretical perspectives in religious studies. Gives attention to the impact of secularization and to the religious elements found in aspects of secular life (e.g., politics, literature, education, and recreation). Approved for arts and sciences core curriculum: contemporary societies.

**RLST 2450-3. Self, Society, and Spirituality since the Sixties.** Looks at religious expression in the U.S. in the 1960s counterculture, with special attention to the relation between self and society. Examines the impact of the counterculture on current popular ideas about religion, self, and society. Approved for arts and sciences core curriculum: United States context or ideals and values.

**RLST 2500-3. Religions in the United States.** Explores the development of various religions within the shaping influences of American culture, including separation of church and state, the frontier experience, civil religion, and the interaction of religions of indigenous peoples, immigrants, and African Ameri-

cans. Approved for arts and sciences core curriculum: United States context or ideals and values.

**RLST 2600-3. World Religions: Western.** Introduces literature, beliefs, practices, and institutions of Judaism, Christianity, and Islam, in historical perspective. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2610-3. World Religions: India.** Introduces the literature, beliefs, practices, and institutions of Hinduism, Buddhism, Jainism, and Sikhism, in historical perspective. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2620-3. World Religions: China and Japan.** Introduces literature, beliefs, practices, and institutions of Taoism, Confucianism, Buddhism, and Shintoism in historical perspective. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2700-3. American Indian Religious Traditions.** Introduces religions of the peoples indigenous to the Americas. Concerns include ritual, mythology, and symbolism occurring throughout these many cultures in such areas as art, architecture, cosmology, shamanism, sustenance modes, trade, and history. Same as RLST 2700. Approved for arts and sciences core curriculum: ideals and values or cultural and gender diversity.

**RLST 2800-3. Women and Religion.** Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism, and goddess traditions. Same as WMST 2800. Approved for arts and sciences core curriculum: cultural and gender diversity.

**RLST 2840 (1-3). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 3000-3. Christian Traditions.** Studies origins and development of various aspects of Christian tradition as expressed through scripture, theology, ritual, church order, ethics, and the arts. Approved for arts and sciences core curriculum: historical context.

**RLST 3020-3. Advanced Writing in Religious Studies.** Seminar for religious studies majors that emphasizes the development of writing skills for use inside as well as outside the academy. Writing assignments are focused on one or more core topics in religious studies. Restricted to RLST majors. Approved for arts and sciences core curriculum: written communication.

**RLST 3050-3. Religion and Literature in America.** Studies religious dimensions of American culture through representative literature, beginning with the Puritans and focusing on diversity in the 19th and 20th centuries. Approved for arts and sciences core curriculum: United States context.

**RLST 3100-3. Judaism.** Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions. Approved for arts and sciences core curriculum: historical context.

**RLST 3125-3. Black Religious Life in America.** Emphasizes the four principle periods in the growth and expansion of the black church: African traditional religion to the end of the American Civil War; development stage; traditional stage; and the contemporary period. Same as BLST 3125. Approved for arts and sciences core curriculum: contemporary societies or ideals and values.

**RLST 3200-3. Hinduism.** Studies literature, beliefs, practices, and institutions of Hinduism, in historical perspective.

**RLST 3300-3. Foundations of Buddhism.** Studies selected aspects of Buddhist tradition in India, including the life of the Buddha, development of the early community, Buddhist contemplative tradition, early Buddhist philosophy and psychology, and origins and development of Indian Mahayana Buddhism.

**RLST 3400-3. Japanese Religions.** Studies the literature, beliefs, practices, and institutions of Shinto, Buddhism, and Confucianism within the development of Japanese culture.

**RLST 3510-3. Australian Religions.** Examines the Arunta of the Central Desert. Highlights the relationship between religion and landscape and the historical development of the area by nonaboriginal Australians. Also examines the impact of Australian aboriginal studies on the history of modern Western thought. Approved for arts and sciences core curriculum: cultural and gender diversity.

**RLST 3520 (1-3). Religion and Dance Studies.** Studies dancing in religious cultures to appreciate how it functions to enact religious beliefs, effect social change, shape moods and motivations, and forge personal and group identity. Prereq., RLST 2200 or instructor consent.

**RLST 3600-3. Islam.** Introduces Islamic beliefs and practices through an examination of the *Qur'an*, Muhammad's life, ritual duties, law and theology, mysticism, and social institutions.

**RLST 3700-3. Religion and Psychology.** Examines the relation between religion and psychology in the understanding of human nature. Considers a variety of contemporary theories and models in both psychology and religious studies. Approved for arts and sciences core curriculum: critical thinking.

**RLST 3800-3. Chinese Religion.** Studies classical Confucianism, Taoism, Buddhism, and Neo-Confucianism within the historical context of Chinese culture.

**RLST 3820-3. Topics in Religious Studies.** Intensive study of a selected area or problem in religious studies. May be repeated up to 9 total credit hours as topics change.

**RLST 3830-3. Perspectives on the Study of Religion.** Offered each fall semester. Surveys basic approaches to the study of religion. Students read and respond to seminal works in religious studies selected by faculty members, who visit class for discussions. Students also visit several religious communities in the Boulder/Denver region. Restricted to and required for junior and senior RLST majors.

**RLST 4020-3. Topics in Biblical Christianity.** Studies Christian origins, treatment of the historical person of Jesus, and theological perspectives of the New Testament. Emphasizes methodology, e.g., textual criticism, literary criticism, and form criticism. Variable topics include synoptic gospels, John, and Pauline writing. May be repeated up to 9 total credit hours as topics change. Prereq., 6 credit hours of RLST courses at any level or instructor consent. Same as RLST 5020.

**RLST 4030-3. Religions in America.** Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion, and Asian religions in America. May be repeated up to 9 total credit hours as topics change. Prereq., 6 hours of RLST or instructor consent. Same as RLST 5030.

**RLST 4050-3. Topics in Christian Studies.** Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level or instructor consent. Same as RLST 5050.

**RLST 4200-3. Topics in Hinduism.** Examines in depth central themes, schools of thought, and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, and 19th century Renaissance. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level or instructor consent. Same as RLST 5200.

**RLST 4250-3. Topics in Buddhism.** Examines in depth central themes, schools of thought, and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen, and Buddhism in America. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level including RLST 3300 or instructor consent. Same as RLST 5250.

**RLST 4300-3. Topics in Native American Religions.** Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to the Americas. May consider mythology; shamanism and medicine; trickster, clown, and fool; and crisis cult movements. May be repeated up to 9 total credit hours as topics change. Prereqs., RLST 2700 and 3 additional credit hours of RLST course work or instructor consent. Same as RLST 5300.

**RLST 4650-3. Islam in the Modern World.** Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya, and Pakistan; development and change; the status of women; and media and academic stereotyping. Prereq., 6 credit hours of religious studies at any level or instructor consent. Same as RLST 5650.

**RLST 4750-3. Daoism.** A detailed examination of the history and current state of Daoism, China's indigenous organized religion. Focusing on its origins and development, ethnical teachings, ritual activities, and world view. Topics created include the relationship of Daoism to popular religion, the practice of alchemy and self cultivation, beliefs concerning death and the afterlife, and the structure of the Daoist pantheon. Prereq., RLST 3800 or instructor consent. Same as RLST 5750 and CHIN 4750.

**RLST 4760-3. Sufism.** Studies origins and aims of Islamic mysticism, with concentration on the thought and practice of Al-Hujwiri, Al-Ghazali, Rumi, and others. Prereq., 6 credit hours of religious studies at any level or instructor consent. Same as RLST 5760.

**RLST 4780-3. New Religions of East Asia.** A seminar on the new religious movements of modern China, Japan, and Korea, which have arisen over the

last century due to the influence of the West and in response to the pressures of modernization. Prereq., two courses in East Asia religion or civilization, or instructor consent. Same as RLST 5780.

**RLST 4800-3. Critical Studies in Religion.** Focuses on a current issue or area of research in the study of religion. Students analyze the way theories develop and learn to develop their own critical analysis. Topics vary, e.g., comparative kingship, colonialism, ritual theories, feminist analysis. May be repeated up to 6 total credit hours. Approved for arts and sciences core curriculum: critical thinking.

**RLST 4810-3. Honors Thesis.** Students write an honors thesis based on independent research under the direction of a faculty member. Required for students who elect departmental honors.

**RLST 4820-3. Interdisciplinary Seminar on Religion: Topics.** Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues. May be repeated up to 9 total credit hours as topics change. Prereq., 6 credit hours of religious studies at any level or instructor consent. Same as RLST 5820.

**RLST 4830-3. Senior Majors Seminar.** Topics and instructors vary. Brings advanced majors together in order to focus their major experience on significant topics and issues of common interest. Restricted to majors.

**RLST 4840 (1-6). Senior Independent Study.** May be repeated up to 8 total credit hours.

**RLST 5020-3. Topics in Biblical Christianity.** Same as RLST 4020.

**RLST 5030-3. Religions in America.** Same as RLST 4030.

**RLST 5040 (1-3). Religion and the Internet.** Ongoing editorial writing and technical maintenance of the online journal that is initiated and operated by religious studies graduate students. Includes study of philosophical and theoretical issues, as well as technical training. May be repeated up to 3 total credit hours.

**RLST 5050-3. Topics in Christian Studies.** Same as RLST 4050.

**RLST 5200-3. Topics in Hinduism.** Same as RLST 4200.

**RLST 5250-3. Topics in Buddhism.** Same as RLST 4250.

**RLST 5300-3. Topics in Native American Religions.** Same as RLST 4300.

**RLST 5350-3. Native American Religions: Regional Studies.** Same as RLST 4350.

**RLST 5650-3. Islam in the Modern World.** Same as RLST 4650.

**RLST 5750-3. Daoism.** Restricted to graduate students. Same as RLST 4750 and CHIN 5750.

**RLST 5760-3. Sufism.** Same as RLST 4760.

**RLST 5780-3. New Religions of East Asia.** Same as RLST 4780.

**RLST 5820-3. Interdisciplinary Seminar on Religion.** Same as RLST 4820.

**RLST 5840 (1-6). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 6830-3. Approaches to the Study of Religion.** Provides advanced orientation in academic study of religion, focusing on methods and theories. Historical, phenomenological, and social scientific approaches are examined, in context of history and present state of the discipline. Restricted to RLST graduate students.

**RLST 6840 (1-6). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 6850-3. Comparative Studies in Religion.** Focuses on theories and methods of comparative study in religion through an examination of at least two distinct traditions (e.g., public worship in Judaism and Islam; pilgrimage in Hinduism and Christianity). May be repeated up to 6 total credit hours as topics change. Restricted to RLST graduate students.

**RLST 6940 (1-3). Master's Degree Candidate.**

**RLST 6950 (1-6). Master's Thesis.**

## Sanskrit

**SNSK 1010 (3-4). Introductory Sanskrit 1.**

**SNSK 1020 (3-4). Introductory Sanskrit 2.** Prereq., SNSK 1010.

**SNSK 2110 (3-4). Intermediate Sanskrit 1.** Continued study of the grammar of classical Sanskrit and translation of selected readings from the literature. Meets MAPS requirement for foreign language. Prereq., SNSK 1020.

**SNSK 2120 (3-4). Intermediate Sanskrit 2.** Continuation of SNSK 2110. Prereq., SNSK 2110.

## Sewall Residential Academic Program

**SEWL 1000 (1-3). Topics: Humanities 1.**

**SEWL 1020 (1-3). Topics—Social Sciences 1.**

**SEWL 2000-3. America, the Environment, and the Global Economy.** Examines the debate over globalization and the global environmental crisis. Does increasing global economic development threaten to undermine the environment? What role should America play in the development of a sustainable economy? Students may not receive credit for both SEWL 2000 and SOCY 1002. Approved for arts and sciences core curriculum: ideals and values.

**SEWL 2020-1. Conversations on the American West.** Series of special lectures and activities that further explore and supplement material covered in CAMW 2001. Required of all students enrolled in CAMW 2001 or its equivalent.

**SEWL 2100-3. Digital Design Interfaces, Interactivities, and Information Design.** Learn the key components of digital design and how to create unique and informative digital designs. Immediate application through work in small groups with nonprofit agencies with whom they will work to design a web site based on the agency's information and needs. Same as FARR 2100.

## Sociology

*Sociology courses numbered at the 1000- and 2000-level are designed for first- and second-year students (fewer than 56 credit hours). Sociology courses numbered at the 3000- or 4000-level are restricted to students with 56 credit hours or more, or those with instructor consent.*

**SOCY 1001-3. Introduction to Sociology.** Examines basic sociological ideas including social relations, social interaction, social structure, and social change. Examples are drawn from societies around the world. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**SOCY 1031-3. Introduction to Social Psychology.** Surveys social psychology with special attention given to theories such as psychoanalysis, symbolic interactionism, culture and personality, and structural-functionalism.

**SOCY 1841 (1-6). Independent Study in Sociology.** May be repeated up to 7 total credit hours.

**SOCY 2001-3. Introduction to Sociological Theory.** Reviews classical, modern, and post-modern sociological theory. Begins with Marx, Durkheim, and Weber, and considers structural functionalist, conflict, and symbolic interactionist theory. Ends with recent feminist and European theories.

**SOCY 2011-3. Contemporary Social Issues and Human Values.** Explores contemporary societies on a global scale. Focuses on such issues as capitalism, socialism, race and ethnic problems, sex discrimination, poverty and the concentration of wealth, crime and deviance, human rights and human values, peace and war.

**SOCY 2031-3. Social Problems.** Examines U.S. society from a normative perspective emphasizing theories of social change. Considers such problems as distribution of power, unemployment, poverty, racism and sexism, the changing role of the family, and drugs. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 2041-3. The Social Construction of Reality.** Analyzes the human environment as a human product. Studies how all things that construct the objective social facts of our social world are created, reproduced, maintained, and distributed by specific human interaction processes.

**SOCY 2051-3. Sociology of Sport.** Looks at the role of sport in contemporary society, examining the function of sport, socialization of the values and power hierarchies in sport, progression through sport, race and sport, and gender and sport.

**SOCY 2061-3. Introduction to Social Statistics.** Introduces students to quantitative analysis of social phenomena. Emphasizes understanding and proper interpretation of graphs; measures of central tendency, dispersion, and association; and the concept of statistical significance. Assumes students have only limited mathematical background.

**SOCY 2091-3. Topics in Sociology.** Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics.

**SOCY 3001-3. Classical Theory.** In-depth study of classical sociological theorists, particularly Marx, Durkheim, and Weber. Examines their roles in defining the discipline of sociology. Prereq., SOCY 1001.

**SOCY 3011-3. Contemporary Theory.** Continuation of SOCY 3001. In-depth study of modern and post-modern theories of the 20th century, including structural-functionalism, conflict, symbolic interactionist, feminist, and world system theories. Prereq., SOCY 1001.

**SOCY 3041-3. Self and Consciousness.** Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as INVS 3041.

**SOCY 3111-3. Social Change.** Studies historically and cross-culturally the causes of modernization and its effects upon the individual, the family, and economic and political institutions. Prereqs., SOCY 1001 and SOCY 2001, 3001, or 3011.

**SOCY 3141-3. Social Movements in the U.S.** Considers theory and research about American social movements. Emphasizes leadership, ideology, recruitment, strategy, organizational dynamics, public response, and reasons for success or failure. Prereqs., SOCY 1001 and SOCY 2001, 3001, or 3011.

**SOCY 3151-3. Self in Modern Society.** Using a variety of Eastern and Western perspectives, this course explores how modern social institutions and culture shape our personal experiences, how personal experiences can affect the nature of those institutions and culture, and how strategies can be developed for achieving balance between the individual and society. Prereqs., SOCY 1001 and SOCY 2001, 3001, or 3011. Approved for arts and sciences core curriculum: United States context or ideals and values.

**SOCY 3201-3. Introduction to Research Methods.** Introduces students to methods of conducting social science research and selected topics in the philosophy of science. Emphasizes use of library resources, research design, hypothesis construction, methods of data collection, verbal and written reports, observational techniques, unobtrusive methods (content analysis, secondary analysis), measurement, scaling, report writing. Prereqs., SOCY 1001, 2061, and SOCY 2001, 3001, or 3011.

**SOCY 3301-3. Survey Methods.** Teaches quantitative research methods and, particularly, methods of survey research. Topics include sampling, interviewing, schedule construction, data analysis, computer methods, index construction, and statistical analysis. Students participate in a survey project, design, collect data, and prepare a research paper on the basis of collected data. Prereqs., SOCY 1001, 2061, and SOCY 2001, 3001, or 3011.

**SOCY 3401-3. Field Methods.** Skill development prepares students to conduct qualitative sociological research. Emphasizes ethnographic techniques, including intensive interviewing, direct observation, coding, participant observation, and report writing. Students conceive and execute a field research project with data collection, analysis, and a report. Prereqs., SOCY 1001, 2061, and SOCY 2001, 3001, or 3011.

**SOCY 4031-3. Social Psychology.** Studies individuals in social context. Reviews philosophical and sociological treatments of the relation between the individual and society. More specific topics include the socialization process, theories of human development and personality formation, language acquisition, conformity, aggression, sex differences in personality and gender identity, and the relation between attitudes and overt behavior. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011.

**SOCY 4041-3. The Creative Self.** Experimental approach to the creative process that fosters experimentation outside of conventional patterns of thinking and expression, and explores the use of imagination and creative thinking in problem solving, writing, and art. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as INVS 4041.

**SOCY 4051-3. Phenomenological Sociology.** Examines the contributions of phenomenology to sociology through a critical analysis of Husserl and Schutz's influence on classical and modern sociological theories and methods. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Restricted to seniors.

**SOCY 4061-3. Social Statistics.** Introduction to quantitative analysis of social phenomena. Emphasizes use of probability, statistical inference, analysis of variance, and multiple regression techniques for production of sociological research. Prepares students for more advanced-level statistics courses. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3001.



**SOCY 4081 (1-3). Sociology of Education.** Analyzes the school as a social organization. Among topics considered are power and control in the school; classroom interaction and its relation to learning and personality development in students; roles of educators; and reciprocal relations of school and community. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as SOCY 5081.

**SOCY 4121-3. Sociology of Religion.** Discusses the social origin of religion, its significance as a cultural factor and as a form of social control in contemporary society, and its relationship to other institutions. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011.

**SOCY 4441-3. Senior Honors Seminar 1.** Helps students design and initiate an honors thesis based on original sociological research. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011, and instructor consent. Restricted to sociology majors with a minimum grade point average of 3.30.

**SOCY 4451-3. Senior Honors Seminar 2.** Helps students complete an honors thesis based on original sociological research. Emphasizes analyzing data, writing research reports, and presenting results. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011, and instructor consent. Restricted to sociology majors with a minimum grade point average of 3.30.

**SOCY 4461-3. Critical Thinking in Sociology.** Examines a sociological topic in depth, covering such issues as class structure, race relations, gender roles, criminal justice, and political conflict, with an emphasis on writing, reading, and critical thinking. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Restricted to seniors. Approved for arts and sciences core curriculum: critical thinking.

**SOCY 4841 (1-6). Independent Study in Sociology.** Upper-division variable credit. May be repeated up to 6 total credit hours. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011, and instructor consent. Restricted to majors.

**SOCY 4911-3. Teaching Sociology.** Students participate in a teaching seminar under the supervision of a faculty member. Includes pedagogical strategies for implementing concrete educational goals and encouraging higher levels of creativity and analysis in a large, lower-division class. Emphasizes mentorship and personal development. Prereqs., SOCY 1004 and instructor consent.

**SOCY 4931 (1-6). Internship in Sociology.** Provides an academically supervised opportunity for junior and senior sociology majors to work in public or private organizations. Focuses on the sociology of education, institution building, and social change in educational settings. Interns work in specially devised learning centers. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Restricted to majors.

**SOCY 5001-3. Classical Theory.** Surveys sociological theory into the early 20th century and its influence in the emergence of major contemporary theoretical perspectives. Restricted to SOCY graduate students.

**SOCY 5011-3. Modern Theory.** Surveys post-World War II sociological theory emphasizing such theories as functionalism, symbolic interactionism, exchange theory, conflict theory, and phenomenology.

**SOCY 5021-3. Data Analysis.** Examines modern methods of quantitative and qualitative data analysis such as regression analysis, causal modeling, computer methods, content analysis, and written presentation of findings.

**SOCY 5031-3. Research Design.** Principles and practice of social research, including the nature of scientific explanation, the relationship between theory and research, research design, measurement problems, sampling questionnaire construction, interviewing, ethnographic methods, and statistical analysis.

**SOCY 5041-3. Cultural Sociology.** Explores “the cultural turn” in sociology and related disciplines. Reviews basic themes in cultural studies—e.g., distinguishing “cultural” and “social”; narrative as catalyst between symbols and practices; cultural production processes; self as embodied; culture and power; methods and epistemological issues. Students present their own projects in class and as research papers. Prereq., graduate standing.

**SOCY 5081 (1-3). Sociology of Education.** Same as SOCY 4081.

**SOCY 5091-3. Postmodernism: Theories and Debates.** Examines the historical conditions that led to postmodern thought and its challenges to social sciences, its theoretical and methodological assumptions, and its political implications. Also discusses postmodern views on science, subject, power, and social change. Prereq., graduate standing.

**SOCY 5121-3. Ethnographic Research Methods.** Training in the systematic observation of people in situations, finding them where they are, staying with them in a role acceptable to them that allows intimate observations of behavior. Students report their findings in ways useful to social science but not harmful to those observed.

**SOCY 5161 (1-3). Special Topics.** May be repeated up to 9 total credit hours.

**SOCY 5221-3. Ethnographic Analysis.** Drawing on data gathered through participation, observation, and in-depth interviewing, students focus on developing theoretical analyses and exploring classical and post-modern ethnographic writing formats. Students present and revise their papers as well as review journal articles. Prereqs., graduate standing and SOCY 5121, or instructor consent.

**SOCY 5531-3. Seminar in Social Psychology.** Studies the individual in social context. Focuses on theoretical perspectives and substantive issues specific to sociological and social psychology, including socialization, the self, social roles, language, deviance, gender, collective behavior, group processes, attitudes and behavior, social norms, and conformity.

**SOCY 5601-3. Advanced Data Analysis.** Extends general linear regression model to consider residual analysis, curvilinearity and interaction, and logistic regression. Includes completion of a written research paper. Prereqs., graduate standing and SOCY 5021.

**SOCY 5841 (1-6). Independent Study in Sociology.** Graduate variable credit. May be repeated up to 7 total credit hours. Prereq., instructor consent.

**SOCY 6821-1. Graduate Sociology Forum 1.** Introduces first-year graduate students to the full range of substantive topics, research programs, and other projects in which graduate sociology faculty are engaged. Provides a forum in which issues of the discipline are presented and discussed. Features weekly presentations by graduate sociology faculty. Prereq., graduate standing.

**SOCY 6831-1. Graduate Sociology Forum 2.** Introduces first-year graduate students to the full range of substantive topics, research programs, and other projects in which graduate sociology faculty are engaged. Provides a forum in which issues of the discipline are presented and discussed. Features weekly presentations by graduate sociology faculty. Prereq., graduate standing.

**SOCY 6841 (1-6). Guided Research in Sociology.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**SOCY 6941 (1-6). Candidate for Degree for Master's Thesis.**

**SOCY 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Population and Health Issues

**SOCY 1002-3. Global Human Ecology.** Examines global survival issues and human values. Focuses on such problems as overpopulation, world hunger and poverty, pollution, resource shortages, environmental impact of technology and population dynamics, public policy, and strategies for change. Students may not receive credit for both SOCY 1002 and SEWL 2000.

**SOCY 1012-3. Population Issues in the United States.** Introduces the sociological study of human populations in contemporary societies: their size, composition, and distribution. Examines changes in these factors as they occur through processes of mortality, fertility, and migration. Approved for arts and sciences core curriculum: United States context.

**SOCY 3002-3. Population and Society.** Examines population, its structure and processes, and its relationships to selected areas of the social structure. Examines Malthusian, neo-Malthusian, and Marxist perspectives. Prereqs., SOCY 1001 or 1004.

**SOCY 3012-3. Women, Development, and Fertility.** Investigates the status of women and fertility in context of social and economic development. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as WMST 3012. Approved for arts and sciences core curriculum: cultural and gender diversity.

**SOCY 3022-3. Sociology of Chicanos and Mexican Americans.** Surveys contemporary sociological studies of Chicanos, and theories used to understand and explain their status. Issues covered include population growth, socioeconomic status, reverse discrimination, Chicana feminism, and U.S.-Mexico relations. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as CHST 3023.

**SOCY 4022-3. Population Studies: Fertility and Mortality.** Examines sociological causes and consequences of different levels of fertility, mortality, and population growth. Emphasizes methods, theory, policy, and practical applications. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as SOCY 5022.

**SOCY 5012-3. Population Issues, Problems, and Policies.** Presents contemporary perspectives on relations between population and society. Focuses on

mortality, fertility, and migration, the major demographic areas, with reviews of specific demographic phenomena and controversies.

**SOCY 5022-3. Population Studies: Fertility and Mortality.** Same as SOCY 4022.

## Health and Medicine

**SOCY 1003-3. Ethics and Social Issues in U.S. Health and Medicine.** Explores current ethical and policy issues in U.S. health and medical practices. Includes such issues as alcohol and drug abuse, organ transplants and substitutes, genetic engineering, contraception, abortion, occupational safety and health, and euthanasia. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 4003-3. Sociology of Aging.** Studies present and future roles of the aged in the family, the community and the larger society. Considers economic, political, and health consequences of various retirement systems. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011.

**SOCY 5223-3. Continuities and Changes in the Modern World Economy.** Introduces the topics of globalization and democratization from an interdisciplinary perspective. Examines major changes to the global political economy and explores implications for local, national, regional, and international affairs. Restricted to graduate students in SOCY, GEOG, PSCI, or ECON. Same as PSCI 5223 and GEOG 5222.

**SOCY 5333-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as PSCI 5333 and GEOG 5332.

## Criminology

**SOCY 1004-3. Deviance in U.S. Society.** Examines social construction of deviance in the U.S., emphasizing existing theory and research about such issues as deviant careers, deviant lifestyles, and processes of social control. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 2004-3. Topics in Criminology.** Variety of courses in criminology taught by visiting lecturers. See current departmental announcements for specific content. May be repeated up to 9 total credit hours.

**SOCY 2044-3. Crime and Society.** Explores patterns of crime and victimization, classical and contemporary theories explaining crime and criminal justice agencies (police, courtroom and criminal justice personnel, correctional institutions).

**SOCY 3034-3. Perspectives on Violence.** What counts as violence? Who decides what is violence and what is not? In what contexts does violence occur? This course critically examines different criminological and social science perspectives on violence. Prereq., SOCY 1001 or 1004.

**SOCY 3044-3. Race, Class, Gender, and Crime.** Overview of race, class, gender, and ethnicity issues in offending, victimization, and processing by the justice system. Examines women and people of color employed in the justice system. Prereq., SOCY 1001 or 1004. Same as WMST 3044.

**SOCY 3314-3. Violence Against Women and Girls.** Focuses on aspects of the victimization of women and girls that are “gendered”—namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence. Prereq., WMST 2000. Same as WMST 3314.

**SOCY 4004-3. Topics in Criminology.** Variety of courses in criminology to be taught by visiting lecturers. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics. Prereq., SOCY 1001 or 1004.

**SOCY 4014-3. Criminology.** Scientific study of criminal behavior with special attention to development of criminal law, definition of crime, causes of law violation, and methods of controlling criminal behavior. Prereq., SOCY 1001 or 1004. Restricted to juniors and seniors.

**SOCY 4024-3. Juvenile Delinquency.** Examines the history, incidence and prevalence of delinquent behavior, as well as why children become involved in criminal activity. Prereq., SOCY 1001 or 1004. Approved for arts and sciences core curriculum: contemporary societies.

**SOCY 4054-3. Law and Society.** Examines the law as a set of codes for dispute resolution, an institution of social control, a “civilizing” force, and a tool for violence and criminality. Prereqs., SOCY 1001 or 1004. Students may not receive credit for both SOCY 4054 and 2024. Similar to SOCY 2024.

**SOCY 4144-3. Criminal Justice System in the United States.** Explores power, socioeconomic status, race, age, and gender issues in law enactment and enforcement, judicial practice, and correctional policy and practice. Examines historical change in these structures. Students may not receive credit for both SOCY 4144 and 2014. Prereq., SOCY 1001 or 1004. Similar to SOCY 2014.

**SOCY 4934-3. Internship in Criminology 1.** Provides opportunity for students to gain professional experience with various criminal justice agencies, such as prosecutor or public defender agencies, jails or prisons, or juvenile justice or community corrections agencies. Prereqs., 12 hours of SOCY course work and instructor consent.

**SOCY 4944-3. Internship in Criminology 2.** Designed to continue the training received in SOCY 4934. Students may receive credit for this course up to two times when necessary to complete their obligations to the internship organization. Prereqs., 12 hours of SOCY course work and instructor consent.

**SOCY 5004-3. Topics in Criminology.** Variety of courses in criminology to be taught by visiting lecturers. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics.

**SOCY 5014-3. Seminar in Criminology.** Examines theories of social causation of crime and crime control policies.

**SOCY 5114-3. Criminological Theory.** Examines the major criminological theories of the 18th through 21st centuries in Europe, Australia, and the U.S. Emphasizes the historical contexts and paradigms of knowledge influencing these theories. Prereq., graduate standing.

**SOCY 5314-3. Institutions of Social Control.** Exploration of sociological perspectives on the criminal justice process. Considers organization of criminal law responses, including enforcing and sentencing. Race, class, gender, and age differences in treatment and sentencing are analyzed. Prereq., graduate standing.

## Social Conflict

**SOCY 1005-3. Social Conflict and Social Values.** Explores origin, escalation, and resolution of social conflict. Focuses on major conflict theories, human values and social action, and use of simulation and negotiation exercises for learning conflict management skills. Approved for arts and sciences core curriculum: contemporary societies or ideals and values.

**SOCY 1015-3. United States Race and Ethnic Relations.** An examination of race and minority problems in U.S. society, including the psychological, social, and cultural sources of prejudice and discrimination. Same as ETHN 1015. Approved for arts and sciences core curriculum: United States context.

**SOCY 2025-3. Nonviolence and the Ethics of Social Action.** Examines nonviolence as a strategy of social action. Focuses on ethics and dynamics of nonviolent action; racial and economic justice movements; civil disobedience; and conscientious objection to war.

**SOCY 2505-3. Sociology of Peacemaking.** Analyzes institutions of war and the forces emerging to counter them, such as negotiation, nonviolent national defense, and peace movements. Similar to SOCY 3015.

**SOCY 4025-3. Conflict Management in Social Systems.** Explores conflict resolution theory and method as applied to interpersonal, intergroup, and interorganization conflict. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as SOCY 5025.

**SOCY 4035-3. Social Stratification.** Studies theories of class, ethnic, sex, and age stratification. Examines social inequality in the United States and analyzes the resulting conflicts. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as SOCY 5035.

**SOCY 4115-3. Democracy and Nonviolent Social Movements.** Explores theories of democracy and development in relation to movements for nonviolent social change. Focuses on means and ends, spirituality, leadership, decision making, civil society, cooperative economics, ecology, and decentralized power. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as INVS 4914.

**SOCY 5025-3. Conflict Management in Social Systems.** Same as SOCY 4025.

**SOCY 5035-3. Social Stratification.** Same as SOCY 4035.

**SOCY 5055-3. Modern Marxist Social Theory.** Analyzes recent Marxist theories of class structure, exploitation, political economy, alienation, culture, and the state as discussed in the work of Althusser, Gramsci, Lukacs, Mandel, Marcuse, Roemer, and others.

**SOCY 5205-3. Collective Action.** Studies primary forms of collective action including movements for social change; religious movements; and civil resistance to military occupation and political repression. Emphasizes movement leadership, ideology, organizational structure, and use of nonviolent action. Prereqs., graduate standing and instructor consent.

**SOCY 5615-3. Teaching in Sociology.** Learn how to teach sociology more effectively while developing a new content area and a clearer sense of the field. Choose a content area within sociology as the basis for planning a course and developing and practicing different teaching techniques. Prereqs., enrollment in SOCY graduate program and completion of graduate teacher program fall intensive.

## Sex and Gender

**SOCY 1006-3. The Social Construction of Sexuality.** Discusses the social determinants of sexuality. Analyzes the economic, psychological, and cultural influences on human sexuality. Interactional perspective of human sexuality is presented. Same as WMST 1006. Approved for arts and sciences core curriculum: cultural and gender diversity.

**SOCY 1016-3. Sex, Gender, and Society 1.** Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification. Same as WMST 1016. Approved for arts and sciences core curriculum: cultural and gender diversity.

**SOCY 2026-3. Men and Masculinity.** Studies the historical development, cross-cultural definition, and social construction of masculinity. Emphasizes contemporary meanings of masculinity and their impact. Approved for arts and sciences core curriculum: cultural and gender diversity.

**SOCY 3016-3. Marriage and the Family in U.S. Society.** Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to the nuclear family and traditional marriage exploring new definitions of family. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as WMST 3016. Approved for arts and sciences core curriculum: United States context.

**SOCY 3026-3. Women of Color: Chicanas in U.S. Society.** Critically explores the Chicana experience and identity. Examines issues arising from the intersection of class, race, and gender. Focuses on controversies surrounding culture and gender through an analysis of feminism and feminismo. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as CHST 3026.

**SOCY 3046-3. Topics in Sex and Gender.** Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics. Students may receive credit for this course up to three times for different topics. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011.

**SOCY 4016-3. Sex, Gender, and Society 2.** Studies status and power differences between the sexes at individual, group, and societal levels. Examines empirically established sex differences, and reviews biological, psychological, and sociological explanations for gender differences. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as WMST 4016.

**SOCY 4086-3. Family and Society.** Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic, and economic determinants of family formation. Prereqs., SOCY 1001, and SOCY 2001, 3001, or 3011. Same as WMST 4086.

**SOCY 5006-3. Sociology of Sex and Gender.** Theoretical and empirical examination of sex stratification, sex role differentiation, and sex differences in socialization, personality, institutions, and culture.

**SOCY 5026-3. Feminist Research Methods.** Epistemological and methodological issues generated by feminist research and students' own projects.

**SOCY 5036-3. Feminist Theory.** Examines the main schools of feminist thought and their impact upon sociological theories. Also examines current feminist theoretical debates and their relevance to feminist sociology. Prereq., graduate standing.

## Environmental Sociology

**SOCY 3007-3. Environment and Society.** Examines how both natural and built environments influence human behavior and social organization. Focuses on microenvironments and their influence on individuals; the impact of macroenvironments on societal organization; and environmental movements. Prereqs., SOCY 1001 and SOCY 2001, 3001, or 3011.

**SOCY 5007-3. Foundations of Environmental Sociology.** Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters. Same as ENV 5007.

**SOCY 5117-3. Population and Environment.** Reviews research on human-environment interactions, with a focus on ways in which demographic processes influence, and are influenced by, the environmental context. Specific topics include conceptual and analytical frameworks; methodologies; intervening factors shaping human dimensions of environmental change; and regionally-focused research. Restricted to graduate students.

## Spanish and Portuguese

### Spanish

**SPAN 1000-3. Cultural Difference through Hispanic Literature.** For freshmen only. Organized around the general topic of cultural differences. Focuses on a related issue such as gender or history articulated in the literature of Spain, Latin America, and the Hispanic United States. Taught in English; students read selected literary texts in English from the various traditions. Does not count towards the Spanish major. Approved for arts and sciences core curriculum: literature and the arts.

**SPAN 1010-5. Beginning Spanish 1.** Offers students a firm command of Spanish grammar. Grammar is used as a point of departure for development of oral skills. Reading and writing are stressed to a lesser degree. Attendance at the language laboratory may be mandatory. Similar to SPAN 1150.

**SPAN 1020-5. Beginning Spanish 2.** Continuation of SPAN 1010. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1010 with a grade of C- or better, or placement. Similar to SPAN 1150.

**SPAN 1150-8. Intensive First-Year Spanish.** An intensive beginning course covering the same material as SPAN 1010 and 1020. Attendance at the language laboratory may be mandatory. Not open to students with credit in SPAN 1010 and 1020.

**SPAN 2110-3. Second-Year Spanish 1.** Grammar review. Emphasizes reading, writing, and speaking skills. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1020 or 1150 with a grade of C- or better, or placement. Similar to SPAN 2150. Meets MAPS requirement for foreign language.

**SPAN 2120-3. Second-Year Spanish 2.** Grammar review. Emphasizes reading, writing, and speaking skills. Attendance at the language laboratory may be mandatory. Prereq., SPAN 2110 with a grade of C- or better, or placement. Similar to SPAN 2150.

**SPAN 2150-5. Intensive Second-Year Spanish.** Intensive review of grammar and other subjects covered in SPAN 2110 and 2120. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1020 or 1150 with a grade of C- or better, or placement and departmental approval. Not open to students with credit in SPAN 2110 and 2120. Meets MAPS requirement for foreign language.

**SPAN 3000-5. Advanced Spanish Language Skills.** Transitional course that introduces students to the Spanish major and improves their writing skills. Involves composition, reading, and to a lesser extent, conversation. Prereq., SPAN 2120 or 2150 with a grade of C- or better, the equivalent, or placement.

**SPAN 3001-3. Spanish Conversation.** Emphasizes vocabulary acquisition and speaking fluency. Through structured and carefully monitored individual, group, and class work, students achieve enduring language growth and meaningful acculturation that otherwise could only be achieved through an extended stay in an Hispanic country. Prereqs., SPAN 2120 or 2150 with a grade of C- or better, the equivalent, or placement.

**SPAN 3030-3. Professional Spanish for Business 1.** Includes study of terminology and techniques used in business transactions and the interpretation and understanding of ideas expressed in business letters and simple documents. Prereq., SPAN 3000.

**SPAN 3040-3. Professional Spanish for Business 2.** Includes writing, interpreting, and elementary translation. Some attention given to writing of resumes and application letters, as well as to the entire job-search process. Prereqs., SPAN 3000 and 3030.

**SPAN 3050-3. Spanish Phonology and Phonetics.** Designed to teach some of the methods, techniques, and tools of descriptive linguistics as they apply to articulatory phonetics. Students analyze important contrasts between sounds of Spanish and English by means of phonetic transcription. Prereq., SPAN 3000.

**SPAN 3100-3. Literary Analysis.** Students read short stories and other brief narrative texts, critical and creative essays, short plays, and poems to facilitate the acquisition of critical skills in identification of basic ideological and formalistic issues within texts being studied. Prereq., SPAN 3000 or equivalent. Approved for arts and sciences core curriculum: critical thinking.

**SPAN 3120-3. Advanced Spanish Grammar.** Analysis of texts from morphological and syntactic perspectives. Structural and semantic characteristics of major features of Spanish are studied at the sentence level. Use of these grammatical features is then studied in selected literary texts. Prereq., SPAN 3000 or equivalent.

**SPAN 3200-3. Spanish Culture.** Examines historical bases of modern Spain's cultural and political currents. Prereq., SPAN 3000.

**SPAN 3210-3. The Cultural Heritage of Latin America.** Examines literary, artistic, and philosophical currents in Latin America beginning with pre-Columbian indigenous cultures and continuing to the present. Prereq., SPAN 3000. Students may receive credit for only one of SPAN 3210 and 3220.

**SPAN 3220-3. Latin American Culture: Spanish America and Brazil.** Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish. Prereq., SPAN 3000. Recommended prereqs., PORT 2110 and 2120. Same as PORT 3220. Similar to SPAN 3210. Students may receive credit for only one of SPAN 3210 or 3220.

**SPAN 3310-3. 20th Century Spanish Literature.** Surveys leading writers of Spain from 1898 until the present. Prereq., SPAN 3100.

**SPAN 3340-3. 20th Century Spanish American Literature.** Introduces contemporary Spanish American literature. Prereq., SPAN 3100.

**SPAN 3700-3. Selected Readings: Spanish Literature in Translation.** Introduces selected Spanish literature masterpieces. Taught in English. Will not count toward major requirements. Approved for arts and sciences core curriculum: literature and the arts.

**SPAN 3800-3. Selected Readings: Latin American Literature in Translation.** Introduces selected Latin American (Spanish and Portuguese) literature masterpieces. Taught in English. Does not count toward the Spanish major. Approved for arts and sciences core curriculum: literature and the arts.

**SPAN 4000-3. Hispanic and Native American Culture of the Southwest.** Does not count for major. Taught in English. Same as SPAN 5000 and CHST 4000.

**SPAN 4010-3. Advanced Rhetoric and Composition.** Designed to improve written expression in Spanish. Offers a detailed study of nuances of grammar points most difficult for students. Gives attention to errors in student compositions and to various styles of written Spanish. Prereqs., SPAN 3100 and 3120 or equivalent.

**SPAN 4060-3. Problems of Business Translation in Spanish 1.** Develops skills in English-Spanish and Spanish-English translation and interpretation. Prereq., SPAN 3040 or equivalent.

**SPAN 4070-3. Problems of Business Translation in Spanish 2.** Legal and commercial documents are studied, prepared, and discussed to enable students to perform successfully in real translation situations. Prereq., SPAN 4060 or equivalent.

**SPAN 4110-3. Hispanic Women Writers.** Discusses the image of women in Spanish literature through the centuries using works by representative female writers. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4150-3. Masterpieces of Spanish Literature to 1700.** Treats major literary tendencies of Spanish literature from its origins to the end of the Baroque period. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4160-3. Masterpieces of Spanish Literature: 1700 to Present.** Requires a reading of selected masterpieces and an examination of major movements and figures in the literature of Spain from 1700 to the present. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4170-3. Masterpieces of Spanish American Literature to 1898.** Examines major works of Spanish American literature from the colonial period to the late 19th century. Emphasizes major figures and their works. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4180-3. Masterpieces of Spanish American Literature: 1898 to Present.** Examines major works of Spanish American literature from late 19th century to present. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4220 (1-3). Special Topics in Spanish and/or Spanish American Literature.** Examines intensively particular topics or issues concerning Spanish and/or Spanish American literature selected by the instructor. May be repeated up to 7 total credit hours. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4230-3. Special Topics in Luso-Brazilian and/or African Literature.** Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil, and/or the African countries of Portuguese colonization. Taught in Spanish. May be repeated up to 7 total credit hours. Prereq., SPAN 3100, 3120, and an additional course above SPAN 3000. Same as PORT 4230.

**SPAN 4430-3. Special Topics in Hispanic Linguistics.** Examines intensively particular topics or issues concerning Hispanic linguistics selected by the instructor. May be repeated up to 9 total credit hours on different topics. Prereqs., SPAN 3100, 3120, and an additional course above 3000.

**SPAN 4450-3. Introduction to Hispanic Linguistics.** Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation, and Spanish spoken in the United States. Prereqs., SPAN 3100, 3120, and an additional course above 3000. Same as SPAN 5450.

**SPAN 4500-3. Methods of Teaching Hispanic Literature and Cultures.** Introduces the methodologies associated with teaching Hispanic literature and culture in the secondary schools. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000. Same as SPAN 5500.

**SPAN 4620-3. Cervantes.** Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4650-3. Methods of Teaching Spanish.** Familiarizes students with current methodology and techniques in foreign language teaching. Peer-teaching coupled with opportunity to teach mini-lessons provide students with actual teaching experience in the foreign language classroom. Prereqs., SPAN 3100, 3120, an additional course above SPAN 3000, and admission to the teacher certification program or departmental approval. Same as SPAN 5650.

**SPAN 4660-6. High School Spanish Teaching.** Part of supervised secondary school teaching required for state certification to teach Spanish. These hours do not count toward student hours in the major nor in the total departmental hours allowed. The credit is pass/fail only. Prereq., SPAN 4650/5650.

**SPAN 4840 (1-3). Independent Study.** Departmental approval required. May be repeated up to 7 total credit hours.

**SPAN 4930 (1-4). Languages Internship for Professions.** Participants interested in public service or management-oriented careers in government or business are able to work as interns in public sector agencies or in private industry, on campus, or abroad. Prereqs., SPAN 3100 and 3200, an additional course above SPAN 3000, and departmental approval. Instructor consent required.

**SPAN 4980-1. Theories and Methods of Language Learning and Pedagogy for Teaching Assistants and Graduate Part-Time Instructors.** Required, intensive mini-course for teaching assistants in Spanish and Portuguese. Provides teachers with the opportunity to learn about language learning theory and pedagogy. Prereq., graduate standing or departmental consent.

**SPAN 4990-3. Spanish Honors Thesis.** May be repeated up to 7 total credit hours. Prereqs., 18 hours of upper-division Spanish (3.00 GPA overall and 3.50 GPA in Spanish).

**SPAN 5000-3. Hispanic and Native American Culture of the Southwest.** Same as SPAN 4000.

**SPAN 5120 (1-3). Seminar: Spanish Literature and/or Spanish American Literature.** Selected topics in Spanish and/or Spanish American literature. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7120.

**SPAN 5130 (1-3). Seminar: Critical Approaches to Hispanic Literature.** Treats various topics and genres, as needs and resources dictate. Gives special attention to theoretical and critical analysis of Hispanic literature with greatest emphasis on contemporary trends. Genres might include narrative, poetry, and theatre. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7130.

**SPAN 5140-3. Seminar: Spanish Literature, Medieval Period.** Studies medieval works, authors, and themes, with consideration of principal influences from other literatures. Reading in Old Spanish. May be repeated up to 7 total credit hours. Prereq., graduate standing and SPAN 5420 or 7420 or instructor consent. Same as SPAN 7140.

**SPAN 5200-3. Seminar: Spanish Literature, Renaissance and Baroque.** Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, *Don Quixote*, and *Novelas ejemplares*, picaresque novel, and the Spanish comedia of the 17th century. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7200.

**SPAN 5210 (2-4). Seminar: Spanish Literature, 18th and/or 19th Centuries.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry, and 19th century theatre. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7210.

**SPAN 5220 (1-3). Seminar: Spanish Literature, 20th Century.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7220.

**SPAN 5300 (2-4). Seminar: Spanish American Literature, Colonial Period and/or 19th Century.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7300.

**SPAN 5320 (1-3). Seminar: 20th Century Spanish American Literature.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or department consent. Same as SPAN 7320.

**SPAN 5400 (2-4). Seminar: Spanish Phonology.** Topics within Spanish phonology are treated, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching, and different schools of Spanish phonology. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7400.

**SPAN 5410 (2-4). Seminar: Spanish Syntax.** Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax, and different schools of Spanish syntax. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7410.

**SPAN 5420 (2-4). Seminar: History of the Spanish Language.** Treats topics within the history of the Spanish language, as needs and resources dictate. Concerned with linguistic evolution of Spanish from neo-Latin to its present status as a world language; considers important historic, linguistic, literary, and cultural currents. Representative topics might include a diachronic study of Spanish linguistic forms, the extension of Spanish to the New World, and linguistic and literary texts

in Old Spanish. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7420.

**SPAN 5430 (1-3). Seminar: Hispanic Linguistics.** Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7430.

**SPAN 5440-3. Seminar: Trends in Hispanic Linguistics.** Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition, and applied linguistics. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7440.

**SPAN 5450-3. Introduction to Hispanic Literature Linguistics.** Same as SPAN 4450.

**SPAN 5460-3. Topics in Spanish Applied Linguistics.** Treats topics within the scope of Spanish first and second language acquisition and the speech of bilinguals. Other topics include contrasting linguistics, interlingual stages of learning, and code switching as they relate to language acquisition. Prereq., graduate standing or instructor consent. Same as SPAN 7460.

**SPAN 5500-3. Seminar: Methods of Teaching Hispanic Literature and Cultures.** Same as SPAN 4500.

**SPAN 5650-3. Methods of Teaching Spanish.** Same as SPAN 4650.

**SPAN 6840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental approval.

**SPAN 6940 (1-3). Master's Degree Candidate.** Prereq., graduate standing in Spanish or departmental approval.

**SPAN 6950 (1-6). Master's Thesis.** Prereq., graduate standing in Spanish or departmental approval.

**SPAN 7120 (1-3). Seminar: Spanish Literature and/or Spanish American Literature.** Same as SPAN 5120.

**SPAN 7130 (1-3). Seminar: Critical Approaches to Hispanic Literature.** Same as SPAN 5130.

**SPAN 7140-3. Seminar: Spanish Literature, Medieval Period.** Same as SPAN 5140.

**SPAN 7200-3. Seminar: Spanish Literature, Renaissance and Baroque.** Same as SPAN 5200.

**SPAN 7210 (2-4). Seminar: Spanish Literature, 18th and/or 19th Centuries.** Same as SPAN 5210.

**SPAN 7220 (1-3). Seminar: Spanish Literature, 20th Century.** Same as SPAN 5220.

**SPAN 7300 (2-4). Seminar: Spanish American Literature, Colonial Period and/or 19th Century.** Same as SPAN 5300.

**SPAN 7320 (1-3). Seminar: 20th Century Spanish American Literature.** Same as SPAN 5320.

**SPAN 7400 (2-4). Seminar: Spanish Phonology.** Same as SPAN 5400.

**SPAN 7410 (2-4). Seminar: Spanish Syntax.** Same as SPAN 5410.

**SPAN 7420 (2-4). Seminar: History of the Spanish Language.** Same as SPAN 5420.

**SPAN 7430 (1-3). Seminar: Hispanic Linguistics.** Same as SPAN 5430.

**SPAN 7440-3. Seminar: Trends in Hispanic Linguistics.** Same as SPAN 5440.

**SPAN 7460-3. Topics in Spanish Language Acquisition and Applied Linguistics.** Same as SPAN 5460.

**SPAN 8840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental approval.

**SPAN 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Prereq., graduate standing in Spanish or departmental approval.

## Portuguese

**PORT 1010-5. Beginning Portuguese 1.** Offers students a firm command of Portuguese grammar. Uses grammar as point of departure for development of oral skills. Reading and writing stressed to lesser degree. Attendance at language laboratory may be mandatory. Similar to PORT 1150.

**PORT 1020-5. Beginning Portuguese 2.** Continuation of PORT 1010. Prereq., PORT 1010 with a grade of C- or better, or placement. Similar to PORT 1150.

**PORT 1150-8. Intensive Beginning Portuguese.** Intensive review of the structures normally covered in PORT 1010 and 1020. Attendance at language laboratory may be mandatory. Prereqs., placement and departmental approval. Not open to students with credit in PORT 1010 and 1020.

**PORT 2110-3. Second-Year Portuguese 1.** Includes grammar review and a study of Portuguese and Brazilian culture, civilization, literature, and art. Prereq., PORT 1020 or 1150 with a grade of C- or better, or placement. Similar to PORT 2150. Meets MAPS requirement for foreign language.

**PORT 2120-3. Second-Year Portuguese 2.** Includes grammar review and a study of Portuguese and Brazilian culture, civilization, literature, and art. Prereq., PORT 2110 with a grade of C- or better, or placement. Similar to PORT 2150.

**PORT 2150-5. Intensive Second-Year Portuguese.** Intensive review of structures normally covered in PORT 2110 and 2120. Prereq., PORT 1020 or 1150 with a grade of C- or better or placement, and departmental approval. Not open to students with credit in PORT 2110 and 2120. Meets MAPS requirement for foreign language.

**PORT 2350-3. Portuguese for Spanish Speakers.** Intensive introduction to the Portuguese language for those able to speak Spanish. Prereq., five semesters of college Spanish or equivalent, SPAN 3000, placement, or departmental approval.

**PORT 3220-3. Latin American Culture: Spanish America and Brazil.** Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish. Prereq., SPAN 3000. Recommended prereqs., PORT 2110 and 2120. Same as SPAN 3220. Similar to SPAN 3210. Students may receive credit for only one of SPAN 3210 and PORT 3220.

**PORT 4030-3. Topics: Luso-Brazilian Civilization.** Designed to examine particular topics or issues concerning Portuguese and/or Brazilian culture. May be repeated up to 7 total credit hours. Prereqs., PORT 2120, 2150, or 2350, with a grade of C- or better, or equivalent. Same as PORT 5030.

**PORT 4110-3. Survey of Brazilian Literature.** Examines major works of Brazilian literature. Prereq., PORT 2120 or 2150 or 2350 with a grade of C- or better, or equivalent. Same as PORT 5110.

**PORT 4150-3. Survey of Portuguese Literature.** Examines major works of Portuguese literature. Prereq., PORT 2120, 2150, or 2350, with a grade of C- or better, or equivalent. Same as PORT 5150.

**PORT 4230-3. Special Topics in Luso-Brazilian and/or African Literature.** Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil, and/or the African countries of Portuguese colonization. Taught in Spanish. May be repeated up to 7 total credit hours. Prereq., SPAN 3100, 3120, and an additional course above SPAN 3000. Same as SPAN 4230.

**PORT 4840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., departmental approval.

**PORT 5030-3. Topics: Luso-Brazilian Civilization.** Same as PORT 4030.

**PORT 5110-3. Survey of Brazilian Literature.** Same as PORT 4110.

**PORT 5150-3. Survey of Portuguese Literature.** Same as PORT 4150.

**PORT 5850 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing and departmental approval.

## Speech, Language, and Hearing Sciences

### Didactic: All-Department

**SLHS 1010-3. Disabilities in Contemporary American Society.** Addresses the issue that 50 percent of all individuals experience disability in their lifetime. Introduces students to the social, cultural, psychological, economic, political, legal, and health-care issues related to society and individuals with disabilities. Approved for arts and sciences core curriculum: contemporary societies or ideals and values.

**SLHS 2000-3. Introduction to Communication Disorders.** Surveys communication disorders, including hearing impairments, learning disabilities, and speech-language disorders, as well as an introduction to basic speech and hearing science.

**SLHS 2010-3. Science of Human Communication.** Discusses how human communication (the process by which a thought is transmitted from the brain of a speaker to the brain of a listener) involves a complex interaction of acoustics, anatomy, physiology, neurobiology, and psychology. Approved for arts and sciences core curriculum: natural science.

**SLHS 2100-3. Statistics for Research in Human Communication Sciences.** Examines basic statistics for understanding and evaluating research in communication sciences, including parametric and non-parametric inferential statistics and single subject designs using data examples from speech, language, and hearing fields.

**SLHS 4000-3. Multicultural Aspects of Communication Differences and Disorders.** Examines perceptions and attitudes regarding differences in communication as a function of cultural-linguistic diversity. Discusses implications of differing verbal and nonverbal communication styles of various cultural groups in terms of professional responsibilities. Prereq., upper-division standing and a minimum of 60 credit hours. Approved for arts and sciences core curriculum: critical thinking.

**SLHS 4100 (1-3). Special Topics in Speech, Language, and Hearing Sciences.** Studies selected topics in speech, language, hearing sciences, communication disorders, and other professional issues.

**SLHS 4560-3. Language Development.** Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives. Prereqs. or coreqs., PSYC 1001, LING 2000. Same as LING 4560, PSYC 4560.

**SLHS 5000-1. SLHS Research Methods 1.** Familiarizes students with basic methodologies and research designs employed in the field. Focuses on critical reading of research papers and design of experiments. At least one research project is conducted and written as part of the course requirements. May be repeated up to 3 total credit hours.

**SLHS 5020-3. Computer Applications in SLHS.** Familiarizes students with basic concepts of computers and how they are applied in the field. Emphasizes analysis of typical SLHS problems, their computer-based solutions, and skills to use programs.

**SLHS 5110-3. Clinical Theory and Practice.** Reviews models and theoretical perspectives regarding communication disorders with application to the clinical processes of assessment, intervention, counseling, and efficacy of intervention. Focuses on issues, challenges, and skills related to working with consumers of speech-language pathology and audiology services and their families, cultural competence, legal and ethical practices, teaming, and collaborative service delivery. Prereq., graduate standing.

**SLHS 6000 (1-4). Problems in Speech, Language and Hearing Sciences.** Studies selected topics related to the theory and management of communication disorders, and theoretical/scientific information related to speech, language, and hearing.

**SLHS 6940 (1-3). Candidate for Degree.**

**SLHS 6950 (1-4). Master's Thesis.**

**SLHS 7000-3. Research Designs in Human Communication Sciences and Disorders.** Offers an advanced seminar in research designs for human behavior: efficacy, ethnographic, single-subject, quasi-experimental, and experimental designs. Designed to familiarize students with terminologies and research designs frequently used in speech-language-hearing areas. Prereq., basic statistics.

**SLHS 7100-3. Cognitive Bases of Human Communication and Its Disorders.** Explores major cognitive theories related to language, including connectionism, information processing, and cognitive mechanisms of early lexical learning. Discusses data from children and adults.

**SLHS 7250-3. Research Methods in Language Development.** Covers advanced methods of conducting research in language development and acquired disorders. Students design a research project that includes elicitation tasks, transcription, and data coding and analysis. Explores child language data archives and computer-based analysis programs. Prereqs., LING/PSYC/SLHS 4560 or instructor consent. Same as LING 7250.

**SLHS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Didactic: Speech-Language Pathology

**SLHS 4502-3. Language Disorders: Child and Adult.** Language disorders can result from problems with cognitive, linguistic, and/or discourse processing. The theoretical framework of language dysfunction is addressed while drawing upon real clinical examples of language disorders that have been observed in children and adults. Prereq., SLHS 4560.

**SLHS 4512-3. Speech Disorders: Voice, Cleft Palate, Motor Disorders, Stuttering.** Emphasizes stuttering, clefting, voice disorders, and motor disorders. Discusses research, evaluation, and treatment pertaining to each of these four disorder areas. Prereq., SLHS 3136.

**SLHS 4522-2. Clinical Phonetics and Phonological Disorders.** Provides an overview of the production and classification of speech sounds and development of skill in transcribing International Phonetic Alphabet. Emphasizes clinical application of phonetics in understanding and analyzing articulatory/phonological development and disorders. Prereq., sophomore standing.

**SLHS 5242-3. Language Disorders in School Age Children.** Addresses the nature, assessment, and treatment of developmental language disorders in school age children. Prereqs., graduate standing and undergraduate background in SLHS.

**SLHS 5252-3. Acquired Language Disorders in Adults.** Introduces the neural bases and medical etiologies of acquired language disorders in adults, explores the ways in which normal language processing may become disordered, and studies current methods of evaluation and treatment design. Prereqs., graduate standing and undergraduate SLHS background.

**SLHS 5272-3. Augmentative Alternative Communication: Theory and Use.** Provides an overview of the application of current technology to alternative/augmentative communication. Emphasizes assessment and intervention with nonverbal children and adults with need for alternative/augmentative communication systems. Presents various technological devices and systems. Addresses system selection, programming, development, and integration of use in environmental contexts. Prereq., SLHS 5232 and instructor consent.

**SLHS 5282-3. Acquired Cognitive Disorders.** Explores the theoretical and clinical management of acquired cognitive disorders that impact communication. Includes basic functional neuroanatomy. Prereq., graduate standing.

**SLHS 5292-3. Motor Speech Disorders and Dysphagia.** Presents the neural bases of normal and disordered speech motor control, teaches assessment and treatment of motor speech disorders of children and adults, and applies motor control research to clinical problems. Prereqs., graduate standing and undergraduate SLHS background.

**SLHS 5302-3. Phonological Disorders.** Provides overview of phonological development, perception, and production. Presents factors related to articulation and focuses on critical evaluation of traditional and phonological based assessment and intervention procedures. Includes coverage of phonological awareness, metaphonological skills as related to literacy. Prereq., graduate standing.

**SLHS 5332-3. Cleft Palate and Voice Disorders.** Examines the anatomical and physiological bases for normal and disordered velopharyngeal and laryngeal function. Familiarizes students with evaluation and treatment of the speech of individuals with cleft lip and palate and laryngeal-based voice disorders.

**SLHS 5362-3. Stuttering: Therapy and Research.** Emphasizes evaluation and treatment of children and adults who stutter. Discusses and evaluates various stuttering intervention approaches. Also discusses counseling parents of young children who stutter. Familiarity with research is a secondary emphasis.

**SLHS 5602-3. Seminar: Intervention for Children with Communication Challenges: Birth to Six.** Provides an orientation to family-directed intervention in serving young children with disabilities and their families. Facilitates integration of medical, physiological, and theoretical perspectives with specific approaches to assessment and intervention.

**SLHS 5612-3. Learning Disabilities.** Focuses on the nature, assessment, and treatment of learning disabilities and their relation to language disorders. Prereqs., SLHS 5242 or 5293.

**SLHS 6362-3. Seminar: Research in Stuttering.** Emphasizes issues related to research of child and adult stuttering. Discusses the neurophysiology, psychology, and phenomenology. Encourages students to explore other topics in stuttering that are of particular interest. Prereq., SLHS 5362.

**SLHS 7202-3. Motor Control and Speech Production.** Focuses on critical reading of literature on motor control, with particular relevance to theories of motor speech production. Prereq., doctoral student standing.

## Didactic: Audiology

**SLHS 4704-3. Audiological Evaluation.** Studies basic principles and techniques of hearing evaluation, including pure-tone, speech, immittance, and advanced audiometry; hearing conservation in hospital, school, and industrial settings; and identification and evaluation of auditory pathologies. Required projects in screening and pure-tone audiometry. Prereq., SLHS 3136.

**SLHS 4714-3. Audiological Rehabilitation.** Covers basic principles and techniques related to the habilitation and rehabilitation of individuals who are deaf or hard of hearing: amplification, speech, language, auditory, speech reading, and educational issues. Prereq., SLHS 4704.

**SLHS 5524-3. Conservation of Hearing in Schools and Industry.** Highlights principles of identification audiometry in both the pediatric and adult populations and prevention of hearing loss in the educational and industrial settings. Prereq., SLHS 4704 or equivalent.

**SLHS 5674-3. Signals and Systems in Audiology.** Provides in-depth study of instrumentation used by audiologists for hearing aid evaluation and fitting, signal generation and modification, and signal measurement and calibration. Prereq., SLHS graduate standing.

**SLHS 6544-3. Auditory Processes: Adult Assessment.** Advanced study on the current science surrounding hearing assessment of adults across the age span. Includes theoretical foundations and clinical applications.

**SLHS 6554-3. Auditory Processes: Child Assessment.** Provides advanced study in hearing assessment and management of children across the age span. Topics include epidemiological, medical, audiological, developmental, and habilitative aspects of normal and impaired hearing in children. Prereqs., graduate standing and undergraduate audiology course work.

**SLHS 6564-3. Auditory Processes: Neurodiagnostics.** Provides advanced study in the neural bases of hearing. Includes theoretical foundations and clinical assessment of neurological functioning in auditory systems with both normal and impaired function. Prereq., SLHS 6544.

**SLHS 6614-3. Advanced Technologies in Amplification and Electroacoustics.** Discusses theoretical and clinical issues regarding the design, fitting, and evaluation of amplification technology for individuals with hearing loss. Includes the use of behavioral, psychological, electroacoustic, and physiological (real ear) measures in the selection and evaluation of digital and analog hearing aid technology.

**SLHS 6640-3. Communication Processes and Hearing Loss: School Age through Adult.** Theories and processes of the communication of individuals with hearing loss from the school age to adult population.

**SLHS 7520-3. Auditory Processes: Medical and Genetic Bases.** Discusses current developments in epidemiology, pathogenesis, and symptomatology of hearing loss. Investigates the genetic bases of hearing loss and deafness. Incorporates clinical decision theory in assessment and intervention. Explores cross-disciplinary topics from genetics, radiology, pharmacology, pathology, and otology.

**SLHS 7530-3. Auditory Processes: Theory and Application in the School Environment.** Focuses on application of routine audiological practices such as screening, assessment, rehabilitation, and instrumentation to children in educational settings. Emphasizes federal education regulations and pertinent case law.

**SLHS 7540-3. Auditory Processes: Physiology, Assessment, and Management of the Vestibular System.** Emphasizes current research on physiology of the vestibular system, including both structure and function. Considers the etiology of both peripheral and central pathologies of the vestibular system. Discusses ways to assess function of the vestibular system as well as theoretical and practical considerations of vestibular rehabilitation.

**SLHS 7550-3. Auditory Processes: Environmental and Occupational Issues.**

Discusses effects of noise and other damaging agents on the physiology of the auditory system. Highlights principles of hearing conversation programs. Focuses on prevention, identification, and management of occupational hearing loss and current legislation as it pertains to occupational safety and hazards.

**SLHS 7640-3. Communication Processes and Hearing Loss: Birth through Six.**

Provides in-depth study of current research literature and its implications for clinical practice regarding development of communication processes in the first six years of life and impact of hearing loss. Investigates development of language, auditory perception, speech production, social-emotional abilities, and cognition.

## Didactic: American Sign Language

*Students will not receive credit for a lower level course in foreign language instruction taken after credit has been given for a higher level course in the same language sequence. For example, students will not receive credit for SLHS 2305 if it was taken after they passed SLHS 2315.*

**SLHS 2305-4. American Sign Language 1.** Introduces basic sign vocabulary, grammatical structures of ASL, and the culture of deaf people. Classes are taught using ASL without the use of spoken English.

**SLHS 2315-4. American Sign Language 2.** Develops more complex vocabulary and grammatical structures, and an understanding of deaf culture. Classes are taught using ASL without the use of spoken English. Prereq., SLHS 2305 or equivalent.

**SLHS 2325-4. American Sign Language 3.** Continuation of SLHS 2314. Covers ASL literature, advanced grammatical structures, idiomatic expressions, and deaf culture. Prereq., SLHS 2315 or equivalent. Meets MAPS requirement for foreign language.

**SLHS 2335-3. American Sign Language 4.** Studies linguistic structure of ASL, the development of ASL in children, and the sociolinguistics of the deaf community. Students perfect their expressive ASL skills through guided composition of oral expository text. Prereq., SLHS 2325 or equivalent. Meets MAPS requirement for foreign language.

**SLHS 4035-3. The Linguistic Structure of American Sign Language.** Reviews the theoretical and practical aspects of ASL grammatical structure, the sociolinguistics of ASL, and the development of ASL as a normal first language. Focuses on ASL literature and expository text as sources for complex grammatical structures. Prereq., LING 2000; SLHS 2325 recommended. Same as SLHS 5035.

**SLHS 5035-3. The Linguistic Structure of American Sign Language.** Same as SLHS 4035.

**SLHS 5045-3. Discourse analysis of American Sign Language.** Provides an introduction to discourse analysis, focusing on ASL and English discourse. Topics include discourse analysis approaches, natural data analysis, technology for research in spoken and signed languages and topics specific to ASL, including transcription in ASL, use of space and spatial mapping, involvement strategies, discourse structures, narrative, coherence and cohesion, framing, and interaction strategies. Emphasizes relevance of these topics to teaching ASL and/or interpreting. Prereq., SLHS 5035.

**SLHS 5055-3. Assessing First and Second Language Skills in American Sign Language.** Introduction to the concepts of assessment and evaluation of language skills. Focuses on assessment of second language skills of ASL in students and interpreters. Topics include types, purpose, reliability, and validity of assessment; issues of test construction, administration, and grading. Prereq., SLHS 5035 or equivalent. Recommended prereq., SLHS 5045.

**SLHS 5105-3. Mentorship I: Interpreting.** Surveys mentoring approaches in interpreter education in the United States. Topics include definitions of mentorship, knowledge and skills to mentor, characteristics of mentors and mentees, mentorship management, portfolios as mentoring tools, and approaches to mentoring in the U.S. Prereq., demonstrated experience and expertise as an interpreter between spoken and signed languages.

**SLHS 5115-3. Mentorship II: Interpreting English/Visual Modes.** Builds on the information presented in SLHS 5105. Presents examination and practice of various approaches and development of skill in interpreting assessment and feedback. Students are expected to develop their own styles of assessment and feedback, design and prepare the interpreting section of their mentoring portfolios, and design their internship project. Topics include ASL, English signing, oral, and cueing. Prereq., SLHS 5105 and demonstrated expertise as interpreter between spoken and signed languages.

**SLHS 5805-3. Mentorship Practicum: Interpreting.** Supervised mentoring experience with intensive application of mentoring skills. Emphasizes practical application of mentoring through ongoing assessment of interpreting and interpreting settings; provides hands-on opportunities to assess, provide feedback, and receive feedback about both interpreting and mentoring skills. Prereqs., SLHS 5105 and 5115 with a minimum grade of B-; demonstrated experience and expertise as an interpreter between spoken and signed languages.

**SLHS 5905-3. Mentorship Internship: Interpreting.** Implements a supervised mentoring project designed in Mentorship II: Interpreting. Includes an extended, in-depth practice involving mentoring. Applies knowledge and skills acquired and integrates them with real-world experiences in mentoring. Projects are implemented in collaboration with students' home or sponsoring region to provide mentoring in that area. Prereqs., SLHS 5105, 5115, and 5115 (with minimum grade of B); approved project proposal and acceptance into Master Mentor Courses/Certificate; demonstrated experience and expertise as an interpreter between spoken and signed languages.

**SLHS 7035-3. The Development of American Sign Language.** Reviews the development of American Sign Language from the prelinguistic period to the time when a child is using complex syntax and morphology. Emphasis on a linguistic description of development and on research methodology. Prereq., SLHS 4035/5035.

## Didactic: Speech-Hearing Science

**SLHS 3136-5. Speech and Hearing Science.** Examines the anatomical and physiological components of the human speech and hearing mechanism—respiration, phonation, articulation, and audition. Integrates acoustics of sound production, transmission, and auditory perception. Labs include making clinically relevant measurements, e.g., respiratory function, vocal pitch, intensity. Prereq., EPOB 3420 or PSYC 2012–2022.

**SLHS 4576-2. Communication Neuroscience** Provides an introduction to the neuroanatomy and neurophysiology of speech production and perception. Considers how speech and language are represented in, and controlled by, the central nervous system. Emphasizes the mechanisms underlying the communication process and discusses relevant neuropathologies. Prereqs., SLHS 2010, 3136, and one course in biological science.

**SLHS 5006-2. Applied Speech Science.** Provides an advanced understanding of the acoustics, aerodynamics, and biomechanics of speech production and related non-speech behaviors. Emphasizes the integration of theoretical constructs in the speech sciences with applied clinical and basic research. Prereq., SLHS 3136 or equivalent.

**SLHS 6006-3. Advanced Hearing Science.** Provides advanced study in hearing science, including physical, physiological, and psychological acoustics of both normal and impaired auditory systems. Prereq., graduate standing in SLHS; undergraduate course work in biology or anatomy.

**SLHS 6106-3. Experimental Phonetics 1.** Offers an advanced seminar in experimental phonetics for MA and PhD students. Covers selected topics in language/speech/voice production and perception with emphasis on clinical applications.

**SLHS 8206-3. Perception/Production Theories in Human Communication Sciences and Disorders.** Provides an advanced seminar in perception/production theories in human communication sciences and disorders. Familiarizes students with current perception theories related to the auditory/visual system and production theories related to the motor/auditory/visual system. Prereq., doctoral student standing or instructor consent.

## Practica

**SLHS 4918-3. Introduction to Clinical Practice.** Introduces students to the clinical process and key components of assessment and intervention. Explores the application of theoretical and scientific information to clinical settings. Students complete supervised observation and service learning projects in the community with individuals with communication challenges. Prereq. or coreq., SLHS 4502 or 4512, and junior or senior standing. Controlled enrollment.

**SLHS 4938 (1-6). Internship: Speech-Language Intervention.** Provides a supervised clinical experience with children who have communication challenges enrolled in the Child Learning Center programs; individuals demonstrating communication disorders as a cotherapist in the Speech, Language, and



Hearing Center; or off-campus experience in an affiliated hospital or public school program. Prereq., SLHS 4918 or instructor consent.

**SLHS 5848 (1-4). Independent Study.** May be repeated up to 7 total credit hours.

**SLHS 5878 (1-3). Practicum 1: Speech-Language-Learning Appraisal.** Provides a supervised clinical experience on campus in appraisal of speech, language, and learning disorders after training at the observational level. Prereq., SLHS graduate standing.

**SLHS 5898 (1-4). Practicum 1: Speech-Language-Learning Intervention.** Offers on-campus and off-campus supervised clinical practice in management of speech-language-hearing disorders in children and adults. May be repeated up to 6 total credit hours. Prereq., SLHS graduate standing.

**SLHS 5918 (1-3). Practicum 1: Audiology Appraisal.** Offers a supervised clinical experience on campus in appraisal of hearing for children and adults. Prereqs., SLHS 4704 and 4714, or equivalent.

**SLHS 5928 (1-3). Practicum 1: Conservation of Hearing.** Provides a supervised clinical experience off-campus in the organization and administration of hearing conservation programs in schools and/or industry. Coreq., SLHS 5524.

**SLHS 5938 (1-3). Practicum 1: Audiology Intervention.** Provides a supervised clinical on- and/or off-campus experience in management of hearing disorders of children and adults. Prereq., SLHS 4714.

**SLHS 6918-5. Practicum 2: Speech-Language-Learning Internship.** Gives an off-campus experience in a clinical or hospital setting that provides in-depth practice in management of communication disorders of children and adults. May be repeated up to 10 total credit hours.

**SLHS 6928-5. Practicum 2: Public School Internship.** Provides an off-campus supervised experience providing extended and in-depth practice involving school-age children in a school classroom. May be repeated up to 10 total credit hours.

**SLHS 6938-5. Practicum 2: Audiology Internship.** Offers an off-campus experience in a school, hospital, or clinic setting that provides in-depth appraisal and/or rehabilitation practice with hearing-impaired individuals. May be repeated up to 10 total credit hours.

**SLHS 7918-3. Practicum 3: Clinical Supervision.**

**SLHS 7928-3. Practicum 3: Clinical Administration.**

**SLHS 8918-3. Practicum 3: Classroom Instruction.**

**SLHS 8928-3. Practicum 3: Research Coordination.**

## Independent Study

**SLHS 4849 (1-4). Independent Study for Undergraduates.** May be repeated up to 7 total credit hours. Prereq., departmental consent.

**SLHS 5849 (1-4). Independent Study 1, MA.** May be repeated up to 7 total credit hours.

**SLHS 5859 (1-4). Independent Study 2, MA.** May be repeated up to 7 total credit hours.

**SLHS 7849 (1-4). Independent Study 1, PhD.** May be repeated up to 7 total credit hours.

**SLHS 7859 (1-4). Independent Study 2, PhD.** May be repeated up to 7 total credit hours.

## Theatre and Dance

### Theatre

#### *History/Dramaturgy/Directing*

**THTR 1011-3. Development of Theatre 1: Forms of Classical Theatre and Drama.** Examines the interaction of dramatic literature and performance in classical forms of European and Asian theatre, including Greek, Roman, Indian, Japanese, Medieval, and Renaissance European. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 2021-3. Development of Theatre 2: Forms of Modern Theatre and Drama.** Examines the interaction of dramatic literature and performance in European theatre from 1800 to 1975, with attention to innovators like Wagner, Ibsen, Strindberg, Stanislavsky, Meyerhold, Pirandello, Brecht, Beckett, and Churchill.

**THTR 3011-3. Development of the American Musical Theatre.** Studies the American musical theatre heritage and its relation to the continually changing social milieu. Examines productions, their creators, and performers. Prereq., junior or senior standing. Recommended prereq., 3 credits in THTR, DNCE, or MUSC. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 3031-3. Development of Theatre 3: 20th Century International Drama.** Introduces 20th century international drama. Discusses selected plays by major African, Asian, and European authors and explores different dramatic traditions and their increasing interactions throughout the 20th century.

**THTR 4021-3. Development of Theatre 4: American Theatre and Drama.** Explores issues in American theatre and drama in the 19th and 20th centuries. Prereqs., junior or senior standing and at least 12 hours of THTR course work. Similar to THTR 4001. Approved for arts and sciences core curriculum: critical thinking.

**THTR 4041-3. Women and Theatre of the 20th Century.** Explores a body of 20th century dramatic literature central to the study of women and theatre as well as the study of 20th century cultural history from a cross-national and multiracial feminist perspective. Major playwrights, particularly women from Asia, Africa, and Europe, are read and discussed. Recommended prereq., THTR 3031. Same as THTR 5041 and WMST 4041.

**THTR 4051-3. Playwriting.** Introductory course in craft of playwriting; primary focus on technique of developing short plays. Instructor consent required.

**THTR 4061-3. Directing.** Theory and practice of directing for the stage. Prereqs., THTR 1003 or 2003; THTR 1065 and 1075 (or equivalent); and two semesters of THTR 3035. May not be taken concurrently with THTR 3035.

**THTR 4081-3. Senior Seminar.** Intellectual and conceptual capstone course for departmental majors with separate sections for theatre and dance students. Course promotes integration of ideas regarding history, criticism, and theory in performance and production. All inquiry throughout the semester relates to the theme of creative process. Approved for arts and sciences core curriculum: critical thinking.

**THTR 4091-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors and seniors. Same as ENGL 4583 and HIST 4134.

**THTR 5011-3. Seminar: Theory and Criticism.** Studies theories and criticisms of drama and theatrical performances from Plato to post-modernism.

**THTR 5031-3. Russian Theatre.** Studies Russian theatre history and the development of Russian drama from the 18th century to the present. Taught in translation.

**THTR 5041-3. Women and Theatre of the 20th Century.** Same as THTR 4041.

**THTR 5051-3. Special Topics in Theatre History.** Detailed study of a particular topic in theatre history (e.g., an era, a style, a country, or an organization). Topic specified in *Registration Handbook and Schedule of Courses*. May be repeated up to 9 total credit hours on different topics.

**THTR 5061-3. Seminar: Asian Theatre.** Study of theatre and drama of India, China, and Japan: theatre history, production styles, and social functions of theatre. Background required in theatre, Asian studies, or both.

**THTR 5071-3. Perspectives on Directing.** Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts, and classroom exercises. Prereq., previous directing course work and/or directing experience.

**THTR 6011-3. On-Stage Studies: Classical and Neoclassical Drama.** Studies classical and neoclassical drama in performance, with particular attention to 20th century productions and the critical and scholarly responses to these productions.

**THTR 6021-3. On-Stage Studies: Elizabethan and Jacobean Drama.** Studies Elizabethan and Jacobean dramatic texts as playscripts for performance, with particular attention to contemporary Shakespeare criticism and landmark Shakespeare productions over the last two centuries.

**THTR 6031-3. On-Stage Studies: American Theatre and Drama.** Studies American drama in performance, with particular attention to critical and scholarly responses to landmark productions of American classics.

**THTR 6041-3. On-Stage Studies: Modern European Drama.** Studies modern European drama in performance, with particular attention to critical and scholarly responses to landmark productions of modern classics.

**THTR 6051 (1-3). Production Research and Practicum: Directing.** Allows students to undertake a production project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a documented written report and evaluation of the research, rehearsal, and performance process. Prereqs., advanced course work in directing and advisor approval.

**THTR 6071-3. Seminar: Perspectives on Acting.** Art of acting is examined through study of acting theories and practices developed during major periods of theatre history. Examines the variety of theories about acting that remain today.

**THTR 6081-3. Seminar in American Theatre: Lesbians and Gays.** Studies the portrayal of lesbians and gays in mainstream American theatre during the 20th century, as well as the contributions of gay and lesbian theatre artists during the same period.

**THTR 6091 (1-3). Production Research and Practicum: Dramaturgy.** Students undertake a dramaturgical project, normally within the major season, requiring detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision and prepare a documented written report of their project. Prereqs., advanced course work in dramatic literature and advisor approval.

### *Performance*

**THTR 1003-3. Beginning Acting.** Teaches the basic principles of acting for those with no previous acting experience, focusing on relaxation, concentration, improvisation, use of imagination, actions, objectives, initial monologue and scene work, and basic terms and concepts of process work for the actor.

**THTR 2003-3. Acting 1.** Emphasizes principles of acting, focusing on exercises in relaxation, talking and listening, use of images, actions and objectives, and basic concepts of process work. Prereq. or coreq., THTR 1019.

**THTR 2013-3. Performance of Literature.** Students learn to perceive literary form and content and to translate that perception into classroom performances of selected modern plays and stories. Performances, both solo and ensemble, embody literary texts diverse in terms of gender and ethnicity. Prereqs., 15 credit hours and THTR 1003, 2003 or 2043.

**THTR 2043-3. Voice for the Stage.** Natural resources of the human voice and body are studied as artistic resources for the performing artist. Designed to examine both the process and products of vocal and physical craft work. Prereq. or coreq., THTR 1019.

**THTR 3013-4. Studio 1: Acting Process—Technique.** In-depth study of the acting process. Focuses on developing the actor's technique. Explores the craft elements of acting, as well as text analysis. Prereq., sophomore standing and admission to the BFA program in acting.

**THTR 3023-4. Studio 2: Acting Process—Scene Study.** Continued development of acting technique and tools for play analysis, with particular emphasis on American realism from the 1930s to early 1960s. Prereq., THTR 3013 or instructor consent.

**THTR 3033-1. Production Research and Practicum: Acting.** Allows students to undertake an acting project, either within the major season or approved departmental production. Requires detailed preparational research, rehearsal commitments, and public presentation of theories and concepts in practice. Following the performance, students present written reports and evaluations. Prereq., THTR 2003 or 2043.

**THTR 3043-3. Advanced Voice for the Stage.** Continues the work begun in THTR 2043. Studies advanced vocal and physical techniques with the goal of integrating these skills into the working process of the performing artist. Prereqs., THTR 2043 and theatre major, or instructor consent. Coreq., THTR 3013 or instructor consent.

**THTR 3053-3. Acting 2.** Continuation of the techniques introduced in the beginning acting courses (THTR 1003 and 2003). Emphasis is placed on monologues and scene study of contemporary plays. Basic techniques in developing a character are explored. Prereq., THTR 1003, 2003 or 2043. Similar to THTR 2023.

**THTR 4003-3. Advanced Acting.** Acting principles and techniques learned in prerequisite courses are adapted and applied to a range of selected scenes of both contemporary and period plays. Emphasizes developing the necessary craft elements to fulfill textual demands. Prereqs., THTR 1019 and 1029, and THTR 2003 or 2043.

**THTR 4013-4. Studio 3: Shakespeare.** In-depth study of Shakespearean texts from the perspective of their demands on the actor, including the conventions and performance styles of Elizabethan theatre. Prereqs., THTR 3013 and 3023, or instructor consent.

**THTR 4073-3. Performing Voices of Women.** Explores theories underlying the "feminine voice," varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms, and ultimately the students' own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women. Prereq., instructor consent.

**THTR 4083-3. Studio 4: Contemporary British and American Theatre.** Studies selected authors and plays, as well as professional issues in contemporary British and American theatre, and the demands made on the actor. Prereqs., THTR 3013, 3023, and 4013 or instructor consent.

**THTR 4093-4. Studio 5: Ibsen, Shaw, and Chekhov.** In-depth study of selected texts by three major progenitors of modern theatre. Emphasizes the world views and conventions implicit in the texts and how these shape the actor's vocal and physical choices. Prereqs., THTR 3013, 3023, and 4013, or instructor consent.

**THTR 6003 (1-3). Production Research and Practicum: Acting.** Allows students to undertake an acting project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a written report and evaluation of the research, rehearsal, and performance process. Prereqs., advanced studies in acting and advisor approval.

### *Theatre Design and Technology*

**THTR 1065-3. Stagecraft.** Introduces technical production elements and procedures, including materials, organizations, methods and equipment to realize the theatrical scenery, costumes, properties, lighting, and sound production. Includes an introduction to stage makeup and costume crafts. Coreq., THTR 1075.

**THTR 1075 (1-2). Stagecraft Lab.** One-to-two credit course comprised of: a 3-hour lab per week providing practical, hands-on experience in production preparation of costumes, makeup, crafts, sets, props, and lights; and a production running crew, normally related to the department's season productions. Coreq., THTR 1065. Restricted to theatre BA/BFA and dance BA/BFA students.

**THTR 2035-3. Design Fundamentals.** Introduces principles and techniques relevant to the expression of dramatic mood and idea through visual elements of the theatre, giving practice in concept development, style selection, and rendering techniques in scenery and costume design.

**THTR 2065-3. Computer Applications in the Performing Arts.** Introduces software and program uses of computers in spreadsheet, database, CAD, and word processing through projects in arts management, budgeting, and design. Course is taught on both IBM and Mac platforms. Prereq., typing skills and basic computer skills.

**THTR 2085-3. History of Western Fashion.** Surveys topics in western dress from ancient civilizations to contemporary time: the garments, accessories, materials, and technologies of personal adornment in the context of philosophical, political, social, and technological change. Priority given to majors.

**THTR 3005-3. Costume Design 1.** Study and application of the principles of design as applied to stage costume, emphasizing texts in analysis and interpretation. Presented in a studio format and project driven. Explores concept development, style selection, and extensive practice in a variety of media and techniques for costume rendering. Prereqs., THTR 1065 and 1075, or equivalent.

**THTR 3015-3. Scene Design 1.** Examines the process of theatrical scene design from early conception to realization. Course work is project-based. Students are introduced to the crafts of script analysis, conceptualization, design expression, drafting, and 3-D model building. Prereqs., THTR 1065 and 1075 or equivalent; or instructor consent.

**THTR 3035 (1-2). Production Practicum.** Practical production projects within a designated area of technical theatre, design, stage management, normally related to the department's season. May be repeated up to 8 total credit hours. Prereqs., THTR 1065 and 1075.

**THTR 3045-3. Stage Management.** Covers stage management from the inception of a production concept through the process of mounting a production, focusing on the interrelationships of the various artists involved, management

and scheduling of time, and the psychology of handling a wide range of personalities. Prereqs., THTR 1065 and 1075, or equivalent.

**THTR 3055-3. Stage Lighting Design 1.** Introduces the craft of stage lighting design through experimental lighting labs, lecture/demos, hands-on production experience, and theoretical projects. Subject matter includes aesthetics of light, color theory, lighting for performance, design graphics, and basic lighting technology. Prereqs., THTR 1065 and 1075, or equivalent.

**THTR 3075-3. Sound Design.** Study and application of the principles of sound technology and design, emphasizing concepts of electricity, acoustics, equipment, and their application to the stage. Prereqs., THTR 1065 and 1075.

**THTR 4005-3. Costume Design 2.** Advanced studio course building on experiences and techniques studied in THTR 3005, with additional emphases on portfolio quality rendering technique and costume production technology as it affects and is affected by the designer. Prereq., THTR 3005.

**THTR 4015-3. Scene Design 2.** Advanced projects in theatrical scene design. Provides intensive practice in sketching, rendering, drafting and model-building. Emphasizes portfolio development and preparing the student designer for graduate training or professional work. Prereq., THTR 3015 or instructor consent.

**THTR 4025-3. Costume Construction.** Includes techniques for the patterning and construction of contemporary and period costumes. Hands-on format covers techniques, materials, and equipment particular to theatrical production. Prereqs., THTR 1065 and 1075, or equivalent, or instructor consent.

**THTR 4035-3. Scene Painting.** Introduces the craft of scene painting through practical projects. Sessions are in a studio format. Students are trained in traditional methods of scenic art, including layout, representational painting, trompe l'oeil, faux finishing, and related skills. Students are taught about proper tool use and care, paint products, and the profession. Prereqs., THTR 1065 and 1075, or equivalent, or instructor consent.

**THTR 4055-3. Stage Lighting Design 2.** Assumes a basic knowledge of stage lighting; concentrates on advanced technology, processes, and design projects. Prereq., THTR 3055.

**THTR 4065 (1-3). Advanced Design Projects.** Practical course in the application of design theory. Students design major costume, lighting, or scenic elements in a season production. Design concept and process must be explained and defended. May be repeated up to 6 total credit hours.

**THTR 4075 (1-3). Advanced Technical Projects.** Students assume responsibility, under faculty supervision, for planning and executing specific technical responses to a design concept in the department's season productions. May be repeated up to 6 total credit hours.

**THTR 4085-3. Theatre Management.** Concentrates on theory and practice of management aspects of the performing arts, emphasizing theatre and dance. Includes marketing, budgeting, house and stage management, audience development, grant writing, unions, and season development. Includes practical experience. Prereqs., THTR 1065 and 1075, or equivalent. Students may not receive credit for both THTR 3065 and 4085. Same as THTR 5085.

**THTR 4095 (1-3). Special Topics in Theatre Design and Technology.** Intensive study of specialized topics in theatre technology and design. Topic and credits specified in the *Registration Handbook and Schedule of Courses*. May be repeated up to 6 total credit hours within a term.

**THTR 4135-3. Technical Production.** Examines the process of and technology for producing theatrical scenery on a limited production timeline. Prereqs., THTR 3035 and QRMS 1010. Recommended prereq., THTR 3015 or 3055.

**THTR 4145-3. Colloquium in Advanced Design.** An advanced theatre design course that emphasizes the collaborative process and advanced design presentation methods. Course work includes completion of several "mock" design projects, with students often working in collaborative teams. Prereq., THTR 3005 or 3015 or 3055 or 3075, or instructor consent.

**THTR 5085-3. Theatre Management.** Same as THTR 4085.

**THTR 6005 (1-3). Production Research and Practicum: Designing.** Allows students to undertake a design project, normally within the theatre season, that requires detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision, and prepare a documented written report and evaluation of the research, design, and realization process, as well as fully rendered designs and/or plots. Projects may be in costumes, lights, or scenery.

## *Shakespearean Production*

*Offered in summer only.*

**THTR 3037 (2-3). Shakespeare Practicum.** Students are assigned to work with production artisans of the Colorado Shakespeare Festival. While there are many possible areas, production designs for each season determine the number of available positions. May substitute for one semester of THTR 3035. Prereqs., THTR 1065 and 1075, or equivalent.

**THTR 4047-3. Shakespeare Behind the Scenes.** Detailed study of script analysis, directing concepts, staging and criticism of the plays being produced by the Colorado Shakespeare Festival.

**THTR 4057-3. Shakespeare in Performance.** Studies Shakespeare's plays in performance with special attention to the way in which key performance elements have been addressed in 20th century productions. Focuses on the plays produced by the Colorado Shakespeare Festival.

**THTR 6007-3. Colorado Shakespeare Festival Dramaturgy.** Students work as production dramaturgs for the Colorado Shakespeare Festival, developing detailed textual, historical, and critical research for CSF productions, participating in education and outreach programs, and writing production-related articles for publication. May be repeated up to 6 total credit hours.

## *Special Courses in Theatre*

**THTR 1009-3. Introduction to Theatre.** Introduces the varieties of theatrical art, past and present, contributions of the various theatrical artists to the total production, and the place of theatre art in today's society. Designed for nonmajors. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 1019-3. Theatre Foundations I: Text Analysis and Practice for the Theatre Arts.** Introduces fundamental methods of text analysis for the stage, presents common vocabulary and concepts of the theatre event as an art form and how it works, and what playmaking means to those who do it. This course is for theatre majors.

**THTR 2849(1-3). Independent Study.** May be repeated up to 3 total credit hours.

**THTR 3849 (1-3). Independent Study.** May be repeated up to 3 total credit hours.

**THTR 4009 (1-3). Strategies of Teaching Theatre.** Specifically designed for teachers at the elementary, middle school, and secondary levels. Focuses on developing effective, innovative performance-based strategies for teaching theatre.

**THTR 4029 (1-12). CU-Boulder Touring Company.** Participation in departmental touring company. By audition. May be repeated up to 12 total credit hours.

**THTR 4039-3. Musical Theatre Repertory.** Developed around the learning of complete scenes, songs, and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition. Same as THTR 5039.

**THTR 4049 (1-4). Problems in Theatre.** Opportunity for students to explore, upon consultation with the instructor, areas in theatre that the normal sequence of offerings may not allow. May be repeated up to 9 total credit hours. Same as THTR 5049.

**THTR 4059-3. Open Topics in Theatre and Drama.** Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the *Registration Handbook and Schedule of Courses*. May be repeated up to 9 total credit hours.

**THTR 4849 (1-3). Independent Study.** May be repeated up to 3 total credit hours.

**THTR 5039-3. Musical Theatre Repertory.** Same as THTR 4039.

**THTR 5049 (1-4). Problems in Theatre.** Same as THTR 4049.

**THTR 5849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 6009-1. Research Strategies and Techniques.** Examines research methodologies appropriate to the performing arts, particularly theatre and dance. Projects are aimed at familiarizing graduate students with the library and other resources, and the development of thesis and dissertation prospectuses. Same as DNCE 6009.

**THTR 6849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 6949 (1-4). Master's Candidate.**

**THTR 6959 (1-6). Master's Thesis.** May be repeated up to 6 total credit hours.

**THTR 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Dance

### *Nonmajor Technique*

**DNCE 1000-2. Beginning Modern Dance.** Introduces basic concepts and skills of modern dance. In-class technique work develops muscle strength, flexibility, coordination, rhythm, and dynamic and spatial awareness. Lecture/discussions focus on various aspects of modern dance including history, composition, kinesiology, and criticism. Limited amount of written work is required.

**DNCE 1020-1. Beginning Modern Dance with Experience.** Studio course that continues the work from the beginning level on basic concepts and skills in modern dance technique to increase strength, flexibility, and coordination.

**DNCE 1100-1. Beginning Ballet.** Ballet for beginners; no previous experience required. Stretching, basic barre, simple terre a terre, and jumping steps are learned, as well as alignment and basic extended positions such as arabesque and attitude. Mastery of simple enchainements and rhythmic patterns. May be repeated up to 2 total credit hours.

**DNCE 1120-1. Beginning Ballet with Experience.** Extension of beginning ballet, when basic concepts of ballet have been mastered. Enchainements are of greater complication and variety. Dance vocabulary is more extensive. Pirouettes and more complex musical phrases are expected. May be repeated up to 2 total credit hours. Prereq., DNCE 1100.

**DNCE 1160-1. Recreational Dance Forms.** Survey course includes dance fundamentals, country western dance, international folk dance, square dance, and ballroom dance. Novelty dances as well as some current dances of the day are included.

**DNCE 1190-1. Ballet 1.** Beginning ballet covering the basic vocabulary of classical ballet technique. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 1200-1. Beginning Jazz Dance.** Introduces various styles of movement unique to jazz dance. Students learn fundamental technical dance skills as well as specific jazz vocabulary. Designed for students with little or no dance experience. May be repeated up to 2 total credit hours.

**DNCE 1220-1. Beginning Jazz with Experience.** Further develops work begun in Beginning Jazz. Exercises and jazz dance phrases are more complex. May be repeated up to 2 total credit hours. Prereq., DNCE 1200.

**DNCE 1290-1. Jazz 1.** Introduces jazz dance, consisting of a technique warm-up, locomotion across the floor, and a series of dance phrases developed into a short dance combination. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 1900 (1-3). Technique Practicum.** Offers special courses in the technique series. Includes world dance and/or social dance forms. May be repeated up to 6 total credit hours.

**DNCE 2040-2. Intermediate/Advanced Modern Dance.** See DNCE 1020. More in-depth study of modern dance concepts. Class technique work more advanced. May be repeated up to 8 total credit hours. Prereq., DNCE 1000 or 1020.

**DNCE 2140-1. Low Intermediate Ballet.** All basic ballet steps should have been mastered, including pirouettes en d'hors and en dedans, knowledge of the principles and placement, and the ability to master simple enchainements. May be repeated up to 2 total credit hours. Prereq., DNCE 1120.

**DNCE 2240-1. Intermediate Jazz.** Designed for the experienced jazz dancer. Includes dance techniques that further improve alignment, strength, flexibility, and coordination within the jazz idiom. Greater emphasis on style and rhythm and challenging dance combinations. May be repeated up to 2 total credit hours. Prereqs., DNCE 1200 and 1220.

**DNCE 2290-1. Jazz 2.** Continuation of Jazz 1. Studies coordination, rhythm, style, and advanced body part isolation in depth. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2500-2. African Dance.** Explores the technique, style, and rhythms of various African, Caribbean, and dance forms of the Americas. Music, history, anthropology, and folklore help to enhance the dance and provide a cultural experience. May be repeated up to 6 total credit hours within a term. Same as BLST 2400.

**DNCE 2900 (1-3). Technique Practicum 2.** Offers second level classes in the world dance forms technique series. Topics or forms of dance include world dance forms and/or social dance forms. May be repeated up to 6 total credit hours. Prereq., DNCE 1900 or instructor consent.

**DNCE 3160-1. Intermediate Ballet.** Covers the general vocabulary of classical ballet technique and enchainements of medium complexity. Multiple pirouettes in all positions are required. Audition required. May be repeated up to 8 total credit hours.

**DNCE 3190 (1-3). Ballet Practicum.** Practical studio training in ballet at the advanced/professional level with a professional company. May be repeated up to 4 total credit hours. Prereq., DNCE 2140, 3160, or 4180. Designed for dance majors. Enrollment by audition only.

**DNCE 3290-1. Jazz 3.** Continuation of Jazz 2. Studies coordination, rhythm, style, and advanced body part isolation in depth, emphasizing performance. Phrases are longer and more complex. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 4180-1. Advanced Ballet.** Advanced professional-level classical ballet, covering the complete vocabulary. Enchainements are of complex structure. Tour de force work required. Audition required. May be repeated up to 8 total credit hours.

**DNCE 4260-1. Advanced Jazz Dance Technique.** Opportunity for advanced dancers who want to expand their technical skills in the jazz form. Each class includes a standing warm up, floor work for strength and flexibility, adagio combination for line and balance, and a locomotor combination for turns, leaps, rhythm, and fast footwork. Emphasis is placed on technique, musicality, style, and performance. May be repeated up to 4 total credit hours. Same as DNCE 5260.

**DNCE 5260-1. Advanced Jazz Dance Technique.** Same as DNCE 4260.

**DNCE 5900 (1-3). Graduate Technique Practicum.** Offers special topics and styles in the graduate technique curriculum. Rotating foci include a variety of traditional dance forms from around the world as well as vernacular, recreational, and social dance phenomena indigenous to the US. Course meets simultaneously with an undergraduate studio course, and includes both the practical movement experience and scholarly study of specially-chosen world dance issues. May be repeated up to 6 total credit hours.

### *Major Technique*

*The following dance courses are designed for dance majors. Enrollment by audition or instructor consent.*

**DNCE 1091-1. Modern 1.** Introduces basic skills of modern dance. In-class technique work increases muscle strength, flexibility, and coordination. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2021-2. Beginning Modern Dance for Majors.** Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 2091-1. Modern 2.** Continuation of Modern 1. A developmental sequence of modern dance technique designed to refine the technical/expressive skills required of the professional dancer. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2191-1. Ballet 2.** Intermediate ballet, covering the complete vocabulary of classical ballet technique. Enchainements are of complex structure. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 3041-2. Intermediate Modern Dance for Majors.** Designed for dance majors. Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 3091-1. Modern 3.** Continuation of Modern 2. A developmental sequence of modern dance technique designed to refine the technical/expressive skills required of the professional dancer. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 3191-1. Ballet 3.** A ballet class of advanced level covering the complete vocabulary of classical ballet. Enchainements are of complex structure and tour de force work is required. Offered summers only at the Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 3601-2. Alexander Technique for Actors and Dancers.** The Alexander Technique is a method for changing habits that impede the performance of movement and speech. Through class discussions, movement exploration, and individualized hands-on lessons, actors and dancers gain understanding of the technique and its benefits to performance.

**DNCE 4061-2. Advanced Modern Dance for Majors.** Designed for dance majors. Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 5001-2. Modern Dance for Graduate Students.** Open only to graduate dance majors. May be repeated up to 12 total credit hours.

**DNCE 5101-1. Intermediate Graduate Ballet.** Open only to graduate dance majors. May be repeated up to 6 total credit hours.

**DNCE 5601-2. Alexander Technique for Graduate Students.** Learn the principles of the Alexander Technique through class discussions, movement exploration, and individualized hands-on-lessons. Discover how to improve their overall functioning and learn to apply the technique to performance and teaching.

**DNCE 6101-1. Advanced Graduate Ballet.** Open only to graduate dance majors. May be repeated up to 6 total credit hours.

### Production

**DNCE 1012-2. Dance Production 1.** Provides practical experience in producing formal and semiformal concerts. Introduces and provides basic familiarity with production and promotional responsibilities, theatrical equipment and systems, and backstage and front-of-house duties and procedures. Restricted to dance majors. Similar to DNCE 2012.

**DNCE 3022-2. Dance Production 2.** Establishes awareness of supporting technical theatre arts available to the choreographer; provides practical hands-on introduction to systems and equipment; and provides vocabulary with which the choreographer communicates with designers and technicians. Restricted to dance majors. Prereqs., DNCE 1012 and THTR 1065. Similar to DNCE 2022.

**DNCE 5052 (1-3). Studio Concert.** Restricted to dance majors with 87 credit hours or more.

### Composition

**DNCE 2013-2. Dance Improvisation.** An opportunity for students to develop skills of dance improvisation through the exploration of structured movement problems. Students study selected contemporary dance artists whose work stresses improvisation in performance and/or as a training vehicle. Restricted to dance majors.

**DNCE 2033-3. Beginning Composition.** Introduces the basic elements of dance composition through compositional studies evolved from readings, discussion, and improvisation. Restricted to dance majors.

**DNCE 3043-3. Intermediate Dance Composition.** Opportunity for students to increase knowledge and understanding of dance composition elements as they relate to group forms, theme, development, and phrase manipulation. Prereqs., DNCE 2021 and 2033. Restricted to dance majors.

**DNCE 4013-2. Contact Improvisation.** Contact improvisation is the practice of spontaneously generating movement guided by moment-to-moment physical contact and sharing of weight between two or more dancers. Class work includes contact improvisation skills: rolling, falling, giving and taking weight, and use of momentum and gravity. Skills are developed in both duets and larger groups. Same as DNCE 5013.

**DNCE 4053-3. Advanced Dance Composition.** In-depth approach to composition emphasizing personal invention, solo and group forms; styles based on historical art forms; exploration of the evaluative process. Prereqs., DNCE 3041 and 3043. Restricted to dance majors. Same as DNCE 5053.

**DNCE 5013-2. Contact Improvisation.** Same as DNCE 4013.

**DNCE 5053-3. Advanced Dance Composition.** Same as DNCE 4053.

**DNCE 6073-3. Choreography.** Covers in-depth practical and theoretical approaches to dance composition for graduate students; solo and group forms; and analysis of historical and contemporary dance works. May be repeated up to 6 total credit hours with different instructors. Restricted to graduate students in dance.

### Music

**DNCE 2014-2. Rhythmic Analysis and Accompaniment.** Emphasizes elements of rhythm in relation to dance. Experiences with rhythmic drills, rhythmic notation, and percussion accompaniment for the modern dance class comprise the body of the course. Restricted to dance majors.

**DNCE 3024-2. Musical Resources for Dance.** Surveys basic musical notation and terminology, elements and forms of music, and historical styles, supported by guided listening to representative works within western musical tradition. Special emphasis on 20th century techniques and on the relationship of various music to dance. Restricted to dance majors.

**DNCE 5054-3. West African Music and Dance.** Studies music and dance of selected West African cultures. Uses both the academic inquiry tradition of lectures and research as well as the traditional African methodology of music and dancing. Combines intellectual and creative learning experiences. Enrollment by instructor consent. Same as MUSC 5012.

**DNCE 5064-3. Music and Dance Seminar: Collaboration.** Investigates selected aspects of rhythm, accompaniment, and musical resources for dance and applications to performance, choreography, and teaching. Topics may include movement analysis and rhythmic clarity, self-accompaniment, working with accompanist/composers, relationship of music to dance, and survey of 20th century compositional techniques. Prereq., dance/music experience, or instructor consent. Restricted to graduate students in dance.

### Movement Analysis

**DNCE 1005-3. Movement Awareness and Injury Prevention for the Dancer.** Helps dancers understand the prevention and care of common injuries associated with their art. Through various body therapy techniques, anatomy, and kinesiology, students learn to reduce tension, improve body usage, and enhance their performance. Restricted to dance majors.

**DNCE 4015-3. Movement Analysis.** Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Prereq., DNCE 1005. Restricted to dance majors. Same as DNCE 5015.

**DNCE 5015-3. Movement Analysis.** Restricted to graduate students. Same as DNCE 4015.

### Education

**DNCE 4016-3. Creative Dance for Children.** Methods course for prospective teachers of creative dance for children. Lectures, readings, and laboratory experiences are followed by observation and teaching in primary grades. Restricted to dance majors. Same as DNCE 5016.

**DNCE 4036-3. Methods of Teaching Dance.** Practical experience in teaching modern dance to the young adult follows theoretical grounding in specific teaching methods. Examines values and goals of dance in education and fundamental movement principles as related to the teaching of technique and improvisation. Prereqs., DNCE 2013, 2014, 2033, and 4015. Restricted to dance majors. Same as DNCE 5036.

**DNCE 5016-3. Creative Dance for Children.** Restricted to graduate students. Same as DNCE 4016 with addition of readings and a paper.

**DNCE 5036-3. Methods of Teaching Dance.** Restricted to graduate students in dance. Same as DNCE 4036 with addition of readings and a paper.

**DNCE 6016-2. Teaching Lab: Modern Dance.** Provides opportunity to apply principles and skills introduced in DNCE 5036. Participating students share the responsibility for teaching a lab class that meets twice a week. Focuses on analysis and evaluation of teaching skills. Restricted to graduate students.

**DNCE 6056-2. Dance Administration.** Examines current trends, issues, and problems of dance at colleges, in secondary education, in the community, and in professional dance. Explores curriculum development and educational dance trends along with other topics such as freelance work, grant writing, and dance advocacy. Restricted to graduate students in dance.

## History

**DNCE 4017-3. History and Philosophy of Dance.** Studies dance as a social, economic, and artistic force from primitive times to the early 1900s, emphasizing the development of dance as a theatre art in western civilization. Restricted to students with 57 credit hours or more. Same as DNCE 5017.

Approved for arts and sciences core curriculum: literature and the arts.

**DNCE 4027-3. Dance in the 20th Century.** Covers the development of modern dance and ballet from 1900 to the present through lectures, discussions, critical reviews, and films. Restricted to dance majors. Same as DNCE 5027.

**DNCE 5017-3. History and Philosophy of Dance.** Restricted to graduate students. Same as DNCE 4017 with addition of graduate papers and/or a project.

**DNCE 5027-3. Dance in the 20th Century.** Restricted to graduate students. Same as DNCE 4027 with addition of graduate papers and/or a project.

## Performance

**DNCE 1908-1. Performance Practicum.** Students learn and perform a dance choreographed by a faculty member for an informal and/or formal presentation. May be repeated up to 3 total credit hours.

**DNCE 2098-1. Performance/Repertory.** Students learn and perform dances from the repertory of guest artists. Offered summers only. May be repeated up to 3 total credit hours.

**DNCE 4018-2. Performance Improvisation Techniques.** Explores movement and vocal improvisational techniques to enhance creative and performance skills. Helps individuals discover and make accessible the diversity of the human instrument and develops practical tools to broaden expressive range. Enrollment by instructor consent. Same as DNCE 5018.

**DNCE 4038 (1-3). Dance Repertory.** Learning and performing dances from the repertory of current faculty members, artists-in-residence, and upon occasion from the repertory of historic modern dancers. Dance majors may repeat up to 6 total credit hours with different instructors. Enrollment by audition only. Same as DNCE 5038.

**DNCE 4128-1. Pointe and Variation.** For the more advanced classical ballet student. Entails working on pointe and learning dances from Classical, Romantic, and Neo-Classical ballets. Enrollment by audition only. May be repeated up to 2 total credit hours. Same as DNCE 5128.

**DNCE 5018-2. Performance Improvisation Techniques.** Restricted to graduate students. Same as DNCE 4018 with the addition of written analysis and creative assignments.

**DNCE 5038 (1-3). Dance Repertory.** Same as DNCE 4038 except graduate students are required to keep a log of the learning process involved in repertory to document and analyze each work in terms of stylistic differences, musical/sound accompaniment and trends. Dance majors may repeat up to 6 total credit hours with different instructors. Enrollment by audition only. Restricted to graduate students.

**DNCE 5048 (1-4). Touring Dance Ensemble.** May be repeated up to 8 total credit hours.

**DNCE 5128-1. Pointe and Variation.** By audition only. Students should have previous experience. Restricted to graduate students. May be repeated up to 2 total credit hours. Same as DNCE 4128.

## Philosophy and Independent Study

**DNCE 1029-3. Introduction to World Dance and Culture.** Introduces non-Western dance that demonstrates an appreciation for dance throughout the world. This world view of dance is studied as a universal, historical, cross-cultural art form through the process of research, interpretation, criticism and creative activity. Approved for arts and sciences core curriculum: literature and the arts.

**DNCE 1849 (1-3). Independent Study.** Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Freshman level course. May be repeated up to 7 total credit hours. Same as DNCE 2849, 3849, 4849, 5849.

**DNCE 2849 (1-3). Independent Study.** Same as DNCE 1849, at the sophomore level.

**DNCE 3029-3. Looking at Dance.** Examines the inner workings of the art of dance from the varying perspectives of audience, performer, and choreographer. Encourages a more informed, and therefore a more responsive, viewing of dance as an art form. Approved for arts and science core curriculum: literature and the arts.

**DNCE 3849 (1-3). Independent Study.** Same as DNCE 1849, at the junior level.

**DNCE 4849 (1-3). Independent Study.** Same as DNCE 1849, at the senior level.

**DNCE 4909-2. Problems in Dance.** Explores current topics and research in relation to teaching methods, performance, and criticism that the normal sequence of offerings may not allow. May be repeated up to 7 total credit hours. Same as DNCE 5909.

**DNCE 4919 (1-3). Dance Practicum.** Project in dance under supervision of senior faculty. May be repeated up to 3 total credit hours. Same as DNCE 5919.

**DNCE 4939 (1-3). Dance Internship.** Provides an opportunity for upper-division dance majors to serve apprenticeships in the community in work areas related to their major interests and career goals. Internships are available in areas such as arts administration, dance therapy, and technical production. Prereqs., 30 credit hours in dance.

**DNCE 5849 (1-3). Independent Study.** Same as DNCE 1849, at the graduate level.

**DNCE 5909-2. Problems in Dance.** Same as DNCE 4909.

**DNCE 5919 (1-3). Dance Practicum.** Same as DNCE 4919.

**DNCE 6009-1. Research Strategies and Techniques.** Restricted to graduate students. Same as THTR 6009.

**DNCE 6019-3. Readings in Dance.** Surveys dance literature including an opportunity for graduate students to familiarize themselves with resources, current publications, theoretical materials, and professional organizations in dance. Restricted to graduate students in dance.

**DNCE 6049-3. Seminar: Dance.** Intensive study of selected topics related to the art of dance, dance criticism, dance aesthetics, and dance in relationship to the other arts (performing and visual) with an emphasis on contemporary trends. Restricted to graduate students in dance.

**DNCE 6919 (1-3). Directed Studies.** Explores advanced topics in dance not regularly covered in the curriculum of the graduate program. May be repeated up to 6 total credit hours. Restricted to graduate students.

**DNCE 6949 (1-4). Candidate for Degree.**

**DNCE 6959 (1-4). Master's Thesis.**

**DNCE 6969 (3-6). The Graduate Project.** Provides the opportunity for synthesizing the graduate experience through the execution of a project related to the student's major area of interest. Project must be approved by the graduate faculty advisor.

## Western American Studies

**CAMW 2001-3. The American West.** Students tour the cultural, social, and natural features of the American West, based on readings and presentations by guest faculty from across disciplines. Designed as the foundation course in the Western American Studies certificate program. Approved for arts and sciences core curriculum: United States context.

**CAMW 4001-3. Seminar on the American West.** Interdisciplinary capstone seminar for the Western American Studies certificate program, taught by faculty teams. Applies a selected natural science, social science, or humanities topic to the American West and addresses how westerners can make and sustain viable landscapes and communities. Recommended prereqs., CAMW 2001 and completion of Western American Studies certificate electives. Approved for arts and sciences core curriculum: critical thinking.

**CAMW 4840 (1-3). Independent Study: The American West.** Prereqs., CAMW 2001; junior or senior standing.

## Women's Studies

**WMST 2000-3. Introduction to Feminist Studies.** Examines women's roles from interdisciplinary and cross-cultural perspectives with a goal of evaluating theoretical explanations for the differential access to power among men and women. Also examines the intersection of gender, race, and class through topics such as psychology, sociology, work and the economy, history, and social change. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: cultural and gender diversity.

**WMST 2020-3. Social Construction of Femininities and Masculinities.** Examines the impact of race, ethnicity, social class, and sexual orientation on the social construction of femininities and masculinities. Studies key issues as they arise over the course of the life cycle, e.g., sexual identity, work/family conflicts, violence, dating, and relationships, etc. Approved for arts and sciences core curriculum: cultural and gender diversity.

**WMST 2050-3. Women and Society.** Examines theories that explain the social construction of gender and the subordination of women in a multicultural context. Topics include women of color and feminism, language constructs, and women in developing countries. Approved for arts and sciences core curriculum: cultural and gender diversity.

**WMST 2400-3. History of Women and Social Activism.** Provides a survey of U.S. history through the eyes of women activists. Combines readings in history, autobiography, and literature to examine women's impact on social, political, and cultural change in the U.S. Moves chronologically to discuss colonization, slavery, immigration, urbanization, socialism, suffrage, workers' rights, art activism, civil rights movements, and contemporary feminisms. Recommended prereq., WMST 2000 or 2600. Approved for arts and sciences core curriculum: United States context.

**WMST 2600-3. Gender, Race, and Class in Contemporary U.S. Society.** Introduces the main forms of domination in U.S. society around gender, class, and race relations. Examines intersections of the relations and influences in institutions and everyday life. Particular attention is given to women of color perspectives and resistance to domination. Approved for arts and sciences core curriculum: contemporary societies.

**WMST 2700-3. Psychology of Contemporary American Women.** Surveys psychological theory and research concerning contemporary American women. Deals with such issues as masculine bias in American culture, sex difference in cognitive functioning and personality, psychological conflict for women between career and home, and, finally, specific areas pertaining to women's mental health. Prereq., WMST 2000 or PSYC 1001. Same as PSYC 2700. Approved for arts and sciences core curriculum: cultural and gender diversity.

**WMST 3000-3. Workplace Diversity.** Addresses issues related to an increasing diversity in society and the workforce and the need for new forms of awareness, knowledge, and competencies. Focuses on four dimensions of diversity: race/ethnicity, gender, sexual orientation, and age. Students are required to examine these issues at four levels: personal, interpersonal, institutional, and cultural. Prereq., WMST 2000 or 2050.

**WMST 3090-3. Critical Thinking in Feminist Studies.** Analyzes the concepts, ideas, arguments, and assumptions that inform major texts in feminist theory through close reading, class discussion, and writing papers. Emphasizes developing reading and writing skills to interpret theoretical arguments. Prereqs., WMST 2000 and junior or senior standing. Approved for arts and sciences core curriculum: critical thinking.

**WMST 3100-3. Feminist Theories.** Explores a variety of alternative systematic accounts of, and explanations for, gender inequities. Social norms of both masculinity and femininity are analyzed in relation to other axes of inequality such as class, sexuality, race/ethnicity, neocolonialism, and the domination of nonhuman nature. Prereq., WMST 2000.

**WMST 3110-3. Feminist Practical Ethics.** Explores a variety of personal and public policy issues in light of basic feminist commitment to opposing women's subordination. Provides students not only with a deeper understanding of the specific issues discussed but also with a sense of the ways in which a principled commitment to feminism may influence and be influenced by prevailing interpretations of contemporary ideals and values (such as freedom, equality, and community). Provides an opportunity to develop skills of critical analysis useful in a wide range of contexts. Prereq., WMST 2000 or 2290, and junior or senior standing. Same as PHIL 3110. Approved for arts and sciences core curriculum: ideals and values or critical thinking.

**WMST 3200-3. Religion and Feminist Thought.** Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity. Prereq., WMST 2000 or WMST/RLST 2800.

**WMST 3210-3. American Indian Women.** Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of indigenous women in mainstream culture. Emphasizes the agency of American Indian women—their persistence, creativity, and activism, especially in maintaining indigenous traditions. Prereq., WMST 2000 or ETHN 2000. Same as AIST 3210. Approved for arts and sciences core curriculum: cultural and gender diversity.

**WMST 3302-3. Facilitating Peaceful Community Change.** Students gain knowledge and skills that enable them to become effective organizers and facilitators of community goals. Focuses on understanding the processes of community building and fostering grass-roots democracy with a multicultural emphasis. Students are encouraged to apply concepts to life experiences and to examine themselves as potential change agents. Theory and summer experience are integrated. Same as INVS 3302.

**WMST 3300-3. Women and the Legal System.** Explores the role of women in the legal system by looking at women as jurors, witnesses, law students, lawyers, law professors, and judges. Two areas of the law are examined that impact women in particular: divorce and sexual assault. Prereq., WMST 2000 and junior or senior standing.

**WMST 3314-3. Violence Against Women and Girls.** Focuses on aspects of the victimization of women and girls that are "gendered"—namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence. Prereq., WMST 2000. Same as SOCY 3314.

**WMST 3400-3. Gender, Personality, and Culture.** Explores the relationship among gender, culture, and personality. Brings together the disciplines of psychology and sociology in the study of gender and personality formation through investigation of psychoanalytic theory and the social environment. Prereqs., WMST 2000 or 2700, and junior or senior standing.

**WMST 3500-3. Global Gender Issues.** Introduces global gender issues, such as the gendered division of labor in the global economy, migration, women's human rights, environmental issues, gender violence in war, women in the military, nationalism and feminism, and the representation of the Third World in the United States. Offers students the opportunity to broaden their perspectives beyond the borders of the United States. Recommended prereq., WMST 2000, 2050, or 2800.

**WMST 3505-3. Historical and Contemporary Issues of Black Women.** Explores the social, economic, political, historical, and cultural role of African-American women from an interdisciplinary perspective. Prereq., WMST 2000 or BLST 2000. Same as BLST 3505.

**WMST 3600-3. History of Latinas: Social Movements and Art Activism.** Drawing from work produced by and about Latinas, discusses the social and cultural construction of race and ethnicity, the function of nationalism, the politics of migration and citizenship, Latina literary production and theory, historiographical trends, Latina feminist theory, activism and the academy, and Latina/o political organizing. Prereq., WMST 2000 or 2600.

**WMST 3656-3. History of Women in Progressive Social Movements.** Explores women's involvement in the United States, in international peace, feminist, and civil rights movements of the 19th and 20th centuries. Teaches research methods by using a variety of primary and secondary sources and writing an original research paper. Prereq., WMST 2000 or HIST 1015 or 1025. Same as HIST 3656. Approved for arts and sciences core curriculum: critical thinking.

**WMST 3700-3. Topics in Women Studies.** Examines selected topics in women studies. Content varies by semester and reflects relevant contemporary issues in women studies scholarship, e.g., women working, women and health, mothers and daughters in literature, and women, war, and peace in literature. Prereq., WMST 2000 or 2600. May be repeated up to 6 total credit hours for different topics.

**WMST 3710-3. Topics in Global Studies.** Content varies by semester and reflects relevant issues in global feminist scholarship (e.g., women and Islam, or global women writers). May be repeated up to 6 total credit hours. Prereq., WMST 2000 or 2600.

**WMST 3730-3. Third World and the Politics of Development.** Examines women's contributions to household and national economies. Includes women in the home and the work force, women in agricultural production, women's health as a development concept, migration and urbanization, women and education, political and historical aspects of development, and the status of women, development policy, and planning. While the course examines women in general, it focuses primarily on African women. Prereq., WMST 2000 or 2600 and junior or senior standing.

**WMST 3800-3. Advanced Writing in Feminist Studies.** Offers expository writing training in analytical and descriptive skills, structures of argument, critical thinking, the rhetoric of persuasion, and the development of a personal voice. Readings and papers focus on basic issues in gender studies. Prereq., WMST 2000 and junior or senior standing. Approved for arts and sciences core curriculum: written communication.

**WMST 3900-3. Asian American Women: Historical and Contemporary Issues.** Drawing from work produced by and about Asian American women, examines historical and contemporary issues including representation of Asian American women, identity politics, feminism, coalition building, and activism for social change. Prereq., WMST 2000 or 2600, AMST 2000, or ETHN 1015. Same as AAST 3900, AMST 3900. Approved for arts and sciences core curriculum: U.S. context.

**WMST 3930 (1-6). Women Studies Internship.** Matches selected students with supervised internships in local businesses and human service and government agencies. Internships focus on women's issues (e.g., affirmative action, services to abused women). Students meet a minimum of twice monthly with the instructor, keep a journal, and submit a final paper. May be repeated up to 6 total credit hours. Prereqs., 6 hours of course work in WMST and 30 cumulative credit hours.

**WMST 4000-3. Senior Seminar: Special Topics.** Provides an advanced interdisciplinary course organized around specific topic, problem, or issue relating to women in culture and society (such as feminist theology, women and the law, and the social psychology of women). Course work includes discussion, reading, and written projects. May be repeated up to 6 total credit hours for different topics. Prereqs., WMST 2000 and junior or senior standing.

**WMST 4020-3. Senior Research Seminar.** Allows for group work on research projects related to women (such as oral histories of women in management). Introduces students to basic research techniques, develops research skills, and contributes to knowledge of contemporary and historical Rocky Mountain women. May be repeated up to 7 total credit hours. Prereqs., WMST 2000 and junior or senior standing.

**WMST 4200-3. Contemplation, Poetry, and Self.** This interdisciplinary course focuses on contemplative practices across several spiritual traditions, ecstatic poetry—poetry that describes mystical states—and historic and contemporary ideas of self, including the gendered self, as articulated in Eastern and Western philosophy, psychology, and literature. Same as ENGL 4200.

**WMST 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of homosexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as ENGL/LGBT 4287.

**WMST 4300-3. International Sex Trade.** Studies the commercial trade of sexual labor in the global economy, examining theories and assumptions about sexual-economic exchanges and gendered and racialized relations of power in the sex trade. Emphasizes prostitution. Recommended prereq., WMST 2600 or 3100.

**WMST 4636-3. Lesbian and Gay History: Culture and Politics and Social Change in the U.S.** Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the U.S. through investigation of lesbian and gay identity formation, community development, politics, and queer cultural resistance. Prereqs., WMST 2000 and 2600, and junior or senior standing. Same as HIST 4636.

**WMST 4700-3. Women and Mental Health.** Examines mental health issues of women by focusing on theories of female personality development. Looks at theory and research pertaining to women and psychopathology and to women as patients in traditional and nontraditional forms of treatment. Prereq., WMST/PSYC 2700 or WMST 2000. Same as PSYC 4700.

**WMST 4800-3. Capstone Seminar.** Encourages students to sum up, evaluate, and develop a project based on their experiences as women's studies majors. Students collect materials from their previous women's studies courses and write a narrative that describes the process of their learning and evaluates that process. They complete a project that extends their previous work, and then present their projects to other members of the class. Prereqs., senior standing and women's studies major.

**WMST 4840 (1-6). Independent Study.** May be repeated up to 7 total credit hours.

**WMST 4950-3. Honors Research.** For qualified WMST majors working on the research phase of departmental honors. Prereq., junior/senior standing and 3.30 overall GPA.

**WMST 4999 (1-3). Senior Honors Thesis.** Qualified women's studies majors may write an honors thesis, an in-depth research paper, on a topic of choice. Thesis hours available to majors only after successfully completing the research phase.

**WMST 5010-3. Feminist Methodology.** Explores themes that emerge in research across a range of disciplines. They include experience and interpretation, the social position of the researcher, language and argument structure, knowledge and power, bias and objectivity, and the ethics and politics of research. Required for WMST graduate certificate.

**WMST 5090-3. Feminist Theories.** Begins with a reconsideration of the 19th century antecedents of contemporary Anglophone feminist theory, but primary focus on debates of the last 25 years. Theme throughout is gender, how gender should be understood, and how it interrelates with our understandings of class, race, embodiment, sexuality, and knowledge. Required for WMST graduate certificate. May be repeated up to 6 total credit hours.

## Crosslisted Courses by Discipline:

### Art and Art History

**WMST 4769-3. Gender Studies in Early Modern Visual Culture.** Approved for arts and sciences core curriculum: cultural gender and diversity or critical thinking. Same as ARTH 4769.

### Chicano Studies

**WMST 3135-3. Chicana Feminisms and Knowledges.** Provides insight into the present socioeconomic condition of Mexican American women and the concept of *femenismo* through interdisciplinary study of history, sociology, literary images, and film portrayals. Prereq., WMST 2000 or 2600. Same as CHST 3135. Approved for arts and sciences core curriculum: cultural and gender diversity.

### Classics

**WMST 2100-3. Women in Ancient Greece.** Same as CLAS 2100.

**WMST 2110-3. Women in Ancient Rome.** Same as CLAS 2110.

### English

**WMST 1260-3. Introduction to Women's Literature.** Same as ENGL 1260.

**WMST 3267-3. Women Writers.** Same as ENGL 3267.

**WMST 4277-3. Topics in Women's Literature.** Same as ENGL 4277.

### Ethnic Studies

**WMST 3670-3. Immigrant Women in the Global Economy.** Same as ETHN 3670, CHST 3670, and AAST 3671.

### Geography

**WMST 3672-3. Gender and Global Economy.** Same as GEOG 3672.

### History

**WMST 4063-3. Women in Victorian England.** Same as HIST 4063.

**WMST 4614-3. Women and Society in Industrial Europe.** Same as HIST 4614.

**WMST 4616-3. History of Women in the United States to 1890.** Same as HIST 4616.

**WMST 4619-3. Women in Asian History.** Same as HIST 4619.

**WMST 4626-3. History of Women in the United States since 1890.** Same as HIST 4626.



**Honors**

**WMST 3004-3. Women in Education.** Same as HONR 3004.

**LGBT Studies**

**WMST 2030-3. Introduction to Lesbian, Gay, Bisexual, and Transgender Studies.** Same as LGBT 2000.

**Philosophy**

**WMST 2290-3. Philosophy and Women.** Same as PHIL 2290.

**Political Science**

**WMST 4271-3. Sex Discrimination: Constitutional Issues.** Same as PSCI 4271.

**WMST 4291-3. Sex Discrimination: Federal and State Laws.** Same as PSCI 4291.

**Religious Studies**

**WMST 2800-3. Women and Religion.** Same as RLST 2800.

**Russian**

**WMST 4471-3. Women in 20th Century Russian Culture.** Same as RUSS 4471.

**Sociology**

**WMST 1006-3. The Social Construction of Sexuality.** Same as SOCY 1006.

**WMST 1016-3. Sex, Gender, and Society 1.** Same as SOCY 1016.

**WMST 3012-3. Women, Development, and Fertility.** Same as SOCY 3012.

**WMST 3016-3. Marriage and the Family in the United States.** Same as SOCY 3016.

**WMST 3044-3. Race, Class, Gender, and Crime.** Same as SOCY 3044.

**WMST 4016-3. Sex, Gender, and Society 2.** Same as SOCY 4016.

**WMST 4086-3. Family and Society.** Same as SOCY 4086.

**Theatre**

**WMST 4041-3. Women and Theatre of the 20th Century.** Same as THTR 4041.

**Writing and Rhetoric, Program for**

**WRTG 1100-4. Extended First-Year Writing and Rhetoric.** Extended version of WRTG 1150 that carries an additional hour of credit and is intended for students desiring more preparation and practice in college writing. Meets the same goals as WRTG 1150. Features required out-of-class work in the Writing Center. Focuses on critical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated for a total of 8 credit hours. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**WRTG 1150-3. First-Year Writing and Rhetoric.** Rhetorically informed introduction to college writing. Focuses on critical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated for a total of 6 credit hours. Meets MAPS requirement for English. Same as UWRP 1150. Approved for arts and sciences core curriculum: written communication.

**WRTG 1250-3. Advanced First-Year Writing and Rhetoric.** Advanced version of WRTG 1150 intended for more experienced writers, this course meets the same goals as WRTG 1150, but at a more challenging level. Taught as a writing workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated for a total of 6 credit hours. Meets MAPS requirement for English. Same as UWRP 1250. Approved for arts and sciences core curriculum: written communication.

**WRTG 1840 (1-3). Independent Study in Writing.**

**WRTG 3007-3. Writing in the Visual Arts.** Enables art and art history majors to improve their writing skills through organization, presentation, critique, and revision. Writing assignments include formal writing (analysis and argument), informal writing, and grant proposals. Prereq., junior or senior standing. Formerly FINE 3007. Approved for arts and sciences core curriculum.

**WRTG 3020-3. Topics in Writing.** Through sustained inquiry into a selected topic or issues, students practice advanced forms of academic writing. The course emphasizes analysis, criticism, and argument. Taught as a writing workshop, the course places a premium on substantive, thoughtful revision. May be repeated for a total of 6 credit hours. Restricted to arts and sciences juniors and seniors. Same as NRLN 3020 and UWRP 3020. Approved for arts and sciences core curriculum: written communication.

**WRTG 3030-3. Writing on Science and Society.** Through selected reading and writing assignments, students examine ethical and social issues that arise within the decision-making process associated with science and technology. Focuses on critical thinking, analytical writing, and oral presentation. Taught as a writing workshop, the course emphasizes effective communication with both professional and nontechnical audiences. May be repeated for a total of 6 credit hours. Restricted to junior and senior engineering students and junior and senior physical and biological science majors. Same as UWRP 3030. Approved for arts and sciences core curriculum: written communication.

**WRTG 3040-3. Writing on Business and Society.** Through selected reading and writing assignments, students examine ethical and social issues that arise within the decision-making process associated with business and industry. Focuses on critical thinking, analytical writing, and oral presentation. Taught as a writing workshop, the course emphasizes effective communication with both professional and nontechnical audiences. May be repeated for a total of 6 credit hours. Restricted to junior and senior business students and junior and senior economics and IAFS majors. Same as UWRP 3040. Approved for arts and sciences core curriculum: written communication.

**WRTG 3090 (1-3). Open Topics in Writing: Advanced.** Advanced topics course providing intensive, specialized writing instruction in selected topics. Check with the program for semester offerings. May be repeated up to 6 total credit hours if the topics are different. Prereqs., WRTG 3020, or 3030, or 3040, or instructor consent.

**WRTG 3840 (1-3). Independent Study.** May be repeated up to 8 total credit hours.

**WRTG 5050-3. Graduate Composition: Special Topics in Writing.** Topic-oriented graduate courses for students engaged in writing theses, articles, or applications for grant support. Students are taught how to temper the jargon of academic prose, so that their writing is clear without being elementary, and concise without being elliptical. The courses do not apply to the minimum number of hours required for graduate degrees on the Boulder campus. Prereq., instructor consent.

## Accounting

**ACCT 3220-3. Corporate Financial Reporting I.** First of a two-course sequence intended to provide students with increased fluency in the language of business. Focuses on accounting concepts and methods that underlie financial statements and the related implications for interpreting financial accounting information. Prereqs., BCOR 2100 and junior standing.

**ACCT 3230-3. Corporate Financial Reporting II.** Second in a two-course sequence building and extending detailed knowledge of preparation, analysis, and use of financial statements. Prereqs., ACCT 3220 and junior standing.

**ACCT 3320-3. Cost Management.** Provides cost analysis for the support of management decision making. Analyzes activities, cost behavior, role of accounting in planning, financial modeling, and managerial uses of cost data. Prereqs., BCOR 2100 and junior standing.

**ACCT 4240-3. Advanced Financial Accounting.** Examines advanced financial accounting theory and practice, emphasizing accounting for business combinations and consolidations. Prereq., ACCT 3230. Same as ACCT 5240.

**ACCT 4250-3. Financial Statement Analysis.** Focuses on the use of accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes equity valuation and risk analysis. Prereq., ACCT 3220. Same as ACCT 5250.

**ACCT 4330-3. Advanced Cost Management.** Critically analyzes advanced topics in cost management. Uses cases and current readings. Prereq., ACCT 3320. Same as ACCT 5330.

**ACCT 4430-3. Personal Financial Planning.** Provides the concepts, tools, and applications of personal finance and investments. Focuses on individual income taxation and the development of a financial plan to achieve financial goals. Prereq., BCOR 2100.

**ACCT 4440-3. Income Taxation.** Examines concepts and structure of the United States income tax system. Focuses on concepts affecting all taxpayers, with emphasis on business entities. Prereq., ACCT 3220. Same as ACCT 5440.

**ACCT 4540-3. Accounting Information Systems.** Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system. Prereq., ACCT 3220. Same as ACCT 5540.

**ACCT 4620-3. Auditing and Assurance Services.** Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form. Prereq., ACCT 3230. Same as ACCT 5620.

**ACCT 4700-3. International Accounting.** International financial statement analysis, cultural and economic differences that affect financial reporting in various countries. International accounting standards, and accounting for foreign currency transactions. Prereqs., ACCT 3230 and senior standing or instructor consent. Same as ACCT 5700.

**ACCT 4800-3. Accounting for Government and Nonprofit Organizations.** Looks at planning and control of government and nonprofit organizations. Includes program budgets, responsibility accounting, and fund accounting. Prereq., ACCT 3220. Same as ACCT 5800.

**ACCT 4820-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in accounting. Prereq., ACCT 3230. Same as ACCT 5820.

**ACCT 4900 (1-3). Independent Study.** Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors. Departmental form required.

**ACCT 5240-3. Advanced Financial Accounting.** Prereq., ACCT 3230. Same as ACCT 4240.

**ACCT 5250-3. Financial Statement Analysis.** Prereq., ACCT 3220 or equivalent. Same as ACCT 4250.

**ACCT 5330-3. Advanced Cost Management.** Prereq., ACCT 3320. Same as ACCT 4330.

**ACCT 5440-3. Income Taxation.** Prereq., ACCT 3220. Same as ACCT 4440.

**ACCT 5540-3. Accounting Information Systems.** Prereq., ACCT 3220. Same as ACCT 4540.

**ACCT 5620-3. Auditing and Assurance Services.** Prereq., ACCT 3230 or 6220. Same as ACCT 4620.

**ACCT 5700-3. International Accounting.** Prereq., ACCT 3230. Same as ACCT 4700.

**ACCT 5800-3. Accounting for Government and Nonprofit Organizations.** Prereq., ACCT 3220. Same as ACCT 4800.

**ACCT 5820-3. Experimental Seminar.** Prereq., ACCT 3230. Same as ACCT 4820.

**ACCT 6000 (1-4). Academic Internship in Accounting.** Offers students the opportunity to gain professional work experience in an accounting or tax position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes lectures and a course paper. Students may not preregister for this course, and they must contact the director of the concurrent degree program in accounting for approval. Prereq., at least 90 credit hours of course work and a minimum GPA of 3.00, or instructor consent.

**ACCT 6220-3. Corporate Financial Reporting.** Provides an in-depth study of the concepts underlying contemporary financial accounting practice. Includes preparation and analysis of financial statements and the application of concepts to selected current issues. Students with credit for ACCT 3220 and 3230 or equivalents may not receive credit for ACCT 6220. Prereq., MBAC 6020 or equivalent. Same as MBAX 6700.

**ACCT 6250-3. Financial Statement Analysis.** Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes equality analysis. Prereq., MBAC 6020 or equivalent. Same as MBAX 6710.

**ACCT 6260-3. Seminar: Managerial Accounting.** Explores cost management, especially as related to organizational decision making, planning, and control. Emphasizes case analysis and applications. Prereq., ACCT 3320 or equivalent, or instructor consent.

**ACCT 6270-3. Seminar: Income Determination.** Critical analysis of problems and theory of measurement and reporting of periodic net income of business organizations. Net income models, research efforts, and role of professional accounting organizations. Current issues and problems given special attention. Prereq., ACCT 3230 or 6220 or equivalent, or instructor consent.

**ACCT 6350-3. Current Issues in Professional Accounting.** Focuses on application integration and extension of accounting theory and practice. Prereq., ACCT 6220 or equivalent, or instructor consent.

**ACCT 6420-3. Research and Planning in Income Taxation.** Studies and applies the methodology used in tax research and tax planning, with the goal of developing tax research, writing, and planning skills. Prereq., ACCT 5440 or equivalent, or instructor consent.

**ACCT 6430-3. Taxation of Conduit Entities.** Studies federal income taxation of pass-through entities such as are used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests, and liquidation. Prereq., ACCT 5440 or equivalent, or instructor consent. Coreq., ACCT 6420, 6700. Same as LAWS 6167.

**ACCT 6440 (2-3). Tax Policy.** Offers a research seminar exploring policy issues of taxation including recent legislative proposals. Students prepare a publishable research paper on a tax policy topic agreed upon with the instructor. Prereq., ACCT 5440 or equivalent, or instructor consent. Coreqs., ACCT 6420 and 6700.

**ACCT 6450-3. Taxation of Corporations.** Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests, and liquidation. Prereq., ACCT 4430 or instructor consent. Coreqs., ACCT 6420 and 6700. Same as LAWS 6157.

**ACCT 6490-3. Taxation of Natural Resources.** Concerned with tax problems encountered in acquisition, operation, and disposition of natural resource properties. Topics include depletion, lease bonuses, intangible drilling costs, depreciation, and financing arrangements. Prereqs., admission to the graduate tax program, ACCT 5410 or equivalent, or instructor consent.

**ACCT 6500-3. Special Topics in Taxation.** Covers a diverse array of issues in taxation. Highlights areas of current interest and draws on the strengths of leading outside authorities as guest lecturers in various topic areas. Prereq., ACCT 6420 and 6700.

**ACCT 6620-3. Business Risk and Decision Analysis in Auditing.** Explores contemporary issues, historical developments, and selected topics pertinent to business assurance services by independent accountants. Emphasizes improving both the decision behavior of decision makers and the quality of information, or its context, for decision makers. Prereq., ACCT 4620/5620 or equivalent.

**ACCT 6700-4. Income Taxation.** Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual. Prereq., ACCT 5440 or equivalent. Same as LAWS 6007.

**ACCT 6710-3. Federal Estate and Gift Tax.** Analyzes federal estate and gift taxation of inter vivos and testamentary transfers, introduces income taxation of estates and trusts, and involves elementary estate planning. Same as LAWS 7207.

**ACCT 6720-2. Estate Planning.** Discusses problems and solutions for owners of various-sized estates and different types of assets including jointly-held property, stock in closely-held corporations and farms, analysis of federal taxation of generation-skipping transfers in trust, postmortem estate planning, and drafting of trusts and wills. Same as LAWS 7217.

**ACCT 6730-3. Real Estate Planning.** Considers various contemporary legal problems involved in the ownership, use, development, and operation of real estate. Emphasizes the income tax and financing aspects of commercial and residential use and development such as shopping plazas and apartment buildings. Same as LAWS 7204.

**ACCT 6740-3. Business Planning.** Same as LAWS 7211.

**ACCT 6750-3. Taxation of Natural Resources.** Considers the federal income tax aspects applicable to the exploration for, the development of, and the operation of natural resources, as well as the financing thereof. Also considers oil and gas, hard minerals, timber, and water. Offered in alternate years. Same as LAWS 7307.

**ACCT 6780-3. International Taxation.** Covers basic aspects of the United States taxation of income earned abroad by its citizens and the taxation income derived by foreign persons from U.S. sources, including the implications of income tax treaties. Same as LAWS 7617.

**ACCT 6820 (1-3). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in accounting. Prereq. varies.

**ACCT 6900 (1-6). Independent Study.** Requires prior consent of instructor under whose direction study is taken. Departmental form required.

**ACCT 6940 (1-6). Master's Degree Candidacy.** Departmental form required.

**ACCT 6950 (1-4). Master's Thesis.**

**ACCT 7300-3. Doctoral Seminar: Accounting Research 1.** Discusses the nature of scientific theories and the development of modern accounting theory, relating it to theories in economics and finance. Introduces major research areas and research methods relating to accounting. Builds skills for reading and critically evaluating accounting research. Open only to doctoral students.

**ACCT 7320-3. Doctoral Seminar: Judgment and Decision Making.** Introduces the major areas of inquiry in judgment and behavioral decision making research in accounting. Focuses on major theoretical and methodological issues and assesses the practical implications of the research. Prereq., ACCT 7300.

**ACCT 7330-3. Doctoral Seminar: Management Accounting Research.** Presents theoretical foundations (including agency theory, strategic decision making, transaction cost theory, and contingency theory) and empirical tests (including experiments, survey and field studies, and statistical tests of archival data) of current management accounting issues. Prereq., ACCT 7300.

**ACCT 7340-3. Doctoral Seminar: Accounting and Capital Markets.** Examines contemporary research evaluating the role of accounting information in capital markets. Emphasizes development of skills for critically evaluating and conducting research aimed at better understanding the relation between accounting information and firm value. Prereq., ACCT 7300.

**ACCT 7800-3. Doctoral Seminar: Proseminar in Accounting.** Provides students with an orientation to the accounting academic profession. Introduces leading accounting research and researchers. Provides guidance for critically evaluat-

ing research, choosing a dissertation topic, and developing the skills to produce outstanding accounting research and education. Open only to doctoral students.

**ACCT 7830-3. Doctoral Seminar: Accounting Research.** Designed to assist the doctoral student in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in accounting. Special attention given to the development of thesis topics.

**ACCT 8820 (1-6). Graduate Seminar.** Provides opportunity for investigation of new frontiers in accounting through an experimental seminar (offered irregularly). Prereq. varies.

**ACCT 8900 (1-3). Independent Study.** Requires instructor's consent and departmental form (taught as doctoral seminar).

**ACCT 8990 (1-10). Doctoral Thesis.**

## Business Administration

**BADM 2050-3. Honors/Special Topics.** Variable topics in business, drawing from a variety of disciplines. Prereq., 3.50 minimum cumulative GPA.

**BADM 3820-3. Analysis of Business and Society.** Exposes students to business theory, leadership, team work, and extensive oral and written communication. Stresses the analysis and synthesis of companies and industries with social and corporate responsibility. Training class for the peer teaching associate role for BCOR 1100. Prereqs., BCOR 1100, junior standing, and instructor approval.

**BADM 3830-3. Interpretation of Business and Society.** Requires students to hone leadership skills, present before a large audience, manage a classroom environment and participate in weekly interactions with senior business executives. Students act as peer teaching associates and assume primary responsibility for recitation/discussion sections of BCOR 1100. Prereqs., BADM 3820 and instructor approval.

**BADM 3930 (1-6). Internship.** Student training and participation in government or industry environment under faculty supervision. Prereqs., BCOR 1000, 2000, 2010, 2050, GPA 2.50, junior standing and instructor consent.

**BADM 4820-3. Special Topics.** Variable topics in business drawing from a variety of business disciplines.

## Business Core

**BCOR 1000-3. Business Computing Skills.** Focuses on the development of business computing skills while introducing important concepts and principles related to working smart in a networked world. The skills component of the course focuses on use of productivity tools such as operating systems, word processing, spreadsheets, presentation packages, and databases. Teaches students how to explore and use the global Internet with a variety of tools. Covers applications in accounting, finance, marketing, management, and information systems. Lectures and labs.

**BCOR 1100-3. Profiles in Business and Society.** Develops a strong understanding of business with a focus on corporate and social responsibility. Weekly visits by senior executives in for profit and not for profit companies. Executives bring reality into the classroom and offer students a wealth of valuable information on how to manage/lead a business, manage a career, balance a life, and be successful. Weekly recitations include discussions on diversity, environmentalism, volunteerism, and ethics, as well as current business and academic topics.

**BCOR 2000-4. Accounting and Financial Analysis.** Builds a basic understanding of how information regarding a firm's resources and obligations is conveyed to decision makers both outside and within the firm. Prereq., sophomore standing.

**BCOR 2010-3. Business Statistics.** Covers descriptive statistics, basic probability theory, statistical inference, correlation and regression analysis, and time series analysis. Uses statistical features of commonly used business spreadsheet software. Students use this software to solve problems using real business data. Prereqs., MATH 1071 or 1081 and BCOR 1000.

**BCOR 2050-3. Fundamentals of Marketing.** Examines how activities in organizations provide value to the purchasers of its products and services. Includes gathering information about consumers and competitors through research and information systems, applying knowledge and technology to the design of products and services, communicating information to consumers and organizational units, and pricing and distributing products and services. Also in-

cludes issues in global marketing, ethics and diversity, relationship marketing, and integrating marketing with financial analyses. Coreq., second semester of ECON series and sophomore standing.

**BCOR 2100-3. Introductory Finance.** Emphasizes the concepts and skills needed to make sound financial decisions. Topics include financial statement analysis, time value of money, interest rates, bond valuation and bond markets, stock valuation and stock markets, cost of capital and capital structure, capital budgeting, financial forecasting, and working capital management. Prereqs., BCOR 2000 and 2010, or ECON 2010 or 2020. Coreq., second semester ECON series.

**BCOR 2150-3. Adding Value with Management.** Focuses on how modern business firms compete in the global marketplace by adding value. Examines the value-chain of a firm and how firms use people, organizations, operations, and information systems to compete and win in world markets. Also covers contemporary issues such as total quality management, process reengineering, teams and team building, employee empowerment, and horizontal organizations.

**BCOR 3000-3. Business Law, Ethics, and Public Policy.** Surveys major topics and case studies in business law, business ethics, and government policy. Students spend approximately five weeks on each subject. Business law topics include the American legal system; constitutional law; and the fundamentals of contracts, criminal law, torts, and business entities. Ethics topics include the theory of ethics, legal versus moral issues, theories of justice, and practical issues including the rights and duties of the corporations and stakeholder theory. Public policy topics include the roles of business and government, types of government intervention, and the nature and theory of governmental policy formulation. Prereq., junior standing.

**BCOR 4000-3. Business Senior Seminar in Business and Society.** Investigates the relation between business and society by drawing on theories from ethics, sociology, economics, political science, and philosophy, and applying these theories to specific business contexts. Separate sections are offered in the following business disciplines: accounting, finance, management, marketing, and systems. Prereq., senior standing, four upper-division business courses, and additional section-specific requirements.

## Business Economics

**BECN 4100-3. Business and Government.** Studies government and its role in a market system. Topics include regulation, antitrust, and other economic policies that affect business, labor, and consumers. Prereqs., BCOR 2100, 2150, 3000. Restricted to students with a minimum of 52 credit hours.

**BECN 4200-3. Business and Society.** Special topics on business ethics and business social responsibilities. Prereqs., BCOR 2100, 2150, 3000. Restricted to students with a minimum of 52 credit hours.

**BECN 5080-3. Economic Theory and Application for Managers.** Introduction to micro- and macroeconomic theory for MBA candidates. No credit for students with credit in ECON 2010 and 2020. Open only to graduate degree candidates.

**BECN 6110-3. Public Policies toward Business.** Instructs students in the various roles of business and government in helping societies attain their goals. Examines various roles and functions of government, business, and the markets. Integrates case issues into substantive law areas involving ethical dilemmas that managers are likely to face.

## Business Law

**BSLW 4120-3. Advanced Business Law.** Continuation of BCOR 3000. Covers secured transactions, agency, creditor's rights, partnerships, corporations, suretyship, guarantees, and other advanced topics in legal and regulatory environments. Prereqs., BCOR 3000 and junior standing. Same as BSLW 5120.

**BSLW 4820 (1-3). Topics in Business Law.** Experimental course offered irregularly for purpose of presenting new subject matter in business law.

**BSLW 4900 (1-3). Independent Study.**

**BSLW 5120-3. Advanced Business Law.** Same as BSLW 4120.

**BSLW 6900 (1-6). Independent Study.**

## Business Policy and Strategy Management

**BPOL 7500-3. Doctoral Seminar: Strategic Management 1.** Provides an overview of the literature, including classic articles and books, in business strategy and policy (strategic management). Brings the student up to date on schools of thought, research issues, and practical applications in strategic management.

**BPOL 7530-3. Doctoral Seminar: Strategic Management 2.** Continuation of BPOL 7500. Prereq., BPOL 7500.

**BPOL 7560-3. Entrepreneurship, International Business and Technology Management.** Provides doctoral students with an understanding of strategic management and entrepreneurship theory, as applied to international business and technology management literatures. Additionally, students are exposed to research methods in the strategy and entrepreneurship arenas. Prereqs., BPOL 7500 and 7530.

**BPOL 8900 (1-3). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**BPOL 8990 (1-10). Doctoral Thesis.**

## Entrepreneurship and Small Business Management

**ESBM 3700-3. Entrepreneurial Environments.** Overview of entrepreneurship, addresses topics such as opportunity recognition, sources of funding, alternative entrepreneurship such as franchising and corporate entrepreneurship, and managing rapid growth. Prereqs., BCOR 2000, 2050, 2100, 2150, and junior or senior standing.

**ESBM 4570-3. Entrepreneurial Finance.** Focuses on the financial concepts, issues, methods, and industry practices relevant to entrepreneurial decision makers. Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering. Provides an understanding of the segments of the capital markets specializing in start-ups and growth financing. Prereq., BCOR 2100.

**ESBM 4820-1. Engineering Entrepreneurship.**

**ESBM 4830-3. Entrepreneurship Business Planning and Preparation.** In-depth preparation for writing a business plan for a new business venture. Prereqs., ESBM 3700 and 4570.

**ESBM 4900-3. Projects in Entrepreneurial Companies.** Complete projects in preselected entrepreneurial companies. Prereq., instructor consent.

## Finance

**FNCE 3010-3. Corporate Finance.** Covers the theory and practices governing the management of capital in a business firm. Examines the determinants of capital requirements, methods of obtaining capital, problems of internal financial management, and methods of financial analysis. Prereq., BCOR 2100.

**FNCE 3020-3. Financial Markets and Institutions.** Examines the economics of financial markets and the management of financial institutions, both domestic and international. Topics include an overview of U.S. and international financial markets, pricing and risk factors, interest rates, markets for securities and financial services, and markets for derivative financial instruments. Prereq., BCOR 2100.

**FNCE 4000-3. Financial Institutions Management.** Analyzes the structure, markets, and regulations of financial institutions. Studies problems and policies of internal management of funds, loan practices and procedures, investment behavior, deposit and capital adequacy, liquidity, and solvency. Prereqs., FNCE 3010 and 3020.

**FNCE 4020-3. Applied Business Finance.** Develops analytical and decision making skills in the context of problems that confront financial management. Topics include planning, control, and financing of current operations and longer term needs, expansion, leasing, valuation, and capital structure policies. Uses a combination of lecture and cases. Prereqs., FNCE 3010 and 3020.

**FNCE 4030-3. Investment and Portfolio Management.** Develops modern portfolio theory and applies it to pricing both individual assets and portfolios of assets. Topics include Markowitz portfolio selection model, capital asset pricing

model, arbitrage pricing theory, options, futures, bonds, portfolio performance measurement, and issues of market efficiency. Prereqs., FNCE 3010 and 3020.

**FNCE 4040-3. Derivative Securities.** Develops the modern theory of contingent claims in a mathematical framework oriented toward applications. Examines how to use derivatives for risk management and to tailor portfolio payoffs. Provides an in-depth analysis of the properties of options. Prereqs., FNCE 3010 and 3020.

**FNCE 4050-3. Capital Investment Analysis.** Focuses on capital budgeting and investment issues. Emphasizes issues relating to cash flows, capital rationing, the investment versus financing decision, leasing, fluctuating rates of output, investment timing, capital budgeting under uncertainty, and investment decisions with additional information. Prereqs., FNCE 3010 and 3020.

**FNCE 4060 (1-6). Special Topics in Finance.** Presents new subject matter in finance. The summer offering is the London Seminar in International Finance and Business. Prereqs. vary depending upon course offering. See advising office.

**FNCE 4820 (1-3). Experimental Seminar.** Offered irregularly to provide opportunity for investigation into new frontiers in finance. Prereq., instructor consent.

**FNCE 4900 (1-6). Independent Study.** Intended only for exceptionally well qualified business seniors. Prereq., prior consent of dean and instructor under whose direction study is taken, and departmental form.

**FNCE 6820 (1-3). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.

**FNCE 6900 (1-6). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**FNCE 6950 (3-6). Master's Thesis.**

**FNCE 7100-3. Doctoral Seminar: Finance Theory.** Develops the foundations for the study of modern financial economics by analyzing individuals' consumption and portfolio decisions in the context of risk and then traces the implications to market valuation of traded securities. Topics include the meaning and measurement of risk, portfolio theory, the Capital Asset Pricing Model, and arbitrage pricing arguments like those employed in Modigliani and Miller's capital structure theory and the Black-Scholes option pricing model.

**FNCE 7200-3. Doctoral Seminar: Empirical Research Methods in Finance.** Develops an understanding of current empirical methods used to examine research issues related to corporate finance and the capital markets.

**FNCE 7330-3. Doctoral Seminar: Corporate Finance, Theoretical, and Empirical Issues.** Develops and examines theories and issues in corporate finance. Topics may include corporate control, capital structure, financial signaling, and payout policy.

**FNCE 7550-3. Doctoral Seminar: Special Topics in Finance.** Closely examines areas of specific interest to academic research in finance. Subjects vary and may include game theory, stochastic processes in finance, continuous-time modeling, derivative security pricing, the microstructure of securities markets and financial institutions, innovation, and engineering.

**FNCE 7800-3. Doctoral Proseminar: Finance.** Provides finance doctoral students with an orientation to the finance field; introduces contemporary research perspectives and priorities. Students discuss papers that illustrate academic researchers' use of various disciplinary theoretical and empirical tools to address finance problems.

**FNCE 7830-1. Doctoral Seminar: Dissertation Research.** Assists doctoral students in integrating courses and fields of study in order to apply their knowledge and skills to problems in finance. Gives special attention to development of thesis topics. Continuous enrollment required of all finance doctoral students while doing course work.

**FNCE 8820-3. Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.

**FNCE 8900 (1-3). Independent Study.** Instructor consent and departmental form required.

**FNCE 8990 (1-10). Doctoral Thesis.**

## International Business

**INBU 4200-3. International Financial Management.** Examines the financial policies and problems associated with firms doing business internationally. Topics include the foreign exchange environment, country risk, managing foreign ex-

change exposure, international working capital management, international capital budgeting, and international financial markets. Prereq., BCOR 2100.

**INBU 4300-3. International Business and Management.** Exposes students to the concerns and management of international activities that fall largely within functional disciplines. Topics might include overseas market assessment and analysis, marketing internationally, export-import procedures. Prereq., BCOR 2150. Offered spring semesters only.

**INBU 4900 (1-12). Independent Study.** Prereq., instructor consent. Departmental form required.

**INBU 5100-3. International Business and Marketing.** Same as MKTG 4400.

## Management

**MGMT 3030-3. Critical Leadership Skills.** Provides an opportunity to learn about and practice the skills required of all managers. These skills include leadership, negotiation, conducting performance appraisals, delegation, effective communication, interviewing and making hiring decisions, and managing employees with problem behaviors. Objectives include developing self-awareness of strengths and weaknesses as a manager, gaining familiarity with theory-based skills, and developing proficiency in the use of these skills. Emphasizes experiential learning through group work, role plays, and case analysis. Prereq., BCOR 2150.

**MGMT 4000-3. Strategic Management.** Surveys the sources of competitive advantage in a global economy. Discusses principles, frameworks, and techniques that help managers and students understand markets and competitive positioning. Focuses on specific company examples. Provides an interdisciplinary team exploration of the evolving strategies across different industries. Cases are formally presented to an executive panel. Prereq., BCOR 2150.

**MGMT 4010-3. Redefining the Employee-Employer Relationship.** Explores developments in such areas as employee relations law and procedures, employee and employer rights, worker involvement programs, environmental safety and health, and the effects of technology on emerging organization forms.

**MGMT 4020-3. Hiring and Retaining Critical Human Resources.** Allows students the opportunity to practice conducting job analyses and then use this information to develop employee selection and performance appraisal systems. Provides thorough coverage of employers' equal employment opportunity and affirmative action obligations, as well as various approaches to gender, cultural, and ethnic diversity.

**MGMT 4030-3. Managing Employee Reward Systems.** Examines theories of work motivation and relates them to the strategic use of compensation and other reward systems. Topics include procedures for managing base pay; linking pay incentives to productivity at the individual, group, and organizational levels; developing cost-effective programs of employee benefits; and the use of nonfinancial reward systems.

**MGMT 4040-3. Individual, Team, and Organizational Development.** Explores how to determine where an organization needs to focus its development efforts, how to develop and deliver an effective training program, and how to evaluate the impact of development programs on organizational effectiveness. Explores individual, team, and organization-wide development, including such topics as skills training, team building, and managing change. Student teams work with local businesses to practice applying the course material to practical problems. Prereq., BCOR 2010.

**MGMT 4070-3. International Operations Management.** Compares systems of production/operations management in the United States with those in Japan, Europe, and Asia. Contrasts various regional and national approaches to business, quality management, labor practices, management styles, international competitiveness, productivity, distribution systems, trade practices, and strategies for penetrating foreign markets. Examines different sociocultural environments, government-business relationships, banking industries, operations strategies, and the potential for transferring industrial management practices and techniques between countries. Prereqs., BCOR 2150.

**MGMT 4080-3. Environmental Operations.** Addresses the increasingly important topic of green operations, and how firms are using environmental awareness to reduce costs, add value, and increase competitiveness. Various approaches to reducing waste-streams are considered, including reuse, recycling, and recovery. Other topics include the role of government regulation and public pressure, comparisons between different national approaches to green operations, individual company programs, and prospects for the future. Prereq., BCOR 2150.

**MGMT 4820 (1-4). Topics in Business.** Experimental course offered irregularly for purpose presenting new subject matter in organization management. Same as MGMT 5820.

**MGMT 4900 (1-3). Independent Study.** Intended only for exceptionally well qualified business seniors. Departmental form required. Prereq., dean and instructor consent.

**MGMT 5820 (1-4). Topics in Business.** Same as MGMT 4820.

## Marketing

**MKTG 3250-3. Buyer Behavior.** Covers both consumer buying behavior and organizational buying behavior. Consumer behavior topics include needs and motives, personality, perception, learning, attitudes, cultural sensitivity, and contributions of behavioral sciences that lead to understanding consumer decision making and behavior. Explores differences between business and consumer markets, business buying motives, the organizational buying center and roles, and the organizational buying process. Required for marketing majors. Prereq., BCOR 2050.

**MKTG 3350-3. Marketing Research.** Explores fundamental techniques of data collection and analysis used to solve marketing problems. Specific topics include problem definition, planning an investigation, developing questionnaires, sampling, tabulation, interpreting results, and preparing and presenting a final report. Required for marketing majors. Prereqs., BCOR 2010 and 2050.

**MKTG 3400-3. Marketing Institutions and Retailing.** Studies macroeconomic foundations of marketing intermediaries, middlemen, and institutional alignments. Emphasizes development and change of institutional structures, functions, and roles played by participants in moving goods to the ultimate consumer, focusing on retailing functions and strategies. Prereq., MKTG 3000.

**MKTG 3500-3. Principles of Advertising.** Analyzes principles and practices in advertising from the executive's viewpoint. Considers whether a firm should advertise; product and market analysis as planning phase of advertising program; media; survey of creation and production of advertisements; advertising budgets, copy testing, and organization. Prereq., MKTG 3000.

**MKTG 3600-6. Marketing Analysis.** Covers key concepts in consumer and industrial buyer behavior and techniques of marketing research. Conceptual topics include consumer needs and motives, personality, perception, learning, attitudes, individual and group decision making, social class, culture, and other contributions of behavioral sciences to the understanding of buyer decision making and behavior. Prereqs., BCOR 2010, 2050, and junior standing.

**MKTG 4150-3. Sales Management.** Explores the selling task and the essentials of managing the sales force. Includes recruiting, selecting and hiring, training, compensating, supervising, and controlling. Covers sales organization, sales planning, sales forecasting, assigning territories, quotas, and sales analysis. Prereqs., MKTG 3250 and 3350.

**MKTG 4250-3. Product Strategy.** Covers major topics in managing long-term customer relationships that derive from products. Focuses on concepts, analyses, and strategies for existing and new products. Topics include product positioning, brand image measurements and brand management, brand equity, conjoint analysis, concept development and testing, and product issues in public policy and ethics. Methods of instruction include lectures, case discussions, student group papers and projects, and examinations. Prereqs., MKTG 3250 and 3350.

**MKTG 4350-3. Services Marketing Strategy.** Designed for those students interested in working in the service industries. Addresses the distinct needs and problems of service organizations in the area of marketing and service quality. Service organizations (i.e., banks, transportation companies, hotels, hospitals, educational institutions, professional services, etc.) require a distinctive approach to marketing strategy—both in its development and execution. Builds and expands on marketing ideas and how to make them work in service settings. Prereqs., MKTG 3250 and 3350.

**MKTG 4400-3. International Marketing.** Describes the economic, geographic, political, and social forces that have shaped and continue to define global markets. Examines topics critical to success in international markets, including assessment of a firm's international capabilities, techniques for gauging the potential of international markets, international segmentation approaches, and alternative arrangements for entering foreign markets. Compares and contrasts product, price, distribution, logistics, promotion, and research decisions made in global versus domestic markets. Introduces students to finan-

cial arrangements characteristic of international marketing, including exchange rates and controls, balance-of-payment principles, import licensing agreements and tariffs. Prereq., BCOR 2050.

**MKTG 4500-3. Advertising Management.** Prereq., MKTG 3500. Same as MKTG 5500.

**MKTG 4550-3. Advertising and Promotion Management.** Analyzes advertising and promotion principles and practices from the marketing manager's point of view. Considers the decision to advertise, market analysis as a planning phase of the advertising program, media selection, public relations, sales promotion, promotion budgets, campaigns, evaluation of results, and agency relations. Prereqs., MKTG 3250 and 3350.

**MKTG 4650-3. Institutional Relationships and Strategy.** Focuses on the management of a firm's relationships with other businesses. Addresses business-to-business marketing strategies, relationships with channel members, and strategic alliances/partnerships. Topics include relationship structures, power, conflict, negotiation, industry analysis, selection of business partners, and managing for long-term stability. Prereqs., MKTG 3250 and 3350.

**MKTG 4800-3. Marketing Policy and Strategies.** Provides students with the insight and skills necessary to formulate and implement sound marketing strategies. Examines pricing strategies, product introduction and innovation strategies, product line management strategies, promotional and product/service communication strategies, and distribution strategies. Capstone marketing course integrates and further develops what students have learned in other courses. Prereqs., MKTG 3250 and 3350, two additional 4000-level marketing courses, and senior standing.

**MKTG 4810-3. Honors Seminar.** Social responsibilities of the business executive, business ethics, business-government relations, and business in literature. Open to seniors who have completed at least 30 semester hours of business courses with not less than a 3.30 GPA and have instructor consent. Prereq., MKTG 3000.

**MKTG 4820-3. Special Topics in Marketing.** Offered irregularly. Provides opportunity for investigation into new frontiers in marketing.

**MKTG 4900 (1-6). Independent Study.** Intended only for exceptionally well qualified business seniors. Prereq., dean and instructor consent.

**MKTG 6900 (1-3). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**MKTG 6940 (1-3). Master's Candidate.** Departmental form required.

**MKTG 6950 (1-6). Master's Thesis.**

**MKTG 7000-3. Seminar in Consumer Behavior.** Studies the nature and determinants of consumer buying behavior. In-depth investigation of contributions of behavioral sciences (especially psychology, sociology, and cultural anthropology) toward understanding consumer behavior. Influence of demographic factors, motivation, personality, culture, and purchasing behavior. Prereq., MKTG 3200 or instructor consent.

**MKTG 7200-3. Experimental Research Methods in Marketing.** Provides a detailed exposure to the design of laboratory/field experiments and quasi-experiments for marketing and consumer research. Emphasizes the choice of design options, data collection methods, statistical analysis, and substantive interpretation of experimental results.

**MKTG 7300-3. Multivariable Methods in Marketing Research.** Includes MANOVA designs, causal models, cluster analysis, discriminant function analysis, factor analysis, and latent structure analysis. Emphasizes computer applications. Prereqs., graduate courses in regression and MANOVA.

**MKTG 7305-3. Qualitative and Survey Research Methods in Business.** Detailed exposure to qualitative and survey research methods in business. Qualitative methods include participant observation, depth interviews, focus-group interviews and ethnography. Survey methods include measurement theory, survey design and sampling, survey implementation, data analysis, and substantive interpretation.

**MKTG 7310-3. Design and Analysis of Experiments in Business.** Detailed exposure to experimental research methods for business applications. Emphasizes the choice of design options, data collection methods, statistical analysis, and substantive interpretation of experimental results.

**MKTG 7400-2. Doctoral Seminar: Channels of Distribution.** Study of marketing literature in channels of distribution. Includes topics of channel structure, channel power, channel conflict and leadership, physical distribution systems, and regulation.

**MKTG 7500-2. Doctoral Seminar: Promotion.** Study of marketing literature dealing with advertising, selling, sales promotion, and sales management. Includes topics of advertising decision models, advertising effects, sales-force performance models, and promotion management.

**MKTG 7600-3. Doctoral Seminar: Services Marketing.** Study of marketing literature dealing with services. Includes such topics as service management, theoretical issues in the study of services, and strategies in travel, tourism, recreation, and financial services industries.

**MKTG 7800-3. Doctoral Proseminar: Marketing.** Provides marketing doctoral students with an orientation to the marketing field and introduces contemporary research perspectives and priorities. Students discuss papers that illustrate academic researchers' use of various disciplinary perspectives to address marketing problems and the range of theoretical and empirical methods used.

**MKTG 7805-3. Doctoral Seminar: Economic and Administrative Science Approaches to Research in Marketing.** Examines marketing management and consumer behavior issues from the vantage of economics and organizational theory. One segment of the course focuses on theoretical and empirical analysis of the means by which utility-maximizing consumers learn about consumption environment and respond to firms' marketing decisions. Another segment examines research on firms' competitive strategy and marketing mix decisions and explores how organizational sociological factors influence these decisions.

**MKTG 7810-3. Doctoral Seminar: Psychological Approaches to Research in Marketing.** Examines the basic psychological processes that underlie common marketing phenomena. Topics include memory and judgment, persuasion, attitude-behavior consistency, information processing, automatic and controlled processes, learning, motivation and cognition, social judgment, and the role of affect and mood on judgment. Discusses topics in consumer behavior and marketing management contexts, in conjunction with related methodological issues.

**MKTG 7815-3. Doctoral Seminar: Consumer and Managerial Decision Making in Marketing.** Examines judgment and decision making research pertinent to understanding how consumers and marketing managers make decisions. Uses economic models as a normative backdrop for examining research on decision heuristics, judgment and choice anomalies, and contingent decision behavior. Examines processes of causal judgment and inference and the influence of a variety of contextual factors (including time) on judgment and decision.

**MKTG 7820-3. Doctoral Seminar: Sociological and Anthropological Approaches to Research in Marketing.** Inquires into substantive and methodological issues concerning postmodern consumer research. Attains depth in a few areas while also providing a framework in which to situate other substreams of research. Uses ethnography, semiotics, literary analysis, and other interpretive methods to examine topics such as brand and store loyalty, atmospheric and shopping dynamics, creation of brand meanings, and other marketplace behaviors.

**MKTG 7830-3. Doctoral Seminar: Dissertation Research.** Assists doctoral students in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in marketing. Gives special attention to development of thesis topics.

**MKTG 8820 (1-6). Doctoral Seminar: Special Topics.** Studies marketing literature on a topic or topics selected by instructor. Examples include marketing history, international marketing management, marketing environment, marketing of high technology products, and marketing models.

**MKTG 8900 (1-3) Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**MKTG 8990 (1-10). Doctoral Thesis.**

## Systems Division

**SYST 2010-3. Visual-Language Programming.** Focuses on the programming task of the systems development life cycle. Introduces structured programming techniques in a graphical user interface (GUI) environment. Hands-on portion of course focuses on use of the visual basic development environment, which is taught and practiced by writing program modules to solve prespecified business problems. Prereq., BCOR 1000.

**SYST 2030-3. Introduction to Object-Oriented Programming.** Introduces object-oriented programming. Features advanced topics such as graphics, soft-

ware design using UML, and the object-oriented paradigm. Prereq., at least one programming course such as SYST 2010.

**SYST 3000-3. Systems Thinking.** Introduces systems thinking and the analysis of the interactions of a complex collection of people, processes, organizations, and technologies. Students learn to be creative and critical thinkers who can conceptually model the very complex systems we encounter in our world today.

**SYST 3010-3. Systems Analysis and Design.** Introduces systems planning, analysis and design through the completion of a hands-on project where students interact with a real customer. Very similar to what a systems analyst would do for a real organization. Covers critical thinking, systems strategy, team building, information gathering, and analysis skills, process modeling, interface design, architecture design, and program design.

**SYST 3020-3. Database Design and Inquiry.** Emphasizes the fundamentals of modern database design in the context of large-scale applications. Covers analysis phase activities such as data modeling for requirements analysis. Covers the extended entity-relationship model and the semantic data model in depth. Covers design phase activities such as the normalization criteria of the relational model and transformation from conceptual to physical design. Introduces object-oriented databases. Prereq., one programming course such as SYST 2010.

**SYST 3030-3. Total Quality Systems.** Examines concepts, tools, and techniques used in the management and measurement of quality, productivity, and competitiveness in an international environment. Focuses on how firms add value and compete with quality. Topics include total quality control and management, employee involvement in quality, team building for quality, quality circles, relations between quality, productivity, and competitiveness, and statistical process control. Emphasizes the development of decision making skills through the use of case analysis, field study, consultation with local organizations, and other experimental activities. Prereq., BCOR 2010. Similar to SYST 6030.

**SYST 3050-3. Digital Business Strategies.** Digital refers to the diverse range of emerging disruptive technologies in the media, internet, telecommunications, and e-Business fields. Focuses on an understanding of the skills, tools, business concepts, and strategic and entrepreneurial opportunities, as well as managerial and social issues that surround the emergence of these technologies. Topics involve cases and breaking new stories. Prereq., BCOR 2100 and BCOR 2150.

**SYST 3510-3. World Wide Web Technologies.** Serves as a technical capstone for students in the information systems track. Focuses on solving the complex problems present in systems integration projects that include a mix of legacy software and new commercial software components. Emphasizes developing systems using open Internet standards for the Web. Introduces web servers, Perl, client-side technologies (e.g., JavaScript), server-side technologies (e.g., ColdFusion and CGI), and data structuring technologies (e.g., XML). Prereqs., SYST 3010 and SYST 3020 and at least one programming course such as SYST 2010.

**SYST 4020-3. Advanced Systems Development.** Focuses on the object paradigm, an approach to software engineering that emphasizes increased reliability and extensibility. Emphasizes the fundamentals of object-oriented analysis, design, and implementation as practiced in leading edge organizations. Includes hands-on experience with an object-oriented programming language. Prereqs., SYST 3020 and at least one programming course. Same as SYST 5020.

**SYST 4030-3. Network Design and Management.** Focuses on the network backbone of an organization's information infrastructure that ties various kinds of computers together into a coherent whole. Introduces the component building blocks of network design such as servers, routers, bridges, gateways, transmission media, communication protocols, network operating systems, and middleware. Covers local area networks in some depth and introduces metropolitan and wide-area networks. Also covers data compression, encryption, network security, and performance tuning. Prereqs., SYST 3010 and at least one programming course. Same as SYST 5030.

**SYST 4050-3. Supply Chain Systems.** Introduces the design and analysis of modern production systems in manufacturing, service, and public organizations. Themes include the relationship between productivity and competitiveness, the role of operations in winning competitive advantage, and adding value through improvements in productivity, quality, flexibility, and timeliness. Specific topics may include operations strategy, operations planning, service operations, inventory management, and just-in-time concepts. Prereq., BCOR 2010.

**SYST 4060-3. Business Process Design.** Covers the methods and means by which firms add value and compete by redesigning their key processes. Emphasizes operational planning as an important element of business process

design. Topics include the design of customer service processes (focusing on cycle time reduction), manufacturing and logistic processes (emphasizing lead-time reduction and quality improvement), and the use of technology to support design activities. Graphical discrete-event simulation software is used to model and design business processes and to predict the effect of changes. Prereq., BCOR 2010.

**SYST 4070-3. Decision Modeling Systems.** Systems-oriented survey of management science topics that focus on supporting decision making. Topics include linear and integer programming, network analysis, dynamic programming, nonlinear programming, decision analysis, game theory, Markov chain and Markov decision models, queuing theory, and simulation. Prereq., BCOR 2010.

**SYST 4080-3. Project Management Systems.** Acquaints the student with multidisciplinary aspects of project management, including the relationship between schedule, project cost, and performance. Uses qualitative and quantitative tools to facilitate project management skills. Prereq., BCOR 2010. Same as EMEN 4030.

**SYST 4510-3. Systems Design for Usefulness and Usability.** Serves as a critical thinking capstone for the information systems major. Focuses on not only the design and implementation of a system, but also its usefulness and usability. Examines physical, interface, data, and program designs; performance tradeoffs; and security and control design aspects of systems. Encourages students to think creatively and critically about designing and building information systems. Same as SYST 5510.

**SYST 4820-3. Special Topics in Systems.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in systems.

**SYST 4900 (1-3). Independent Study.** Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well qualified business seniors who desire to study an advanced topic. Departmental form required.

**SYST 5020-3. Advanced Systems Development.** Same as SYST 4020.

**SYST 5030-3. Network Design and Management.** Same as SYST 4030.

**SYST 5510-3. Systems Design for Usefulness and Usability.** Same as SYST 4510.

**SYST 6030-3. Total Quality Systems.** Examines concepts, tools, and techniques used in the management and measurement of quality, productivity, and competitiveness in an international environment. Theme is how firms add value and compete with quality. Emphasizes the development of decision making skills through the use of case analysis. Similar to EMEN 4040/5040, SYST 3030.

**SYST 6070-3. Survey of Operations Research.** Applications oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, decision analysis, Markov chain and Markovian decision models, queuing theory, and simulation. Same as EMEN 5600.

**SYST 6080-3. Operations Management.** Covers demand forecasting, capacity management, scheduling, inventory planning and management, production planning and control, materials requirements planning, just-in-time production systems, product design and process selection, elements of statistical process control, service operations, and quantitative techniques for operations decision making. Similar to EMEN 5500.

**SYST 6420-3. Digital Business Strategies.** Focuses on understanding skills, tools, business concepts, and strategic and entrepreneurial opportunities, as well as managerial and social issues that surround the global information infrastructure and the emergence of electronic commerce. Centers on management of information as a resource and on identification of opportunities to exploit its potential for competitive advantage, with particular emphasis on the role of the Internet. Same as MBAX 6420.

**SYST 7110-3. Simulation Modeling and Analysis.** Introduces the concepts of simulation modeling. Provides practical experience with real examples using popular commercial simulation packages such as Arena or Extend. Emphasizes discrete-event simulation but also covers topics in Monte Carlo simulation and system dynamics. Practical examples from operations management, manufacturing, and services are used to give students an appreciation for the wide scope of application and the robust nature of simulation modeling in the context of decision making.

**SYST 7120-3. Discrete Optimization.** Covers the modeling and solution of discrete problems that arise in business and engineering. Classical techniques such as

cutting planes and branch and bound are covered. Emphasizes the application of metaheuristic procedures, such as tabu search and evolutionary approaches, to the solution of practical combinatorial optimization problems.

**SYST 7330-3. Advanced Operations Management Modeling.** Covers concepts, models, and solution techniques relevant to the management of the processes required to provide goods or services to consumers. Emphasizes supply chain systems topics such as production, inventory, distribution, and scheduling. Management science and operations research methodology is also applied to problems such as facility capacity planning, facility design, and location analysis.

**SYST 7800-3. Doctoral Proseminar in Systems.** Provides systems doctoral students with an orientation to current research and the academic discipline in operations and information systems. Familiarizes students with key schools of thought in the field, provides background on reference disciplines, examines significant research streams, and helps students begin developing their own area of interest.

**SYST 7805-3. Foundations of Research in Information Systems.** Examines foundations of information systems research, including classic readings in information systems and its reference disciplines, different research approaches, processes of research, and classic and contemporary readings in major topics in information systems. Prereq., PhD standing or instructor consent.

**SYST 7810-3. Technical Topics in Information Systems Research.** Examines in depth a selection of topics in technical areas of information systems. Includes theoretical perspectives for technical topics, critical perspectives on past and current research, appropriate methods for examining technical topics, and development of students' ability to identify and develop research topics in technical areas. Prereq., PhD standing or instructor consent.

**SYST 7815-3. Behavioral Topics in Information Systems Research.** Covers both basic and advanced topics. Develops skill in designing, evaluating, and understanding both quantitative and qualitative research methods. Includes the development of research proposals, making and justifying methodological choices, writing research reports, and understanding how to publish in information systems. Prereq., PhD standing or instructor consent.

**SYST 7820-3. Advanced Research in Information Systems.** Examines advanced topics in information systems research, focusing on the electronic era and eBusiness. Examines foundations of eBusiness, including basic technical, organizational, and behavioral foundations. Covers leading edge research from both topical and methodological perspectives. Focuses on methods appropriate for studying eBusiness and examines future research directions. Prereq., PhD standing or instructor consent.

**SYST 8820-3. Graduate Seminar.** Provides opportunity for investigating new frontiers in information systems through an experimental seminar. Offered irregularly.

**SYST 8900 (1-3). Independent Study.** Students must have consent of instructor under whose direction study is taken. Departmental form required.

**SYST 8990 (1-10). Doctoral Thesis.**

## Master of Business Administration Courses

### MBA—Core Courses

*Open only to MBA students. Non-MBA students seeking to enroll in non-core courses must meet the prerequisite requirements and have the consent of both the instructor and the director of the MBA program. Across all business areas, MBA students have enrollment priority for courses with an MBA prefix. Non-MBA students seeking to enroll in the noncore courses must meet the prerequisite requirements. Other elective options for MBA students may be found in the main business course descriptions.*

**MBAC 6000-3. Business and Society.** Investigates the relation between business and society by drawing on theories from ethics, sociology, economics, political science, and philosophy and applying these theories to specific business contexts. Gives managers an understanding of how broader societal issues can affect business decisions. Emphasizes case studies of current business practices.

**MBAC 6010-3. Managerial Economics.** Studies the elements of the business firm's fundamental problem—how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of relevant



concept, primarily through case studies. Differential calculus and statistics are used throughout the course.

**MBAC 6011 (1.5). Managerial Economics 1.** Studies the elements of the business firm's fundamental problem—how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of the relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.

**MBAC 6012 (1.5). Managerial Economics 2.** See MBAC 6011.

**MBAC 6020-3. Financial Accounting.** Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.

**MBAC 6030-3. Quantitative Methods.** Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate-level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions, and statistical inference (estimation and hypothesis testing). Provides an introduction to regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.

**MBAC 6031 (1.5). Quantitative Methods.** Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate-level treatment of descriptive statistics, probability, probability distributions, sampling theory, sampling distributions, and statistical inference (estimation and hypothesis testing). Provides an introduction to regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers and nonparametric methods.

**MBAC 6040-3. Management Behavior in Organizations.** Develops an awareness of the impact of individual and group processes on effective organizational functioning, an understanding of the impact of behavioral concepts, and practices their application through discussion and experiential learning.

**MBAC 6050-3. Corporate Strategy.** Experience the real-world problems facing general managers while enhancing skill at solving complex, real-business problems in strategy. Blends functional with strategic management and introduces students to the best new thinking in strategy. Integrates previous MBA learning, and instills a broadened perspective, competence, and familiarity with good practice in strategic management.

**MBAC 6060-3. Corporate Finance.** Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management, and financial planning topics. Prereq., MBAC 6020.

**MBAC 6080-3. Decision Modeling and Applications.** Integrates topics from decision analysis and operations management as they relate to modeling management decisions. Field projects involve the university, local companies, and/or government agencies. Prereq., MBAC 6030.

**MBAC 6090-3. Marketing Management.** Provides a solid foundation of marketing knowledge by focusing on principles of marketing. Introduces the role that marketing cases play in advancing understanding and skill development in the field of marketing. Case discussions illustrate concepts discussed, and case studies are used to introduce the marketing decision making process. Emphasizes the international nature of marketing, as well as the importance of analysis and the understanding of the economic, demographic, political-legal-regulatory, sociocultural, technological, and natural environments. Prereq., MBAC 6030.

## MBA—Entrepreneurship

**MBAX 6100-3. Entrepreneurship and Small Business Management.** Examines the environments of entrepreneurial firms from start-up to development of ventures. Allows students to assess their fit with entrepreneurial firms. Key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans. Prereq., MBAC 6020 or instructor consent.

**MBAX 6110-3. Entrepreneurial Finance.** Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in ar-

anging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering. Prereq., MBAC 6020.

**MBAX 6120-3. Entrepreneurial Marketing.** Addresses the marketing challenges that face the entrepreneur or start up firm with a limited budget. From initially positioning the company and its products to marketing that position to key shareholders for a new venture, to establishing channels of distribution and reaching the consumer, take a specialized look at the development and implementation of a marketing plan.

**MBAX 6170-3. Business Plan Preparation 1.** Completion of a sophisticated business plan within task groups from concept through all the elements of a professionally written business plan. Provides students high interaction with businesses and entrepreneurs. Prereq., MBAC 6020 and MBAX 6100, or instructor consent.

**MBAX 6180-3. Business Plan Preparation 2.** Affords student teams that have taken MBAX 6170 the opportunity to further refine and improve their plans and/or prepare for national business plan competitions via independent study.

**MBAX 6190-3. Projects in Entrepreneurial Companies.** Limited to 12 students per section, each student is matched with an entrepreneurial company to complete a project that is key to company strategy. Students experience total company environment from the top management level through attending management meetings and interacting with cross-functional managers and employees. E-mail and face-to-face meetings result in discussing opportunities and issues resulting from experiences in companies. Prereq., MBAX 6100.

**MBAX 6830-3. Sustainable Business Ventures.** Focuses on environmentally sustainable business ventures as well as issues associated with starting and operating a business that solves natural environmental challenges while achieving profitability. Includes a number of case studies, topical discussions, talks by environmental entrepreneurs, and an applied or library research project.

**MBAX 6860-3. Bootstrap Tactics for Entrepreneurs.** Covers a variety of topics in applied entrepreneurship. Studies how start-up businesses can successfully undertake standard business functions (organization, marketing, sales, advertising, operations, team building, and equipment). Relies heavily on outside lecturers who have personal experience as entrepreneurs. Complements other entrepreneurship curriculum courses such as Entrepreneurship, Entrepreneurial Finance, Business Plan Preparation, and Business Plan Execution. Prereq., MBAX 6100.

## MBA—Finance

**MBAX 6200-3. Advanced Corporate Finance.** Covers the theory of asset pricing, which is then applied to capital budgeting, capital structure choice, mergers and acquisitions, and risk management. Prereq., MBAC 6060.

**MBAX 6210-3. Applied Financial Management.** Analyzes the financial condition, planning, and control of current assets, current liabilities, and long-term financial arrangements. Topics include financial planning, managing working capital, short- and long-term financing, capital budgeting, valuation, and capital structure policies. Case studies are emphasized. Prereq., MBAC 6060.

**MBAX 6220-3. Investment Management and Analysis.** Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations. Prereq., MBAC 6060.

**MBAX 6230-3. International Financial Management.** Examines the financial procedures, policies, and risks faced by firms conducting business internationally. Topics include examining the international finance environment, managing foreign exchange risk exposure, managing international working capital, conducting analysis, and developing an understanding of international financial markets. Prereq., MBAC 6060.

**MBAX 6240-3. Financial Markets and Institutions.** Deals with the economics of financial markets and the management of financial institutions. Covers factors influencing the cost and availability of capital for financing business firms. Examines both domestic and international markets and institutions. Prereq., MBAC 6060.

**MBAX 6250-3. Derivative Securities.** Derivatives, like options, futures, forwards, and swaps, encompass all aspects of finance. Topics cover the characteristics, valuation, and trading strategies associated with derivatives as well as their use in risk management. Prereq., MBAC 6060.

**MBAX 6880-3. Fixed Income Investing.** Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e., home mortgages). Develops practical analytical tools for describing these securities, the markets where they are traded, and their purchase and management by financial intermediaries. Stresses the huge market for U.S. government debt, because it provides a foundation for the development of more specialized tools used in other markets. Prereq., MBAC 6060.

**MBAX 6885-3. Interpreting the Economic Environment.** The macroeconomic environment is vitally important to business managers regardless of their area of focus. Most macroeconomic events portend future economic changes that influence business and/or industry. Develops a basic understanding of the macroeconomy and its relationship to an individual business or industry through understanding macroeconomic concepts and data sources, developing a basic model, understanding relevant policy instruments, and integrating this information into the global economy. Prereq., MBAC 6010.

## MBA—Marketing

**MBAX 6300-3. Marketing Communication.** Focuses on the strategic and decision making aspects of marketing communication from a managerial perspective. Increases students' understanding of specific decision elements within an integrated marketing communications framework. Topics include promotional objectives, agency relations, media selection, budgeting, and advertising research. Also explores relevant advertising models and the economic and social effects of promotional activity. Prereq., MBAC 6090.

**MBAX 6310-3. Marketing Strategy.** Marketing strategy has developed into an increasingly critical managerial activity as businesses recognize the importance of creating customer value and being customer oriented. Discusses key elements of successful marketing strategy including market/customer analysis and competitor analysis, and identifies strategic approaches managers may adopt to succeed in today's highly competitive and rapidly changing business environment. Prereq., MBAC 6090.

**MBAX 6320-3. International Marketing Management.** Develops skills and analyzes frameworks for selecting competitive strategy and building implementable marketing programs in contemporary global markets. A team project provides students with experience in researching international markets to assemble a product-market entry plan. Prereq., MBAC 6090.

**MBAX 6330-3. Marketing Research.** Develops skills in designing, executing, and evaluating research on applied problems and opportunities in marketing. Topics include research problem formulation, selection of research designs, search for and analysis of secondary data, measurement theory, design of data collection forms, sampling procedures, management of data collection activities, data analysis, and reporting of research results. Prereq., MBAC 6090.

**MBAX 6340-3. Marketing Field Project.** Develops skills in marketing decision making. Teams design and complete a project located at a client business or other organization in the metropolitan area. Team members organize and assign responsibilities, interact with middle- and top-level managers, apply quantitative and behavioral tools presented in marketing and other courses, meet deadlines, and present results of project activities. Prereq., MBAC 6090.

**MBAX 6800-3. Strategic Brand Management.** Focuses on the role of brand in achieving strategic competitive advantage. Examines specific topics related to brand image/equity development, extension, and measurement. Often uses a simulation game to model business practices and predict the effects of branding decisions. Prereq., MBAC 6090.

**MBAX 6810-3. e-Commerce.** Introduces students to digital environments and their use in marketing, and focuses on the importance of mass customization and personalization, the Internet and new product development, brand building, online community, pricing on the Internet, and e-Commerce. Requires students to develop an Internet marketing plan.

**MBAX 6820-3. Support Service Strategies.** Covers major components of a worldwide advanced technology customer support organization, with special emphasis on marketing, business development, and delivery of service. Individual executives or executive panels from local advanced technology companies present their views and experiences on a diverse range of topics relating to the management, development, and delivery of customer support tools and services in a networked environment.

**MBAX 6850-3. New Product Development.** Provides a better understanding of the new-product development process, highlighting the inherent risks and strategies for overcoming them. Using a combination of lectures, cases, and a project, this course examines the process of designing, testing, and launching new products. Emphasizes the interplay between creativity and analytical marketing research throughout the development process. Also covers branding issues, such as brand extensions and their impact on brand equity. Prereq., MBAC 6090.

## MBA—Systems

**MBAX 6400-3. Business Performance Excellence.** Studies World Class Manufacturing (WCM) and methods designed to maximize excellence in business performance. Includes interactions with customers and suppliers, integrated manufacturing, total quality control, just-in-time production, total asset use, and meeting customer requirements. Uses case analysis, field study, and experiential learning.

**MBAX 6410-3. Business Process Design.** Covers methods and means by which firms add value and compete by designing key processes. Emphasizes operational planning as an important element of business process design. A graphical object-based computer simulation package is used to model and design business processes and to predict the effect of changes.

**MBAX 6420-3. Digital Business Strategies.** Focuses on understanding skills, tools, business concepts, and strategic and entrepreneurial opportunities, as well as managerial and social issues that surround the global information infrastructure and the emergence of electronic commerce. Centers on management of information as a resource and on identification of opportunities to exploit its potential for competitive advantage, with particular emphasis on the role of the Internet. Same as SYST 6420.

**MBAX 6430-3. Systems Analysis and Design.** Covers basic concepts, techniques, and tools for effective systems analysis, design, and implementation. Includes basic building blocks of systems, problem solving approaches, methods for systems development, requirements gathering techniques, system modeling techniques, and implementation issues. Also covers user interface design, data design, and program design. Includes hands-on design of an actual systems project.

## MBA—Management

**MBAX 6500-3. Management of Organizational Change.** Explores ways to improve organizations to meet demands of changing environments. Emphasizes theoretical framework and models of organization change, barriers to implementing change and ways to overcome them, and the roles of the change agent and/or consultant. Prereq., MBAC 6040. PREREQ MBAC 6040.

**MBAX 6510-3. (Re)Designing Dynamic Organizations.** Examines new forms of organizations with permeable boundaries and empowered individuals and teams. Explores alternative designs necessary for managing disparate cultural values, the globalization of markets, and rapid technological change. Prereq., MBAC 6040.

**MBAX 6520-3. Human Resources Management.** Addresses such human resource issues as hiring, appraising, compensating, developing, and motivating employees from the perspective of an internal or external consultant. Prereq., MBAC 6040.

**MBAX 6530-3. Negotiating and Conflict Management.** Explores and builds skills for conflict management and negotiation problems faced by managers (e.g., dealing with subordinates, peers, superiors, or clients). Content is relevant to all MBA students, especially those interested in management, accounting, entrepreneurship, finance, and marketing. Prereq., MBAC 6040.

**MBAX 6540-3. Consulting Skills.** Provides an integrative, hands-on exercise in managing change. Develops skills in contracting, collecting, and analyzing data, and writing reports. Teams practice these skills by conducting an organizational diagnosis, consulting project within an organization. Prereq., MBAC 6040.

**MBAX 6550-3. Management of Technology and Innovation.** Examines a variety of issues common to management of technology, such as technology strategies, methods of technology transfer, selecting technology standards, managing the research and development process, and encouraging and rewarding innovation.

**MBAX 6840-3. Successful Innovation and Commercialization.** Focuses on the innovation process from the perspective of a participant, project manager, or manager involved in, or responsible for, getting ideas commercialized into the marketplace or new processes into the firm. Covers a range of topics in a seminar style format: cre-

ativity process and environments that give rise to ideas; traditional and nontraditional development models; success/failure reasons and risk reduction tactics; new development organizations (i.e., virtual). Emphasizes the use of prototyping and other advanced idea evaluation techniques that can affect success.

**MBAX 6870-3. Team Building.** Helps students gain skills in developing trusting relationships, maximizing their leadership potential, and building high performance work teams in organizations. Develops skills through theory study and implementation. Observes a real-life team-building meeting conducted by Dr. Boss that deals with building collaboration among top-level executives and conflict management. Students also conduct a team building meeting with their own clients. Emphasizes startup teams and entrepreneurial organizations. Prereq., MBAC 6040.

**MBAX 6890-3. Corporate Government and Executive Compensation.** Examines how corporations are governed by viewing the roles of the chief executive officer (CEO), board of directors, and shareholders in shaping and developing corporate direction and strategy. Compares governance systems in the USA to models used in Asia and Europe. Applies knowledge of corporate governance to understand administration of executive pay. Studies how short-term and long-term executive incentives are structured and used by the board to motivate executives to meet strategic objectives. Also discusses the function and controversies surrounding the application of stock options for top executives.

## MBA—Real Estate

**MBAX 6600-3. Real Estate Development.** Studies methods of analyzing real estate opportunities. Includes urban economic, market, and location analyses. Studies local government controls. Features actual cases of local residential and commercial projects.

**MBAX 6610-3. Real Estate Finance and Investment Analysis.** Covers link between real estate and capital markets through examination of financial institutions and instruments used to finance real property. Examines methods used to analyze value in property investments. Classroom activities include industry guest speakers. Prereq., MBAC 6060 or equivalent, or instructor consent.

**MBAX 6620-3. Real Estate Project Competition.** Develops skills in real estate decision making. Teams design, complete, and present a real estate project in a competition forum. Team members organize and assign responsibilities, interact with real estate professionals, and apply appropriate quantitative and qualitative tools and procedures. Prereq., MBAX 6600 or equivalent, or instructor consent.

## MBA—Accounting

**MBAX 6700-3. Corporate Financial Reporting.** Provides an in-depth study of the concepts underlying contemporary financial accounting practice. Includes preparation and analysis of financial statements and the application of concepts to selected current issues. Prereq., MBAC 6020 or equivalent. Same as ACCT 6220.

**MBAX 6710-3. Financial Statement Analysis.** Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers, and auditors. Emphasizes credit scoring, risk analysis, and equity valuation. Prereq., MBAC 6020 or equivalent. Same as ACCT 6250.

## MBA—International

**MBAX 6895-3. London Seminar in International Finance and Business.** Offers a summer study abroad program held in London. Focuses on the financial and business issues facing financial markets and institutions in London and Europe, and the impact of the political climate on these issues.

## Operations and Production Management

**OPMG 6900 (1-3). Independent Study.**

**OPMG 8990 (1-10). Doctoral Thesis.**

## Organization Management

**ORMG 7310-3. Seminar on Organizational Behavior.** Doctoral level seminar covering such issues as leadership, job attitudes, motivation, absenteeism, turnover, goal setting, and group dynamics. Prereq., instructor consent.

**ORMG 7320-3. Seminar in Organization Theory.** Critically investigates major issues in organization theory and provides students with experience in comprehensively surveying literature in subject areas such as organization design, power, culture, innovation, technology, environment, size, and strategy. Prereq., instructor consent.

**ORMG 7330-3. Seminar and Practicum in Organization Development.** Provides a doctoral level seminar emphasizing intervention theory and method in effectuating organizational change in a client system. Deals with group development, educational processes, conflict resolution, organizational interventions, change strategies, and ethical and skill requirements of the consultative role. Prereq., instructor consent.

**ORMG 7800-3. Doctoral Proseminar: Management.** Provides an orientation to doctoral level study for all students in management. Through critical analysis of articles and student and faculty presentations, students learn about reading and writing research articles and gain an overview of the management discipline.

**ORMG 7830-3. Doctoral Seminar: Dissertation Research.** Considers philosophical topics and concepts related to the social sciences and examines various methodologies relevant to business and dissertation research.

**ORMG 8820 (1-4). Graduate Seminar.** Provides opportunity for investigating new frontiers in organization management through an experimental seminar (offered irregularly).

**ORMG 8900 (1-3). Independent Study.**

**ORMG 8990 (1-10). Doctoral Thesis.**

## Personnel/Human Resource Management

**PHRM 7400-3. Seminar in Personnel Human Resource Management.** Provides an intensive research-based survey of contemporary issues in personnel-human resource management. Survey literature and conduct research in personnel/human resource subject areas such as performance appraisal, pay strategy, human resource strategy, union impact on compensation, labor relations, and human capital. Prereq., instructor consent.

## Real Estate

**REAL 3000-3. Principles of Real Estate Practice.** Covers principles of real estate law, finance, brokerage, appraising, and investments. Prereq., BCOR 2100.

**REAL 4000-3. Real Estate Law and Financing Instruments.** Covers estates in land, purchase and sales contracts, conveyances, mortgage and trust deed transactions, property taxes, and leases. Prereqs., REAL 3000 and BCOR 3000.

**REAL 4100-3. Real Estate Finance and Investment Analysis.** Covers the link between real estate and the capital markets through an examination of the financial institutions and instruments used to finance real property. Examines methods used to analyze value in real property investments. Prereq., REAL 3000.

**REAL 4820 (3-6). Topics in Business.** Experimental course offered irregularly for purpose of presenting new subject matter in real estate.

**REAL 4900 (1-3). Independent Study.** Intended for exceptionally well-qualified business seniors who desire to study an advanced topic. Prereq., dean and instructor consent.

**REAL 6820 (3-6). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in real estate.

**REAL 6900 (1-3). Independent Study.** Students must have consent of instructor under whose direction study is taken. Departmental form required.

## Tourism Management

**TOMG 3060-3. Resort Tourism.** Examines principles and procedures of resort management, applications of management theory to the resort industry, and environmental issues of resort development. Prereq., junior/senior standing.

**TOMG 3400-3. Tourism Management.** Examines the basic concepts, tools, and techniques of tourism management. Examines the primary trends and issues of tourism management and the unique problems and applications of management practice in the tourism industry. Prereq., junior/senior standing.

**TOMG 3500-3. Tourism Destination Development.** Examines the economic, social, and environmental impacts of tourism development and the planning and policy implications of those impacts. Emphasizes the tourism development process and concerns in rural communities and natural environments. Prereq., junior/senior standing.

**TOMG 4900 (1-6). Independent Study.** Prereq., both dean and instructor consent.

## Transportation Management

**TRMG 5600-3. Carrier Quality and Performance.** Same as TRMG 4600.

# School of Education

## General Education

**EDUC 2910 (1-3). Field Practicum 1.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the IN-VST program. See also EDUC 2920. May be repeated up to 6 total credit hours.

**EDUC 2920 (1-3). Field Practicum 2.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the IN-VST program. See also EDUC 2910. May be repeated up to 6 total credit hours.

**EDUC 4463-2. Teaching Exceptional.** Emphasizes working with these students in the least restrictive environment. Students observe model classrooms where handicapped or gifted and talented students are being mainstreamed. Gives special emphasis to various modifications in curriculum and teaching approaches. Meets Colorado exceptional child teacher licensing requirements. Open only to students admitted to the teacher education program.

**EDUC 4800 (1-9). Special Topics.** Designed to meet needs of students with topics of pertinent interest.

**EDUC 4810 (1-9). Special Topics.** May be repeated up to 18 total credit hours, provided the topics vary.

**EDUC 4831-3. Advanced Peer Counseling Training.** The second semester of an academic year's training for students interested in learning about the skills and knowledge associated with peer counseling. Continuation of ARSC 2274 (offered only during fall semesters). Offered only in spring semesters.

**EDUC 4840 (1-4). Independent Study.**

**EDUC 4910-3. Peer Counseling Practicum (previously EDUC 4830, 4840).** Controlled enrollment. Repeatable for degree credit. Credit given for peer counseling activities. Students are selected to participate in this class and act as peer counselors or TAs for the peer counseling training.

## General Teacher Education

**EDUC 3013-3. School and Society.** Introduces the real world of schools, teaching, and learning. Integrates content on diverse learners with oral communication skills, and the history, philosophy, sociology, and anthropology of education. Links theory to practice with experiences in community settings. Prereq., 30 credit hours completed or in progress. Approved for arts and sciences core curriculum: contemporary societies or cultural and gender diversity.

**EDUC 3023-3. Teaching in American Schools.** Continuation of EDUC 3013. Emphasizes schools and teaching and learning. Focuses on special education, teaching the linguistically different child, differentiation, and classroom management. Includes hands-on experiences in school settings. Prereq., admission to the elementary, secondary, or K-12 music teacher education program.

**EDUC 4513 (1-3). Education and Practice.** Meets during student teaching assignment. Includes topics of concern to teachers, such as classroom organization and management, lesson planning, assessment, journals, preparation of the teacher work sample, etc. Coreq., EDUC 4691, 4712, or 4732.

**EDUC 4732 (4-12). Student Teaching—K-12.** Required experience for music students seeking education at both elementary and secondary levels. Prereq., admission to the secondary or K-12 music teacher education program.

**EDUC 4912-1. Practicum in Teacher Education.** Provides in-school practicum experience.

## Elementary Education

**EDUC 3621-1. Art for the Elementary Teacher.** Introduces elementary education students to art education. Introduces many visual art techniques, art media, and processes used in art education. The class includes hands-on studio art experiences in a format that supports subjects such as literature, writing, music, and social studies. Emphasizes the role of art education and materials in supporting the artistic development and visual literacy of children. Prereq., completion of 30 hours of course work.

**EDUC 4161 (1-3). Children's Literature.** Reading and evaluation of books, children's interests, authors and illustrators, folk literature, multicultural literature, modern fanciful tales, and trends.

**EDUC 4311 (4-5). Integrated Children's Literature and Social Studies for the Elementary School.** Prepares teacher education candidates for teaching children's literature and social studies in a social context. Understand (a) theoretical and developmental processes associated with literary and social studies learning, (b) methods for teaching literature and social studies in a diverse society, and (c) the integration of classroom instruction with the Colorado Model Content Standards that foster such processes. Prereq., EDUC 3013. Restricted to students admitted to the elementary teacher education program.

**EDUC 4321 (4-5). Integrated Reading and Writing for Elementary Schools.** Prepares teacher education candidates for teaching elementary reading and writing in a social context. Understand (a) theoretical and developmental processes associated with reading and writing, (b) methods for teaching reading and writing in a diverse society, and (c) the integration of classroom instruction with the Colorado Model Content Standards that foster such processes. Prereq., EDUC 3013. Restricted to students admitted to the elementary teacher education program.

**EDUC 4411 (7-9). Integrated Math/Science/Education Psychology for Elementary Schools.** Integration of theories and ideas from elementary school mathematics and science education, child development, and educational psychology. Explores theories, teacher strengths, responsibilities for learning, academic achievement, and self-esteem. Prereqs., EDUC 3013, and either 4311 or 4321. Students must be admitted to elementary teacher education program.

**EDUC 4691-10. Student Teaching—Elementary School 1.** Kindergarten through sixth grades. Prereq., completion of all education and content-specific arts and sciences requirements, and passing required licensure exam. Coreq., EDUC 4513.

**EMUS 3203-1. Music for Classroom Teaching.** Provides an overview of children's musical growth. Considers development of strategies to integrate music across the curriculum. Emphasizes refining personal knowledge and skills in order to become an advocate for music in children's lives.

**PHED 4200-1. Physical Education and Health—Elementary School.** Introduces elementary education students to basic aspects of physical education and health in the elementary school curriculum.

## Secondary Education

**EDUC 4112-3. Educational Psychology and Adolescent Development.** Analyzes fundamental psychological concepts underlying classroom instruction, as well as adolescent growth and development. Prereq., completion of 30 hours of course work. Same as PSYC 4114.

**EDUC 4122 (2-3). Principles and Methods of Secondary Education.** Emphasizes objectives, functions, modern philosophy, curriculum, discipline, planning, learning styles, and educational media. For middle/junior high through senior high school levels. Includes in-school experience. Must be admitted to the secondary teacher education program.

**EDUC 4232-3. Language and Literacy across the Curriculum.** Explores the relationship between language and learning with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning about a topic of study. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines. Must be admitted to the secondary or K-12 teacher education program. Same as EDUC 5235.

**EDUC 4312-3. The Nature of Science and Science Education.** Explores contemporary ideas and issues in the history, philosophy, and sociology of science education and science, science as a social and cultural activity, and how contemporary issues in science relate to and impact educational practice. Must be admitted to licensure or MA programs. Same as EDUC 5315.

**EDUC 4322-3. Teaching Literature in Middle and Secondary Schools.** Provides teachers of English with background and experiences relevant to using reading, writing, and a range of other classroom social languages to teach literature to a culturally and intellectually diverse population of students. Explores relevant literary theories, texts, and genres, and examines contemporary and historical perspectives on the meaning and function of stories in both personal and democratic public life. Must be admitted to the secondary English education program. Meets with EDUC 5235.

**EDUC 4342-3. Composition for Teachers.** Prepares beginning teachers to teach composition in the public schools according to the Colorado Model Content Standards. Cultivates a repertoire of skills, assessment techniques, and perspectives to successfully engage secondary students, then move them into

writing proficiency. Develops proficient knowledge of strategies, planning practices, and assessment techniques to ensure student learning in a standards-based curriculum. Must be admitted to the secondary English teacher education program. Same as EDUC 5345.

**EDUC 4352 (3-4). Methods and Materials in Secondary Social Studies.** Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching the social studies in middle and high schools. Examines the Colorado Model Content Standards. Must be admitted to the secondary Social Studies teacher education program. Same as EDUC 5355.

**EDUC 4362 (3-4). Methods and Materials in Secondary English.** Focuses on curriculum, materials, methods, and assessment. Introduces best practices in the teaching of English in middle and high schools. Examines the Colorado Model Content Standards in Reading and Writing. Must be admitted to the secondary English teacher education program. Same as EDUC 5365.

**EDUC 4372 (3-4). Methods and Materials in Secondary Mathematics.** Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Examines the Colorado Model Content Standards. Must be admitted to secondary math teacher education program. Same as EDUC 5375.

**EDUC 4382 (3-4). Methods and Materials in Secondary Science.** Focuses on curriculum, materials, methods, evaluation, and related aspects of instruction. Integrates content and methodology. Examines Colorado Model Content Standards. Must be admitted to the secondary science teacher education program. Same as EDUC 5385.

**EDUC 4712-10. Student Teaching—Secondary School.** Student teacher apprentices in a middle/junior or senior high school in the Boulder–Denver metropolitan area. Must be admitted to the secondary teacher education program. Prereq., completion of all education and content-specific arts and sciences courses, and passing required licensure exam. Coreq., EDUC 4513.

**EDUC 4722-5. Student Teaching—Secondary School 2.** Student teacher attends a middle/junior high or senior high school class in the Boulder–Denver metropolitan area. Prereq., completion of all education and content-specific arts and sciences courses, and passing required licensure exam. Coreq., EDUC 4513. Must be admitted to the secondary teacher education program.

## Graduate Education

*The following courses are not program specific and may be taken by master's and doctoral students as needed for their plans of study.*

**EDUC 5005-3. Advanced Social Foundations of Education.** Critically examines the intellectual and political forces that shape the aims, policies, and practices of K–12 education in the United States, emphasizing the period following the *Brown v. The Board of Education* decision in 1954. Restricted to education graduates and secondary MA+ students.

**EDUC 5035-3. Proseminar: Parent and Community Involvement.** Focuses on models and strategies for improving parent and community involvement in the schools. Discusses administrative concerns, such as parent advisory councils, and instructional concerns, such as helping children with school assignments.

**EDUC 5055-3. Philosophy of Education.** Examines exemplars of educational philosophy from ancient times to the present day, emphasizing their relevance and application to current controversies in education, e.g., multiculturalism, gender equity, and school choice.

**EDUC 5065-3. Curriculum Theories.** Examines four central curricular traditions; progressive, conservative, radical, and spiritual. Highlights the strengths and weaknesses of various writers within each tradition with attention paid to the conceptual features and the practical implications of each educational view. Encourages students to examine their own educational assumptions.

**EDUC 5075-3. Sociology in Education.** In-depth analysis of theories and concepts in sociology and education. Evolution of curriculum, organization, and enrollment characteristics of American schools. Schooling, class, culture, gender, stratification, and educational reform in light of paradigmatic change in theories and concepts of sociology.

**EDUC 5085-3. History of American Education.** Highlights social and intellectual history perspectives of American educational history, major reform movements

from the 18th century to Dewey, and assessment of how differences of race, class, ethnicity, religion, power, and gender affected American education.

**EDUC 5095-3. Teachers as Researchers.** Examines questions central to K–12 curriculum and instruction. Focuses on developing research projects applicable to current classroom practice, writing proposals for curriculum investigations, conducting specific curriculum investigations, and writing research findings.

**EDUC 5105-3. Teaching for Understanding.** Introduces the knowledge base on effective teaching practices, and the theories and research that support these practices. Explores the impact of theory and research on classroom instruction. Emphasizes generic and subject-specific practices that foster conceptual understanding.

**EDUC 5115-3. Modern Trends in Teaching.** Examines recent developments in teaching and trends in the philosophy of education. Focuses special attention on a variety of issues central to school reform.

**EDUC 5125-3. Supervision of Student Teachers.** Develops competency in the supervision of student teachers. For cooperating teachers as well as supervisors.

**EDUC 5165-3. Children's Literature.** Involves reading and evaluation of picture books, and emphasizes children's interests, authors and illustrators, multicultural literature, the components of narrative, and the features of illustrations. Examines connections between children's literature and children's development as writers.

**EDUC 5175-3. Elementary Mathematics Curriculum.** Provides an in-depth study of curriculum building in mathematics at the elementary school level (K–8). Gives particular attention to selection of materials, establishment of content, and evaluation of programs.

**EDUC 5185-3. Elementary Social Studies Theory and Methods.** Explores curricular and pedagogical approaches to social studies. Centers on revisionist historian content, instructional activities, integration of technology into the social studies, and the use of children's literature, participant accounts, and historical accounts sources. Restricted to MA and Elementary MA+ students.

**EDUC 5195-4. Elementary Reading Theory and Methods.** Provides an understanding and acquisition of basic methods in the teaching of reading at the elementary level. Includes basic approach, literature approach, and individualized instruction. Restricted to MA and Elementary MA+ students.

**EDUC 5205-3. Elementary Mathematics Theory and Methods.** Deals with contemporary mathematical content and teaching techniques. Emphasizes mathematical background for the teacher and experimental projects. Restricted to MA and Elementary MA+ students.

**EDUC 5215-3. Elementary Science Theory and Methods.** Emphasizes experimental programs and their implementation. Considers curriculum and assessment development. Restricted to MA and Elementary MA+ students.

**EDUC 5225-4. Elementary Language Arts Theory and Methods.** Highlights current thought, as determined by research findings, in the various areas of the language arts: oral and written communication, spelling, handwriting, usage, grammar, foreign languages, and bilingual education. Restricted to MA and Elementary MA+ students.

**EDUC 5235-3. Language and Literacy Across the Curriculum.** Same as EDUC 4232.

**EDUC 5245-3. Foundations of Reading Instruction K–12.** Comparatively analyzes current and emerging philosophies and programs in K–12 with focus on teaching reading and thinking skills.

**EDUC 5255-3. Processes Involved in Literary Interpretation.** Stresses curiosity, observation, challenge, and insight into how children and adolescents learn to become literate beings. Discusses the work and play of literary interpretation including analytic reading, substantive discussion, reflective writing, visual presentation, and dramatic enactment where readers learn to take the words from the page to inform and transform their worlds. Prereq., EDUC 5245.

**EDUC 5265-3. Processes in Writing.** Investigates processes writers use from early ages to maturity as they compose prose. Considers several process models, surveys current research, and proposes and evaluates research designs.

**EDUC 5275-3. Assessment in Literacy.** Assumes an interactive model of reading and supports the perspective of assessment as interrelated with curriculum and instruction; examines principles that guide the selection and interpretation of assessment techniques, with a particular focus on low-performing students. Prereq., EDUC 5255.

**EDUC 5285-4. Reading Clinic Procedures K–12.** Focuses learning on a select group of low performing students to assess reading proficiency, develop appropriate instructional goals, and provide instruction that addresses these goals. Emphasis on interpreting assessment data, extending a repertoire of instructional strategies, and developing and implementing a strong instructional plan. Prereq., EDUC 5275.

**EDUC 5305 (3-4). Proseminar: Teaching and Learning.** Presents and discusses issues in secondary school curriculum, instruction, and management. Examines, analyzes, and evaluates a variety of instructional delivery strategies, their effectiveness for students, and teacher dispositions to facilitate learning. Restricted to secondary MA+ students.

**EDUC 5315-3. The Nature of Science and Science Education.** Same as EDUC 4312.

**EDUC 5325-3. Teaching Literature in Middle and Secondary Schools.** Same as EDUC 4322.

**EDUC 5345-3. Composition for Teachers.** Same as EDUC 4342.

**EDUC 5355 (3-4). Methods and Materials in Secondary Social Studies.** Same as EDUC 4352.

**EDUC 5365 (3-4). Methods and Materials in Secondary English.** Same as EDUC 4362.

**EDUC 5375 (3-4). Methods and Materials in Secondary Mathematics.** Same as EDUC 4372.

**EDUC 5385 (3-4). Methods and Materials in Secondary Science.** Same as EDUC 4382.

**EDUC 5395-3. Curriculum in Secondary Mathematics.** Investigates curriculum projects in secondary school mathematics including history, modern innovations, program development, research and evaluation.

**EDUC 5425-3. Introduction to Bilingual/Multicultural Education.** Provides a comprehensive survey of bilingual-multicultural education programs for language minority students. Includes an overview of the history and legislation related to bilingual education. Presents various models, philosophies, and theoretical underpinnings of bilingual education.

**EDUC 5435-3. Materials and Methods in Bilingual/Multicultural Education.** Provides an in-depth study of curriculum options available for the bilingual classroom. Presents, reviews, and critiques specific methods and strategies for teaching language minority students. Gives the opportunity to develop and present teaching units in Spanish or in ESL methodology, as appropriate. Prereq., EDUC 5425.

**EDUC 5445-3. Curriculum for Multicultural Education.** Analyzes curriculum programs and applies principles and innovation for education of ethnic-racial students at all school levels.

**EDUC 5455-3. Literacy for Linguistically Different Learners.** Presents current and emerging philosophies and methods on teaching reading to culturally diverse second-language learners. Includes review of materials, strategies for teaching reading and writing skills, and important considerations for transference from L1 to L2 reading. Prereq., EDUC 5425 or reading course at 5000 level.

**EDUC 5465-3. Needs and Education of Exceptional Children.** Discusses characteristics and needs of various types of handicapped and gifted students. Gives special attention to procedures used for diagnosis and the suggested educational adjustments and care required by these students. Discusses successful teaching techniques and instructional approaches including individualization, least restrictive environment transition, and career education. Meets Colorado exceptional child education requirements.

**EDUC 5485-3. Teaching Exceptional Children in the Regular Classroom.** Emphasizes physiological and psychological characteristics of students, as well as educational strategies. Provides for clinical work with handicapped individuals under a variety of noneducational settings. Meets Colorado exceptional child education requirement.

**EDUC 5505-3. Education of Students with Learning and Behavior Disorders.** Discusses unique learning needs of students who are mentally retarded, learning disabled, and behavior disordered. Emphasizes development of a systems model for diagnosis, programming, and remediation. Stresses data-based individualization of instruction with emphasis on intervention in the least restrictive environment.

**EDUC 5515-3. Curriculum and Methods for Moderately Handicapped 2.** Emphasizes development of skills for teaching the moderately handicapped student. Includes designing of classrooms and curriculum. Reviews variety of behavior management and crisis intervention strategies, as well as the use of effective materials for socioemotional behavior changes.

**EDUC 5525-3. Research and Evaluation in Special Education.** Provides practical experience in the review, critique, conceptualization, and writing of research studies in special education. Also offers experience in design of evaluation systems for classroom practice.

**EDUC 5535-3. Diagnostic Testing in Bilingual and Special Education.** Includes both theoretical and applied aspects of diagnostic testing. Reviews administration and interpretation of current educational tests (intelligence, achievement, language proficiency, and adjustment scales). Emphasizes practices for equitable testing and assessment of special populations.

**EDUC 5545-3. Curriculum and Methods for the Moderately Handicapped.** Reviews the various educational curricula currently in use with moderately handicapped students. Emphasizes different teaching methods, instructional materials, and learning strategies that have proven effective in working with students with cognitive learning needs.

**EDUC 5555 (1-4). Elementary Moderate Needs Practicum.** Offers supervised field experience in special education with moderate needs handicapped students. Each credit hour requires 50 contact hours. Prereqs., EDUC 5465, 5505, and either 5515 or 5545.

**EDUC 5565 (1-4). Secondary Moderate Needs Practicum.** Offers supervised field experience in special education with cognitive needs handicapped students. Each credit hour requires 50 contact hours. Prereqs., EDUC 5465, 5505, and either 5515 or 5545.

**EDUC 5575 (1-4). Workshop in Instruction and Curriculum in Content Areas.**

**EDUC 5595 (1-4). Practicum in Linguistically Different—English as a Second Language.** University supervised, school-based field experience teaching linguistically different students. Practicum student is placed in a school setting with an experienced teacher of linguistically different students and supervised by university staff. Full-time for eight weeks (300 clock hours).

**EDUC 5605-3. Research Issues in Bilingual Education.** Offers practical experience in the review, critique, conceptualization, and writing of the research studies in bilingual/ESL education. Provides experience in the design of classroom evaluation systems. Prereq., EDUC 5425.

**EDUC 5615-3. Second Language Acquisition.** Presents a broad survey of second-language acquisition research. Stresses theoretical concerns and research findings and practical applications to teaching second languages. Gives special emphasis to second-language acquisition.

**EDUC 5625-3. Methods of Teaching English as a Second Language.** Prepares teachers to teach English as a second language in American public schools. Covers both theoretical and applied aspects of language learning and teaching. Recommended prereq., EDUC 5615.

**EDUC 5635-3. Education and Sociolinguistics.** Explores the discipline of sociolinguistics, the study of language variation and use, and its application within education settings. Not designed as an advanced sociology or linguistics course. Areas of study include language variation, speech communities, the ethnography of communication, speech and social identities, and sociolinguistic research related to teaching and learning.

**EDUC 5705-3. Theories of Learning and Development.** Examines current theory and research on child development, learning, and motivation. Emphasizes the relationship between and among development, learning, motivation, and how theory and research can inform instructional decisions in the elementary classroom. Restricted to students admitted to the elementary MA+ program. Coreq., EDUC 5715.

**EDUC 5715-4. Education, Society, and the Elementary Teacher.** Introduces issues affecting teachers and the teaching profession. Examines the most pressing (i.e., controversial) issues in American education. It also examines and analyzes the cultural, structural, and institutional features of schooling. Restricted to students admitted to the elementary MA+ program. Coreq., EDUC 5705.

**EDUC 5716-3. Basic Statistical Methods.** Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test.

**EDUC 5725-4. Issues in Elementary Education.** Introduces the role of practical reasoning in curricular and pedagogical practice. Students examine and analyze current curriculum material, pedagogical practices, and instructional contexts. Restricted to elementary MA+ students.

**EDUC 5726-3. Introduction to Disciplined Inquiry.** Considers various research approaches and methodologies included in education including experimental and quasi-experimental methods; anthropological and case study methods; evaluative research and field studies; correlational; and sociological, historical, and philosophical research. Topics include library research, research criticism, and proposal writing.

**EDUC 5730 (1-4). Workshop in Research and Evaluation Methodology.**

**EDUC 5735-3. School-Based Professional Seminar.** Includes cooperating and/or student teachers in the student teaching semester of the elementary MA+ program. Involves observation and analysis of classroom interaction, models for school based professional study groups, and development of action research projects. Prereq., EDUC 5725.

**EDUC 5736 (1-4). Workshop in Research and Evaluation Methodology.**

**EDUC 6318-3. Psychological Foundations of Education.** Surveys results of psychological inquiry, emphasizing applications to educational practices. Major topics include learning, cognitive processes, motivation, development, individual differences, tests and measurements, and adolescent behaviors and problems.

**EDUC 6325-3. Anthropology and Education.** Applies anthropological perspectives to research in educational settings. Focuses on theories of culture, cultural transmission and acquisition, and cultural reproduction and production for understanding schooling and its outcomes.

**EDUC 6328-3. Advanced Child Growth and Educational Development.** Covers recent theoretical and research advances in the study of children's cognitive, social, and emotional development with an emphasis on their implications for children's learning in and out of school. Prereq., EDUC 6318 or instructor consent.

**EDUC 6338-3. Cognitive Processes in Education.** Reviews methods and results of experimental investigation of memory and cognition with implications for instruction and other educational practices. Prereq., EDUC 6318.

**EDUC 6348-3. Instructional Psychology.** Surveys current theory in instructional design psychology, emphasizing the analysis of classroom teaching. Prereq., EDUC 6318.

**EDUC 6358-3. Children's Thinking.** Covers the experimental psychology of thinking, emphasizing differences between children and adults in modes of thought. Topics include memory, concept acquisition, strategies, problem solving, and originality. Prereq., EDUC 6318.

**EDUC 6368-3. Adolescent Psychology for Teachers.**

**EDUC 6504-3. Issues and Methods in Cognitive Science.** Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Prereqs., graduate standing or at least one upper-division course in computer science, linguistics, philosophy, or psychology. Same as CSCI 6402, LING 6200, PHIL 6310, and PSYC 6200.

**EDUC 6505 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as CSCI 7762, LING 7762, PHIL 7310, and PSYC 7765.

**EDUC 6506-2. Cognitive Science Research Practicum.** Project in cognitive science for graduate students pursuing a joint PhD in an approved discipline and cognitive science. Projects integrate at least two areas: psychology, computer science, linguistics, education, and philosophy. Prereq., choose from CSCI 6402, EDUC 6504, LING 6200, PHIL 6310, or PSYC 6200. Recommended prereq., choose from CSCI 7762, EDUC 6505, LING 7762, PHIL 7310, or PSYC 7762. Same as LING 7415, PHIL 7415, CSCI 7412, and PSYC 7415.

**EDUC 6516-2. Cognitive Science Research Practicum 2.** Project in cognitive science for advanced graduate students pursuing a joint PhD in an approved discipline and cognitive science. Projects integrate at least two areas: psychology, computer science, linguistics, education, and philosophy. Prereq., CSCI 6402, EDUC 6504, LING 6200, PHIL 6310, or PSYC 6200. Recommended pre-

req., CSCI 7762, EDUC 6505, LING 7762, PHIL 7310, or PSYC 7762. Same as CSCI 7422, LING 7425, PHIL 7425, and PSYC 7425.

**EDUC 6528 (1-4). Workshop in Educational and Psychological Studies.**

**EDUC 6804 (1-4). Special Topics.** Designed to meet needs of graduate students with topics of pertinent interest.

**EDUC 6844 (1-4). Master's Independent Study.**

**EDUC 6855 (1-4). Independent Study in Instruction and Curriculum in Content Areas—Master's Level.**

**EDUC 6888 (1-4). Independent Study in Educational and Psychological Studies—Master's Level.**

**EDUC 6899 (1-4). Independent Study in Social, Multicultural, and Bilingual Foundations—Master's Level.** Instructor consent required.

**EDUC 6915 (1-4). Practicum in Instruction and Curriculum in Content Areas.**

**EDUC 6916 (1-4). Practicum in Research and Evaluation Methodology.**

**EDUC 6918 (1-4). Practicum in Educational and Psychological Studies.**

**EDUC 6919 (1-4). Practicum in Social, Multicultural, and Bilingual Foundations.** Prereq., instructor consent required.

**EDUC 6925 (1-4). Readings in Instruction and Curriculum in Content Areas.**

**EDUC 6926 (1-4). Readings in Research and Evaluation Methodology.**

**EDUC 6928 (1-4). Readings in Educational and Psychological Studies.**

**EDUC 6929 (1-4). Readings in Social, Multicultural, and Bilingual Foundations.** Prereq., instructor consent required.

**EDUC 6944-3. Master's Degree Candidate.**

**EDUC 6954-4. Master's Thesis.**

**EDUC 7015-3. Teaching Internship in Teacher Education.** One-semester teaching internship in an undergraduate or graduate foundations course.

**EDUC 7105-3. Issues and Consultation in Bilingual Special Education.** Covers fundamental issues of bilingual special education and describes effective consultation practices between the special education teacher and other educational personnel. Uses cooperative learning teams to develop program and curriculum models for identifying and instructing minority handicapped students.

**EDUC 7316-3. Intermediate Statistical Methods.** Studies sampling theory and inferential statistics; advanced applications for testing of hypotheses regarding central tendency, variability, proportion, correlation, and normality; chi-square and the analysis of frequency data; multiple regression and prediction; introduction to the analysis of variance; and related computer programs for statistical analysis. Prereq., EDUC 5716. Required of all doctoral candidates.

**EDUC 7326-3. Experimental Design and Analysis 1.** Focuses on experimental and quasi-experimental designs in educational research; applications of the general linear mode; power and statistical efficiency; randomization and control; multiple comparisons; factorial experiments and interaction with fixed-factor and mixed design; analysis of covariance; effects of assumption violations; and related computer programs for statistical analysis. Prereqs., EDUC 5726 and 7316.

**EDUC 7336-3. Methods of Survey Research and Assessments.** Examines theory and techniques involved in each stage of survey research, including problem formulation, questionnaire development, interview and mailed surveys, assessing reliability and validity, sampling plans, data reduction (e.g., factor analysis), and analysis of continuous and categorical data. Prereqs, EDUC 5726 and 7316.

**EDUC 7346-3. Ethnographic Methods in Educational Research.** Explores the history of ethnography and its translation into educational research. Students practice participant observation, interviewing, journal writing, artifact searches, qualitative analysis and interpretation, and styles of reporting. Prereq., EDUC 6325 or equivalent doctoral level course in anthropological or sociological theory, or sociology of education.

**EDUC 7376-3. Theory and Practice of Educational and Psychological Measurement.** Introduces theories of measurement and applications, and presents classical test theory. Includes quantitative concepts, methods, and computational techniques for the development, application, and evaluation of measurement instruments in social/behavioral science and education. Prereq., EDUC 5716.



**EDUC 7386-3. Educational Evaluation.** Builds an understanding of the range of approaches taken by educational evaluators, focusing particularly on the evaluation of programs. Explores the nature of different evaluation perspectives and how these disparate views translate into methodological and conceptual models. Students develop a familiarity with the most common and influential approaches to evaluation.

**EDUC 7396-3. Multivariate Analysis.** Introduces the theory of advanced multivariate techniques and their application in educational research. Topics include analysis of time-series experiments, MANOVA, discriminant function analysis, and multiple regression.

**EDUC 7416-3. Seminar: Research Methodology.** Presents selected topics for advanced study in educational research, statistics, measurement, and evaluation.

**EDUC 7436-3. Item Response Theory.** Includes one-, two-, and three-parameter logistic models for dichotomously-scored items and partial credit models for polychotomously-scored items; applications of the models to problems such as equating of test forms, test design, computerized adaptive testing, and the detection of item bias. Prereqs., EDUC 7316, 7376.

**EDUC 7446-3. Seminar: Policy Issues in Education.** Explores major policy issues confronting U.S. education and examines the nature and undertaking of educational policy studies. Learn to approach policy issues from a contextual perspective that highlights systemic forces and analyze and apply differing policy instruments. While a wide variety of policies are covered in the course, it particularly emphasizes issues of educational equity.

**EDUC 7456-3. Seminar: Structural-Equation Modeling.** Covers the application of structural-equation modeling techniques and the use of measurement models and structural-equation models of the type that can be analyzed by current computer programs.

**EDUC 8004-3. Doctoral Research Seminar.** Gives beginning doctoral students an overview of the fields of educational research, with special attention to the research programs of education faculty. Programs include work based in history, sociology, anthropology, sociolinguistics, and philosophy. Required of all first-year education PhD students.

**EDUC 8014-3. Doctoral Seminar: Multiculturalism and Education.** Addresses the sociopolitical context of multiculturalism and education, and the sociocultural context of learning. Examines critical issues involved in making schooling responsive to an increasingly multicultural and multilingual society. Required for all doctoral students.

**EDUC 8025-3. Seminar: Curriculum Theories.** Examines in-depth recent developments in curricular theory highlighting conceptual, contextual, and normative issues. Focuses on the works of prominent curriculum theorists.

**EDUC 8035-3. Conceptual Change.** Explores the nature of conceptual change and the conditions that facilitate or impede learner's construction, organization, and reorganization of knowledge. Examines theory and research on alternative conceptions and misconceptions. Integrates central themes with case studies of specific conceptual change projects.

**EDUC 8125-3. Seminar: Radical Education Theories.** Radical (class, gender, and race based) analyses of United States public schooling maintain that dynamics of oppression and domination undermine schools' democratic promise. Scrutinizes the explanatory adequacy and ethical justification of the radical claims.

**EDUC 8135-3. Seminar: Research on Teaching.** Provides a historical perspective of research on teaching, focusing on the evolution of conceptual frameworks, research methods, and research findings. Examines substantive and methodological issues that underlie contemporary research on teaching. Explores areas of research including teacher knowledge and beliefs, teaching for understanding, understanding student thinking, motivation and volition, and classroom assessment.

**EDUC 8145-3. Seminar: Research on Teacher Education and Learning to Teach.** Explores substantive and methodological issues that underlie current research and program development efforts in teacher education and learning to teach. Considers the learning and development of experienced and novice teachers, with an emphasis on learning to teach in ways that conform to reform-based educational ideas.

**EDUC 8348-3. Seminar: Human Development.** Intensive study of selected topics in cognitive development with emphasis on sociocultural theory and its applications. Prereq., EDUC 6318 or instructor consent.

**EDUC 8358-3. Seminar: Human Learning.** Reviews in depth a limited number of currently active topics in cognitive psychology to reveal unresolved research problems. Each participant is responsible for presenting a research proposal and for being an informed critic of the presentations of others.

**EDUC 8368-3. Seminar: Instructional Psychology.** Introduces and intensively studies small sample research designs. Explores selected topics in instructional psychology. Prereq., EDUC 6318 or instructor consent.

**EDUC 8804 (1-3). Special Topics.** Designed to meet needs of graduate students with topics of pertinent interest.

**EDUC 8844 (1-4). Doctoral Independent Study.**

**EDUC 8855 (1-4). Independent Study in Instruction and Curriculum in Content Areas—Doctoral Level.**

**EDUC 8866 (1-4). Independent Study in Research and Evaluation Methodology—Doctoral Level.**

**EDUC 8888 (1-4). Independent Study in Educational and Psychological Studies—Doctoral Level.**

**EDUC 8899 (1-4). Independent Study in Social, Multicultural, and Bilingual Foundations—Doctoral Level.** Prereq., instructor consent required.

**EDUC 8935 (1-6). Internship in Instruction and Curriculum in Content Areas.**

**EDUC 8936 (1-6). Internship in Research and Evaluation Methodology.**

**EDUC 8938 (1-6). Internship in Educational and Psychological Studies.**

**EDUC 8939 (1-6). Internship in Social, Multicultural, and Bilingual Foundations.** Prereq., instructor consent required.

**EDUC 8994 (1-10). PhD Doctoral Dissertation.**

# College of Engineering and Applied Science

## Aerospace Engineering Sciences

**ASEN 1000-1. Introduction to Aerospace Engineering Sciences.** Introduces aerospace history, curriculum, and the many areas of emphasis within aerospace engineering. Field trips are arranged to industries. Students must give an oral presentation and/or paper on various aerospace topics.

**ASEN 2500-3. Gateway to Space.** Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry, and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry. Restricted to freshmen in engineering or science. Same as ASEN 4500, ASTR 2500.

**ASEN 3200-4. Orbital Mechanics/Attitude Dynamics and Control.** Presents the fundamentals of orbital mechanics, 3D rigid body dynamics, satellite attitude dynamics and controls, and the space environment. Prereqs., ASEN 2003, ASEN 2004, and APPM 2380.

**ASEN 3300-4. Aerospace Electronics and Communications.** Lab course that provides the fundamentals of electronics and communications widely used in aerospace engineering. Includes instrumentation electronics, satellite communication principles, and key electrical and computer subsystems in spacecraft and aircraft. Students gain considerable experience with both analog and computer instrumentation. Prereqs., ASEN 2003, APPM 2380, and PHYS 1120.

**ASEN 4010-3. Introduction to Space Dynamics.** Topics include central force fields and satellite orbits, orbital transfer problems, and rigid body dynamics of space vehicles. Prereq., ASEN 3200 or equivalent, or instructor consent.

**ASEN 4090-3. Global Positioning Systems Applications.** Focuses on GPS technology, software development, and applications. Lectures will cover the principal concepts used in GPS, and weekly laboratories will apply that knowledge. The course will culminate in student design projects using GPS. Prereqs., APPM 2380 or equivalent, and GEEN 1300 or equivalent. Recommended prereq., junior or senior standing in engineering.

**ASEN 4500-3. Gateway to Space.** Recommended prereqs., APPM 1360 or MATH 2300 and PHYS 1120. Same as ASEN 2500. Similar to ASTR 2500.

**ASEN 5010-3. Spacecraft Attitude Dynamics and Control.** Studies the rotational motion of spacecrafts, including attitude parameters and spacecraft torques. Applies Euler equations to the attitude motions of simple spacecrafts and their stability. Prereq., ASEN 3200 or equivalent.

**ASEN 5050-3. Space Flight Dynamics.** Includes celestial mechanics, space navigation, and orbit determination; trajectory design and mission analysis trajectory requirements; and orbital transfer and rendezvous. Prereq., ASEN 3200 or instructor consent.

**ASEN 5060-3. Satellite Geodesy.** Provides a unique and valuable approach to the study of the Earth's gravitational field and rotational characteristics, emphasizing Earth-based and space-based tracking of artificial satellites. Develops and applies the basic techniques for studying the physical Earth in this evolving field. Prereq., ASEN 3200.

**ASEN 5070-3. Introduction to Statistical Orbit Determination 1.** Develops the theory of batch and sequential (Kalman) filtering, including a review of necessary concepts of probability and statistics. Course work includes a term project that allows students to apply classroom theory to an actual satellite orbit determination problem.

**ASEN 5080-3. Introduction to Statistical Orbit Determination 2.** Continuation of ASEN 5070. Emphasizes orthogonal transformation techniques such as Givens and Householder, square root filtering and smoothing, and considers covariance analysis. Also includes coordinate systems, force models, and time and polar motion. Requires term project that involves the application of many of the techniques required for precise orbit determination.

**ASEN 5090-3. Global Positioning System Software and Applications.** The global positioning system is an important tool for navigation, science, and engineering. Describes GPS, its significant error sources, and state-of-the-art modeling techniques. Programming experience required. Prereq., graduate standing or instructor consent.

**ASEN 5190-3. Global Positioning System Technology.** Provides a laboratory introduction to the technology used in Global Positioning System. Lab exercises include using GPS receivers, designing simple circuits to generate GPS-like signals, analyzing spread spectrum signals, constructing GPS antennas, and evaluating errors in basic GPS measurements.

**ASEN 6060-3. Advanced Space Flight Dynamics.** Topics include perturbations of orbital motion; classical orbit determination from angles-only observation; modern orbit determination using range and range-rate data; orbit transfer using impulses or continuous thrust; and others. Prereq., ASEN 5050 or instructor consent.

**ASEN 6210-1. Remote Sensing Seminar.** Covers subjects pertinent to remote sensing of the Earth, including oceanography, meteorology, vegetation monitoring, and geology. Emphasizes techniques for extracting geophysical information from satellite data. Prereq., graduate standing.

**ASEN 6220-3. Topics in Remote Sensing.** Covers infrared and microwave techniques for remote sensing, emphasizing oceanographic applications, fundamentals of electromagnetic radiation, remote sensing instrumentation (radars and radiometers), and conversion of sensory data to geophysical parameters, including sea surface topography, temperature, and atmospheric moisture. Prereq., graduate standing and instructor consent.

**ASEN 6950 (1-6). Master's Thesis.**

**ASEN 8990 (16-24). Doctoral Thesis.**

## Fluid Mechanics

**ASEN 1011-3. Science of Flight.** Science of flight, its history and fundamental engineering concepts. Basic understanding of lift and drag, airfoils, and aerodynamic shapes. Elements of aircraft design performance, stability, and control. Controlled enrollment, ASEN freshmen only.

**ASEN 2001-5. Aerospace 1: Introduction to Statics, Structures, and Materials.** Introduces the fundamental analytical tools for statics and structures in the context of aerospace materials. Integrates science of materials, mechanical properties, and manufacturing of aerospace structures. Includes hands-on laboratory experiments and team design exercises. Prereqs., APPM 1360 or MATH 2300, PHYS 1110, CHEM 1111 or CHEN 1211, and CHEM 1221. Coreqs., APPM 2350 and ASEN 2002, or equivalent.

**ASEN 3111-4. Aerodynamics.** Teaches the fundamental concepts of aerodynamics and provides a working knowledge for their application to the design of aircraft and launch vehicles operating at various speeds and altitudes, as well as the atmospheric forces on satellites. Prereqs., ASEN 2002.

**ASEN 5021-3. Viscous Flow.** Studies Low Reynolds number flows, including incompressible and compressible laminar boundary layer theory; similarity theory; and separation, transition, and turbulent boundary layers. Prereq., ASEN 5051 or equivalent, or instructor consent.

**ASEN 5051-3. Fluid Mechanics.** Highlights physical properties of gases and liquids; kinematics of flow fields; and equations describing viscous, heat-conducting Newtonian fluids. Emphasizes exact solutions and rational approximations for low and high speed dissipative flows, surface and internal waves, acoustics, stability, and potential flows. Prereq., instructor consent.

**ASEN 5061-3. Real Gas Dynamics.** Explores physics of particles, physics of uniform fluids, kinetic description of fluids, transport phenomena, and radiation transport. Prereqs., ASEN 4013 or instructor consent.

**ASEN 5111-3. Introduction to Aeroelasticity.** Introduces static and dynamic aeroelasticity of airfoils and wings. Covers the classical aeroelasticity theory and gives a brief overview of computational methods applied to aeroelastic problems. Prereqs., ASEN 3111, MATH 3130, and MATH 4430, or equivalent, or instructor consent.

**ASEN 5151-3. High Speed Aerodynamics.** Provides aerodynamic theory applicable to the high speed flight of subsonic, transonic, and supersonic aircraft, and hypersonic vehicles. Topics include linear theory of subsonic and supersonic speeds, the nonlinear theories of transonic and hypersonic speeds, and compressible boundary layers. Prereq., graduate standing or instructor consent.

## Materials and Structures

**ASEN 2002-5. Aerospace 2: Introduction to Thermodynamics and Aerodynamics.** Introduces the fundamental principals and concepts of thermodynamics and fluid dynamic systems. Emphasizes the synthesis of basic science

(physics), mathematics, and experimental methods that form the basis for quantitative and qualitative analyses of general aerospace technology systems. Prereqs., APPM 1360, GEEN 1300, CHEM 1211, and CHEN 1221, and PHYS 1110, or equivalent. Coreqs., APPM 2350 and ASEN 2001, or equivalent.

**ASEN 3112-4. Structures.** Covers methods of stress and deformation analysis applicable to the analysis of aircraft and space structures, and introduces the design of structural components. Prereq., ASEN 2001.

**ASEN 4012-3. Aerospace Materials.** Reviews major lightweight aluminum alloys, ceramic, composite materials, and the impact of the environmental atmosphere and radiation of space has on advanced alloys. Titanium, nickel, and superalloys are reviewed in terms of their current and future applications as turbine blade, disk, and structural materials. Prereqs., APPM 2380, ASEN 3112, 3113, or MCEN 3022, 3024.

**ASEN 5012-3. Mechanics of Aerospace Structures.** Applies fundamental concepts of continuum mechanics, theory of elasticity, and energy methods to the analysis of thin structures of importance in aerospace products. Provides a brief introduction to alternative design concepts considering shape, weight, cost, and safety tradeoffs. Prereqs., APPM 2360 and ASEN 2001, 2003, and 3112, or equivalent. Similar to MCEN 5023.

**ASEN 5022-3. Dynamics of Aerospace Structures.** Applies concepts covered in undergraduate dynamics, structures, and mathematics to the dynamics of aerospace structural components, including methods of dynamic analysis, vibrational characteristics, vibration measurements, and dynamic stability. Prereqs., ASEN 5012, 5227, or equivalent. Recommended prereq., MATH 3130.

**ASEN 5122-3. Control of Aerospace Structures 1.** Introduces the basic problems in dynamic modeling and active control of large spacecraft and satellites. Includes system descriptions, model reduction, controller design, and closed-loop stability analysis. Prereq., ASEN 3200, graduate standing, or instructor consent.

**ASEN 5212-3. Composite Structures and Materials.** Develops the macromechanical and micromechanical theory of the elastic behavior and failure of composite laminates. Applies basic theory to a broad range of practical problems including the buckling and vibration of composite plates, columns, and shells. Prereq., senior standing in aerospace or mechanical engineering, or instructor consent.

## Thermodynamics and Propulsion

**ASEN 2003-5. Aerospace 3: Introduction to Dynamics and Systems.** Introduces the principles of particle and rigid body dynamics, vibrations, systems, and controls. Topics include kinematics, kinetics, energy methods, orbits, system modeling, and simple feedback control. Class includes experimental and design laboratory exercises for aerospace applications of dynamic principles. Prereqs., APPM 2350 or MATH 2400, and ASEN 2001.

**ASEN 3113-4. Thermodynamics and Heat Transfer.** Focuses on the applications of the first and second laws of thermodynamics to control volumes and teaches the fundamental concepts of different modes of energy and heat transfer. Learn to use these concepts in gas dynamics, high-speed vehicle design, environmental systems, and energy analysis. Prereqs., APPM 2350 or MATH 2400, and ASEN 2002.

**ASEN 4013-3. Foundations of Propulsion.** Describes aerothermodynamics and design of air-breathing engines, including ram jets, turbo jets, turbo fans, and turbo prop engines. Prereqs., ASEN 3113.

**ASEN 5013-3. Advanced Propulsion.** Chemical combustion calculations for multicomponent gases and application to air-breathing and rocket propulsion systems; performance criteria and scaling laws; introduction to chemical reaction rates; combustion instability and nozzle heat transfer; ion propulsion and mhd generators. Prereq., ASEN 4013 or instructor consent.

**ASEN 5053-3. Rocket Propulsion.** An in depth presentation of the theory, analysis, and design of rocket propulsion systems. Liquid and solid propellant systems are emphasized with an introduction to advanced propulsion concepts. Nozzle and fluid flow relationships are reviewed for background. Prereq., senior standing in ASEN or MCEN, or instructor consent.

## Systems and Control

**ASEN 2004-5. Aerospace 4: Aerospace Vehicle Design and Performance.** Introduction to the analysis and design of aircraft and spacecraft performance. Aircraft design topics include cruise performance, wing design, propulsion, stability, and control. Spacecraft design topics include rocket staging, orbit se-

lection, launch systems, and spacecraft subsystems. Includes hands-on laboratory experiments and team design exercises. Prereqs., APPM 2350 or MATH 2400; ASEN 2001, 2002.

**ASEN 4034-3. Stochastic Methods Systems Engineering.** Development of stochastic models used in aerospace and other systems engineering and optimization problems. Review of probability theory, stochastic models used in decision theory, random processes, queuing theory, information theory, reliability, and quality control. Computer solutions required. Same as ASEN 5034.

**ASEN 4054-3. Operations Research Mod Systems Engineering.** Mathematical methods of operations research applicable to systems engineering. Topics include classical optimization methods, linear, dynamic, and nonlinear programming, game theory, network models, production and inventory control, forecasting and time series, and simulation models. Computer solutions required. Same as ASEN 5054.

**ASEN 4114-3. Automatic Control Systems.** Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode, and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Prereqs., ASEN 3128 and 3200. Same as ASEN 5114.

**ASEN 5014-3. Linear Control Systems.** Highlights design of linear systems, using frequency methods, other methods of design, and introduction to sampled data systems. Prereq., ASEN 3200. Coreq., ASEN 4114.

**ASEN 5024-3. Nonlinear Control Systems.** Continuation of ASEN 5014. Introduces nonlinear systems, generalized Lagrangian mechanics, Liapunov method, and calculus of variations. Also covers Pontryagin methods, general optimal control, Hamilton-Jacobi optimization, and Kalman equation. Prereq., ASEN 5014.

**ASEN 5034-3. Stochastic Methods for Systems Engineering.** Same as ASEN 4034.

**ASEN 5054-3. Operations Research Models for Systems Engineering.** Same as ASEN 4054.

**ASEN 5114-3. Automatic Control Systems.** Same as ASEN 4114.

## Geophysical and Environmental

**ASEN 4255-3. Environmental Aerodynamics.** A review of the properties and causes of hazards posed by the environment, ranging from atmospheric wind shear to tornadic flows. Involves a multidisciplinary approach combining analytical, numerical, scale modeling studies with extensive field measurements, wind energy, and biophysical aerodynamics. Prereq., senior standing in ASEN. Same as ASEN 5255.

**ASEN 5215-3. Oceanography.** Prereq., graduate standing. Same as ASEN 4215 and ATOC 5215.

**ASEN 5225-3. Thermodynamics of Atmospheres and Oceans.** Examines the thermodynamics of water in the Earth's atmosphere, including the formation of clouds and cloud physics. Studies atmospheres of Venus and Mars and examines thermodynamics of oceans and sea ice. Prereq., ASEN 3113, or instructor consent.

**ASEN 5235-3. Remote Sensing of the Atmosphere and Oceans.** Applies principles of radiative transfer to the remote sensing of the Earth's atmosphere and oceans. Topics include extinction and scattering-based remote sensing, emission-based passive remote sensing, and active remote sensing. Prereq., ASEN 5225 or instructor consent.

**ASEN 5245-3. Radar and Remote Sensing.** Examines active techniques of remote sensing, wave propagation in the Earth's atmosphere, and signal-to-noise ratio in radio and radar. Looks at pulse-doppler, FV-CW, chirp, and synthetic aperture radars. Also includes scattering processes and applications of radar to remote sensing of the atmosphere, sea, and land. Prereqs., ECEN 3300 and 3410 or instructor consent. Same as ECEN 5254.

**ASEN 5255-3. Environmental Aerodynamics.** Reviews the properties and causes of hazards posed by the environment, ranging from atmospheric wind shear to tornadic flows. Involves a multidisciplinary approach, combining analytical, numerical, and scale modeling studies with extensive field measurements, wind energy, and biophysical aerodynamics. Prereq., senior standing in aerospace engineering.

**ASEN 5315-3. Ocean Modeling.** Introduces students to basic principles behind, and the current practices in, ocean modeling. Discusses different prevailing approaches. Offers students hands-on experience with the use of supercom-

puters and workstations for model running and pre- and post-processing. Prereqs., graduate standing or instructor consent.

**ASEN 5325-3. Small Scale Processes in Geophysical Fluids.** Provides an overview of mixing and wave processes in the oceans and the atmosphere. Topics include turbulent boundary layers in the lower atmosphere and the upper ocean, air-sea interactions, and surface and internal waves. Prereq., graduate standing or instructor consent.

**ASEN 5335-3. Aerospace Environment.** Examines the various components of the solar-terrestrial system (sun, solar wind, magnetosphere, thermosphere, ionosphere, middle atmosphere) and their interactions to provide a solid understanding of the reentry and orbital environments within which aerospace vehicles operate. Prereq., senior or graduate standing in engineering or related physical sciences.

## Bioengineering

**ASEN 3116-3. Introduction to Biomedical Engineering.** Addresses human responses to environment and physical stimuli. Makes use of engineering and physical principles in the study of human dynamics. Prereq., MCDB 1150 or instructor consent.

**ASEN 4216-3. Neural Signals.** Information processing in the brain and peripheral nervous system analyzed in terms of fundamental signaling processes that occur at the neuronal level. Biophysical bases for these processes, neural impulse generation, synaptic communication, sensory reception, of molecular and membrane mechanisms. Prereq., instructor consent. Same as ASEN 5216 and ECEN 4811/5811.

**ASEN 4426-3. Neural Systems.** Surveys behavioral, neurophysiological, and biochemical controls manifested by the central nervous system. Provides biological background material for application of formal control theory. Prereq., ASEN 3116 or instructor consent. Same as ASEN 5426 and ECEN 4821/5821.

**ASEN 4436-3. Brains, Minds, Computers.** An introductory, integrative survey of brain science, cognitive science, artificial intelligence, and their interrelations. Considers central concepts and principles from each of these areas and the similarities and difference of brain, minds, computers, robots, etc. Prereq., senior standing. Same as ASEN 5436 and ECEN 4831/5831.

**ASEN 5016-3. Fundamentals of Space Life Sciences.** Familiarizes students with factors affecting living organisms in the reduced-gravity environment of space flight. Covers basic life support requirements, human physiological adaptations, and cellular-level gravity dependent processes with emphasis on technical writing and research proposal preparation. Prereq., graduate standing in engineering or instructor consent.

**ASEN 5116-3. Spacecraft Life Support Systems.** Provides a working knowledge of the systems needed to sustain human life in a spacecraft environment. Emphasis is on understanding functional requirements of a life support system; operational details of subsystem technologies; new concepts currently being considered in NASA's advanced programs; and conducting a technical trade study. Prereq., graduate standing in engineering or instructor consent.

**ASEN 5216-3. Neural Signals.** Same as ASEN 4216 and ECEN 4811/5811.

**ASEN 5426-3. Neural Systems.** Same as ASEN 4426 and ECEN 4821/5821.

**ASEN 5436-3. Brains, Minds, Computers.** Prereq., graduate standing. Same as ASEN 4436, ECEN 4831/5831.

**ASEN 5506 (1-3). Bioastronautics Seminar.** Focuses on research areas in space flight medical and biological topics ranging from human responses to molecular-level concerns. Literature analysis and scientific presentations are expected. Emphasis is on biophysical mechanisms, comprehensive models, and related technology development. Prereq., ASEN 5016 or instructor consent.

## Computational and Analytic Methods

**ASEN 4047-3. Probability and Statistics for Aerospace Engineering Sciences.** Considers probability concepts and theory for better design and control of aerospace engineering systems. Includes descriptive and inferential statistical methods for experimental analysis. Also covers discrete and continuous random variable distributions, estimators, confidence intervals, regression, analysis of variance, hypothesis testing, nonparametric statistics, random processes, and quality control, including software models of same. Prereq., junior or graduate standing or instructor consent. Same as ASEN 5047.

**ASEN 4337-3. Remote Sensing Data Analysis.** Involves the use of both instrument systems and software systems for data collection and analysis. Studies systems and carries out student projects to assess, evaluate, and use design concepts and facilities. Prereqs., senior or graduate standing or instructor consent. Same as ASEN 5337.

**ASEN 5007-3. Introduction to Finite Elements.** Introduces finite element methods used for solving linear problems in structural and continuum mechanics. Covers modeling, mathematical formulation, and computer implementation. Prereq., matrix algebra.

**ASEN 5037-3. Turbulent Flow Computation.** Studies turbulent closure methods and computational procedures used to solve practical turbulent flows. Emphasizes multi-equation models used with time-averaged equations to calculate free-turbulent shear-flows and turbulent boundary layers. Employs spectral methods in direct and large-eddy simulation of turbulence. Prereq., ASEN 5051 or equivalent.

**ASEN 5047-3. Probability and Statistics for Aerospace Engineering Sciences.** Same as ASEN 4047.

**ASEN 5107-3. Nonlinear Finite Element Methods.** Continuation of ASEN 5007. Covers the formulation and numerical solution of nonlinear static structural problems by finite element methods. Emphasizes the treatment of geometric nonlinearities and structural stability. Prereq., ASEN 5007.

**ASEN 5227-3. Mathematics for Aerospace Engineering Sciences 1.** Covers vector and tensor analysis with linear algebra, complex analysis, and calculus of variations. Prereq., APPM 2350.

**ASEN 5307-3. Engineering Data Analysis Methods.** Gives students broad exposure to a variety of traditional and modern statistical methods for filtering and analyzing data. Introduces these methods and provides practical experience with their use. Students carry out problem assignments. Prereq., APPM 2360.

**ASEN 5327-3. Computational Fluid Mechanics.** Advanced computational methods are introduced for solving fluid mechanics problems on the computer with emphasis on nonlinear flow phenomena. Prereq., ASEN 5417 or instructor consent.

**ASEN 5337-3. Remote Sensing Data Analysis.** Same as ASEN 4337.

**ASEN 5347-3. Math Methods in Dynamics.** Two-part graduate-level course on dynamics. Covers both flexible and rigid multibody analytical dynamics and finite element method for dynamics. Emphasizes formulations that naturally lead to easy computer implementation and stability, linearization, and modern rotational kinematics. Prereqs., graduate standing and instructor consent.

**ASEN 5367-3. Advanced Finite Element Methods.** Continuation of ASEN 5007. Covers more advanced applications to linear static problems in structural mechanics, including three-dimensional finite elements, advanced variational principles, beams, plates, and shells. Prereqs., ASEN 5007 or equivalent, MCEN 5120 and 5130, or equivalent.

**ASEN 5417-3. Numerical Methods for Differential Equations.** Provides computational skills and basic knowledge of numerical methods for advanced courses in engineering/scientific computation using FORTRAN, C, or MATLAB. Prereq., APPM 2360 or 2380, and instructor consent.

**ASEN 5427-3. Computational Gas Dynamics.** Modern computational version of pertinent to gas dynamics, stressing the relationships with and differences between general numerical analysis, general computational fluid dynamics, and classical gas dynamics. Prereqs., ASEN 5417 or instructor consent.

**ASEN 5517-3. Computational Methods In Dynamics.** Continuation of mathematical methods in dynamics. Covers numerical algorithms, computer implementation aspects, and treatment of constraints and nonlinear rotational computational techniques. Emphasizes the combined numerical and physics characterization for the solution of dynamical systems. Prereq., ASEN 5347.

## Design

**ASEN 3128-4. Aircraft Dynamics.** Teaches the fundamental concepts of aircraft dynamics. Covers flight mechanics, performance, dynamics and control of aircrafts, and how they impact aircraft design. Prereqs., APPM 2380, ASEN 2002, 2004.

**ASEN 4018-4. Senior Projects 1: Design Synthesis.** Focuses on the synthesis of technical knowledge, the design process, and communications, within a team environment. Goal is learning the sequence of steps that culminate in the critical design review. Prereq., senior standing.

**ASEN 4028-4. Senior Projects 2: Design Practicum.** Fabrication, integration, and verification of the designs produced in ASEN 4018. Students work within the same teams from ASEN 4018. Prereq., ASEN 4018 and instructor consent.

**ASEN 4138-3. Aircraft Design.** One recitation and two labs per week. Examines principles of aircraft layout to meet a given specification, taking account of both aerodynamic and structural considerations. Also includes design of major elements of an aircraft. Prereq., ASEN 3128.

**ASEN 4148-3. Spacecraft Design.** Provides a systems approach to the design of an unmanned spacecraft, including guest lectures from specialists in each of the disciplines that make up a spacecraft design team. Topics include mission design, payload, launch systems, tracking and data systems, communications, structures, guidance, and control. Prereq., instructor consent. Same as ASEN 5148.

**ASEN 4158-3. Space Habitat Design.** Uses systems engineering methods for designing a spacecraft intended for human occupancy. Emphasis is on identifying mission objectives and subsequently deriving engineering requirements; subsystem integration issues; human factors; and mission operations. Prereq., senior standing in engineering or instructor consent. Same as ASEN 5158.

**ASEN 4218-3. Large Space Structures Design.** Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design. Prereq., senior standing in ASEN or MCEN, or instructor consent. Same as ASEN 5218.

**ASEN 4238-3. Computer-Aided Control Systems Design.** Covers software and multivariable control system synthesis and analysis techniques for typical aircraft and spacecraft control problems. Formulates control problems and synthesizes control functions using pole placement and linear quadratic techniques. Prereq., ASEN 3024.

**ASEN 4248-3. Computer-Aided Control System Design 2.** Studies Multivariable Computer-Aided Control System Design using modern linear-quadratic techniques for design and multivariable frequency domain singular value methods for design evaluation. Emphasizes the synergistic use of classical design insights and modern control design tools. Prereq., ASEN 4238.

**ASEN 4338-3. Computer Analysis of Structures.** Covers basic structural design concepts and finite element modeling techniques. Emphasizes use of finite element static and dynamic analysis to validate and refine an initial design. Introduces basic design optimization and tailoring. Prereq., ASEN 3022.

**ASEN 5148-3. Spacecraft Design.** Same as ASEN 4148.

**ASEN 5158-3. Space Habitat Design.** Prereq., graduate standing in engineering or instructor consent. Same as ASEN 4158.

**ASEN 5168-3. Remote Sensing Instrumentation Design.** Studies design of instruments for remote sensing in a space environment, including optical and mechanical design, modern detector technology, and test and calibration. Examines past and future NASA missions—spacecraft, subsystems, and experiment payloads.

**ASEN 5218-3. Design of Large Space Structures.** Same as ASEN 4218.

## Specialized Topics

**ASEN 2519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the lower-division level. Course content is indicated in the *Registration Handbook and Schedule of Courses*. Prereq., varies.

**ASEN 2849 (1-3). Independent Study.** Study of special projects agreed upon by student and instructor. Prereq., instructor consent.

**ASEN 3519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the *Registration Handbook and Schedule of Courses*. Prereq., varies.

**ASEN 4519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the *Registration Handbook and Schedule of Courses*. Prereq., varies.

**ASEN 4849 (1-6). Independent Study.**

**ASEN 4859 (1-6). Undergraduate Research.** Assigns a research problem on an individual basis.

**ASEN 5519 (1-3). Selected Topics.** Reflects upon specialized aspects of aerospace engineering sciences. Course content indicated in the *Registration Handbook and Schedule of Courses*. Prereq., varies.

**ASEN 5849 (1-6). Independent Study.** Study of special projects.

**ASEN 6519 (1-3). Special Topics.** Reflects upon specialized aspects of aerospace engineering sciences. Course content indicated in the *Registration Handbook and Schedule of Courses*. Prereq., varies.

**ASEN 6849 (1-6). Independent Study.** Studies special projects agreed upon by student and instructor.

## Architectural Engineering

### Building Systems Engineering

**AREN 2050-3. Engineering Systems for Buildings.** Provides an overview of the structural, mechanical, and electrical systems used in buildings, with special emphasis on sustainable practices for building design. Includes team project work in studying the systems in a building on the CU-Boulder campus. Prereq., AREN 1017. Recommended prereq., AREN 1027.

**AREN 2110-3. Thermodynamics.** Explores fundamental principles of thermodynamics, including first and second law of thermodynamics, thermophysical properties, power and refrigeration cycles, gas mixtures and psychrometrics. Computing in the context of engineering problems is introduced. Prereqs., APPM 1360 and PHYS 1110.

**AREN 2120-3. Fluid Mechanics and Heat Transfer.** Explores fundamental principles of fluid dynamics and heat transfer. Topics include fluid statics, momentum, and energy conservation, laminar and turbulent viscous flow, convection heat transfer, conduction heat transfer, heat exchangers, and heat transfer. Prereqs., APPM 2350 and AREN 2110. Coreq., APPM 2360.

**AREN 3010-3. Mechanical Systems for Buildings.** Examines psychrometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems. Prereqs., AREN 2110, 2120, and 3050.

**AREN 3050-3. Environmental Systems for Buildings 1.** Introduces the operation and design of building systems for climate control, water and drainage, life safety, electrical supply, illumination, transportation (elevators and escalators), and noise control. For non-engineering majors.

**AREN 3060-3. Environmental Systems for Buildings 2.** Continues the operation and design of building systems for climate control, water and drainage, life safety, electrical supply, illumination, transportation (elevators and escalators), and noise control. For non-engineering majors.

**AREN 3130-3. Building Energy Laboratory.** Two lectures, one 3-hour lab per week. Offers a laboratory course on mechanical systems in buildings, focusing on building applications of thermodynamics, fluid dynamics, and heat transfer. Applications include solar collectors, pumps, fans, heat exchangers, and air conditioning and refrigeration systems. Prereq., AREN 3010.

**AREN 3140-3. Illumination Laboratory.** Introduces the measurement of photometric and psychophysical quantities used in lighting. Experience is acquired in using light measurement instruments to evaluate lighting equipment and luminous environments. Prereq., AREN 3540.

**AREN 3540-3. Illumination I.** Studies the fundamentals of architectural illumination. Introduces and applies basic principles and vocabulary to elementary problems in the lighting of environments for the performance of visual work and the proper interaction with architecture. Prereq., AREN 3060.

**AREN 4110-3. HVAC Design 1.** Highlights the design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Covers HVAC systems description, load estimating, code compliance, duct design, fan systems, applied psychrometrics, cooling and heating coils, filters, hydronic systems, piping, and pumps. One of several capstone courses available to architectural engineering students. Prereq., AREN 3010. Same as CVEN 5110.

**AREN 4540-3. Exterior Lighting Systems.** Engages students in exploring and solving lighting problems for exterior environments. Provides an understanding of the design criteria and lighting equipment used in three primary exterior applications: parking lots and roadways, floodlighting of buildings, and sports fa-

cilities. Prereq., AREN 3540. Recommended prereqs., AREN 3140 and 4550. Same as CVEN 5540.

**AREN 4550-3. Illumination 2.** Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings. One of several capstone courses available to architectural engineering students. Prereq., AREN 3540.

**AREN 4560-3. Luminous Radiative Transfer.** Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis. Prereq., AREN 3540.

**AREN 4570-3. Building Electrical Systems Design 1.** Introduces the generation and distribution of electrical power. Focuses on understanding the loads, control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings. Prereq., ECEN 3030.

**AREN 4580-3. Daylighting.** Studies design process and lighting calculation techniques for the synthesis and analysis of daylighting in modern buildings. Covers integration with electric lighting and other building subsystems. Prereq., AREN 3540 and AREN 4560.

**AREN 4590-3. Computer Graphics in Lighting Engineering.** Studies the numerical methods and computer implementation of computer graphics visualization for architectural lighting engineering and design. Implements finite element radiative transfer and ray-tracing in computer programs. Studies the use of computer graphics visualization in lighting analysis. Prereq., AREN 3540 and 4560.

## Structures

**AREN 4035-3. Architectural Structures 1.** Analyzes basic structural systems. Covers principles of mechanics and mechanical properties of materials and analysis and design of trusses, arches, and cable structures. For nonengineering students; does not apply toward an engineering degree. Prereq., PHYS 1110, and APPM 1350 or MATH 1300.

**AREN 4045-3. Architectural Structures 2.** Analyzes basic structural systems. Covers principles of mechanics as applied to the design of flexural members, columns, continuous beams, and rigid frames. For nonengineering students; does not apply toward an engineering degree. Prereq., AREN 4035.

**AREN 4315-2. Design of Masonry Structures.** Covers modern masonry construction; properties and behavior of the reinforced masonry component materials, clay and concrete masonry units, mortar, grout, and steel reinforcement; vertical and lateral load types and intensities; and design of reinforced masonry walls, beams, and columns by working stress and strength design methods.

## Construction

**AREN 3406-3. Introduction to Building Construction.** Covers the broad subject of building materials, assembly details, and their method of construction. Includes codes and classifications, foundations, wood, steel, concrete, masonry, cladding, doors and windows, interiors, and finishes.

**AREN 4416-3. Construction Costs and Estimating.** Introduces building construction costs accounting and controls, analysis of direct and indirect cost fundamentals and collecting systems, methods engineering and value engineering. Includes a study of types of estimates, quantity take-off techniques and pricing applications, and preparation of a detailed estimate for a building project including all cost analyses, a complete quantity survey, development of unit prices, and final assembly of the bid proposal. Prereq., senior standing or instructor consent.

**AREN 4466-3. Construction Planning and Scheduling.** Comprehensively studies construction management, including the contractor's role in preconstruction and construction activities; the construction contract; bonds and insurance; and the particular application of CPM/PERT techniques to the planning, scheduling, and control of a construction project. Prereq., AREN 4416.

## Miscellaneous

**AREN 1017-2. Engineering Drawing.** Offers engineering drawing for beginners. Covers the use of instruments, orthographic projection, pictorial drawing, sections, dimensioning, and working drawings.

**AREN 1027-2. Descriptive Geometry.** Studies orthographic projection, including point, line, and plane problems; angle problems and intersections; and computer graphics using AutoCAD on PCs. Prereq., GEEN 1017 or equivalent.

**AREN 1316-1. Introduction to Architectural Engineering.** Surveys the broad subject of architectural engineering and professional practices. Includes professional design services, design documents, methods of construction delivery, materials for construction, codes and standards, life safety, professional ethics, structural systems, mechanical systems, electrical systems, and building systems integration.

**AREN 2300-3. Introduction to Engineering Computing.** Examines three computational tools: spreadsheets and macros, compiled languages, and symbolic computation. Introduces principles of computing at each level using elementary but practical engineering problems. The course is designed to produce extensive capability with spreadsheets and working competency in programming. Prereqs., APPM 1350, 1360, and PHYS 1120.

**AREN 4317-3. Architectural Engineering Design.** Provides a capstone experience to AREN students. Students design a modest commercial building and complete an integrated engineering design of the building systems executed for the conceptual, schematic, and design development phases. Student teams work on life safety, structural, mechanical, and electrical design. Each stage has a professional-quality design document. All members of AREN and some structural faculty participate in the teaching and evaluation of designs. Prereqs., AREN 3010, 3540, 4560, CVEN 3406 and 3535. Recommended prereqs., ARCH 4010, AREN 4110, 4416, 4545, and CVEN 4545 and 4555.

## Special Topics

**AREN 4830-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

**AREN 4837-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

**AREN 4849 (1-3). Independent Study.** Offers an independent, in-depth study, research, or design in a selected area of architectural engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering. Numbered AREN 4840 through AREN 4849.

## Chemical Engineering

**CHEN 1000-3. Creative Technology.** Lect. Introduces undergraduate arts and sciences students to the most recent concepts in technology and how these concepts impact all aspects of life, such as health, the health of the planet, and social structures. Engineering students should consult an advisor before registering for this course. Approved for arts and sciences core curriculum: natural science.

**CHEN 1211-3. General Chemistry for Engineers.** Lect. A one-semester course designed to meet the general chemistry requirement for engineering students. Topics include stoichiometry; thermodynamics; gases, liquids, and solids; equilibrium; acids and bases; bonding concepts; kinetics; reactions; and materials science. Examples and problems illustrate the application of chemistry to engineering subdisciplines. Restricted to students in the College of Engineering and Applied Science; one year of high school chemistry or C- or higher in CHEM 1001 or 1021; and high school algebra. Not recommended for students with grades below B- in CHEM 1001 or 1021. Students may receive credit for only one of CHEM 1111, 1151, and CHEM 1211. Coreq., CHEM 1221.

**CHEN 1300-1. Introduction to Chemical Engineering.** Meets for one lecture per week. Introduces chemical engineering emphasizing history of the profession, curriculum, chemical industry, and industrial chemistry. Includes industry visits, oral presentations, faculty and professional meetings, and development of a goals statement.

**CHEN 2120-3. Chemical Engineering Material and Energy Balances.** Provides a basic understanding of chemical engineering calculations involving material and energy balances around simple chemical processes. Prereq., CHEM 1211. Coreq., GEEN 1300 (or CSCI 1300).

**CHEN 2800-3. Biophysics of Extreme Environments.**

**CHEN 2840 (1-4). Independent Study.** Available to sophomores with approval of Department of Chemical Engineering. Subject arranged to fit needs of student.

**CHEN 3010-3. Applied Data Analysis.** Teaches students to analyze and interpret data. Topics include engineering measurements, graphical presentation and numerical treatment of data, statistical inference, and regression analysis. Prereqs., GEEN 1300 (or CSCI 1300) and APPM 2360.

**CHEN 3130-2. Chemical Engineering Laboratory 1.** One four-hour lab session per week. Investigates chemical engineering fluid flow, heat transfer, and thermodynamics. Emphasizes communication by written reports and oral presentations as well as laboratory safety. Prereq., CHEN 3010 and CHEN 3210. Coreq., CHEN 3320.

**CHEN 3200-3. Chemical Engineering Fluid Mechanics.** Introduces fluid mechanics and momentum transfer, emphasizing the application of these principles to chemical engineering systems. Prereqs., APPM 2350 or 2360, CHEN 2120 or MCEN 2022, and GEEN 1300 (or CSCI 1300). Coreq., APPM 2360 (or APPM 2350, if not completed).

**CHEN 3210-3. Chemical Engineering Heat Transfer.** Examines conservation and transfer of thermal energy. Focuses on conduction and convection of heat in the context of chemical processes, with a special focus on heat exchangers. Also studies thermal radiation. Prereq., CHEN 3200 or equivalent.

**CHEN 3220-3. Chemical Engineering Separations and Mass Transfer.** Studies separation methods including distillation, absorption, and extraction, and graphical and computer-based solutions to separation problems. Also studies mass transfer rate processes, including diffusion, microscopic material balances, and correlations for mass transfer coefficients. Applies mass transfer rate theory to packed and tray columns. Prereq., CHEN 3200. Coreq., CHEN 3210 or MCEN 3022.

**CHEN 3320-3. Chemical Engineering Thermodynamics.** Applies thermodynamic principles to nonideal systems, phase equilibrium, chemical equilibrium, power generation, refrigeration, and chemical processes. Prereqs., CHEN 2120, minimum grade C-; CHEM 4511, minimum grade C-.

**CHEN 3700-3. Bioenergetics: Structure and Function.** Introduces molecular biophysics dealing principally with questions related to energy conversion as related to the structure and function of biological macromolecules and organisms. Concludes by considering a variety of biological systems that interface between the physical and engineering sciences.

**CHEN 3840 (1-4). Independent Study.** Available to juniors with approval of the Department of Chemical Engineering. Subject arranged to fit needs of the student.

**CHEN 3930-6. Chemical Engineering Cooperative Education.** Students enrolled in this course participate in a previously arranged, department-sponsored cooperative education program. Prereqs., CHEN 2120 and GPA higher than 2.85. GPA higher than 3.00 strongly recommended.

**CHEN 4010-2. Chemical Engineering Senior Thesis 1.** Provides an opportunity for advanced students to conduct exploratory research in chemical engineering.

**CHEN 4020-2. Chemical Engineering Senior Thesis 2.** Continuation of CHEN 4010. CHEN 4010 and 4020 can substitute for CHEN 4130.

**CHEN 4090-1. Undergraduate Seminar.** Provides chemical engineering career and professional information, facilitates contact with faculty and industry representatives, and improves communication and leadership skills. Consists of a series of seminars and field trips and requires a research project involving a written and oral report.

**CHEN 4130-2. Chemical Engineering Laboratory 2.** Involves planning and execution of chemical engineering experiments on mass transfer operations, separations, and chemical reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports, and oral presentations. Prereqs., CHEN 3130 and 3220. Coreq., CHEN 4330.

**CHEN 4330-3. Chemical Engineering Reaction Kinetics.** Introduces chemical kinetics and chemical reactor design. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer, catalytic reactions, and multiple steady states in reactors. Prereqs., CHEN 2120 and 3320. Coreq., CHEN 3210.

**CHEN 4390-3. Chemical Reactor Engineering.** Prereq., CHEN 4330 and instructor consent. Same as CHEN 5390.

**CHEN 4440-3. Chemical Engineering Materials.** Introduces materials engineering, including properties of polymers, metals, ceramics, and semiconductors, especially as related to chemical engineering processes. Prereq., CHEM 3311. Coreq., CHEM 4511.

**CHEN 4450-3. Polymer Chemistry.** Lect. Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure. Prereq., CHEN 4330 or instructor consent. Same as CHEN 5450.

**CHEN 4460-3. Polymer Engineering.** Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications. Prereq., CHEM 3311 and CHEN 3320, minimum grade C-, or equivalent, or instructor consent. Same as CHEN 5460.

**CHEN 4520-3. Chemical Process Synthesis.** Studies applied chemical process design including equipment specification and economic evaluation. Prereqs., CHEN 3210, 3220, 4330, minimum grade C-. Same as CHEN 5950.

**CHEN 4530-2. Chemical Engineering Design Project.** Provides a team-based capstone design experience for chemical engineering students. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider chemical process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and final written design report. Prereq., CHEN 4520.

**CHEN 4570-4. Instrumentation and Process Control.** Examines principles of control theory and their application to chemical processes. Focuses on single-loop feedback and feedforward control. Laboratory sessions cover measurement fundamentals, signal transmission, dynamic testing, control system synthesis, and implementation and adjustment. Prereq., APPM 2360.

**CHEN 4580-3. Numerical Methods for Process Simulation.** Covers use of macroscopic and microscopic balances for development of mathematical models to describe common chemical engineering unit operations. Also includes numerical methods for solution of model equations. Prereqs., CHEN 3210 and 3220.

**CHEN 4660-3. Cryogenic Engineering.** Investigation of modern cryogenic systems and processes involving mechanical, thermodynamic, heat and mass transfer considerations. Provides insight into refrigeration, liquefaction, separation, and purification processes. Covers equipment, instrumentation, and storage systems. Emphasizes safety aspects in cryogenic processing. Prereq., undergraduate thermodynamics and heat transfer. Same as CHEN 5660.

**CHEN 4670-3. Environmental Separations.** Lect. Covers traditional, as well as new, chemical separations processes that have environmental applications. Includes chemically benign processing (pollution prevention) as well as approaches to address existing pollution problems. Prereqs., senior or graduate student standing and CHEN 2120. Same as CHEN 5670.

**CHEN 4680-3. Environmental Process Engineering.** Lect. Surveys the field of environmental process engineering and covers the topics of waste minimization and pollution, air pollution control, water pollution control, hazardous waste control, risk assessment and management, and ecological systems. Prereq., senior or graduate standing in engineering. Same as CHEN 5680.

**CHEN 4710-3. Molecular Basis of Biological Behavior.** Lect. Offers a problems approach to neurobiology. Covers molecular biology, genetics, biochemistry, and physiology of model behavioral systems from chemotaxis in bacteria to vision in vertebrates to the brain. Prereq., CHEN 3700 and CHEN 4800 or 5800, or instructor consent. Same as CHEN 5710.

**CHEN 4800-3. Bioprocess Engineering.** Lect. and lab. Reviews the recent developments in the fields of microbiology, molecular genetics, and genetic engineering that are of commercial value and benefit to mankind. Covers engineering implementation of such biological processes. Prereq., senior or graduate standing in engineering or science, or instructor consent. Same as CHEN 5800.

**CHEN 4820-3. Biochemical Separations.** Lect. and lab. Presents purification methods, mass transfer coefficients, problems specific to biologicals, and scale-up of processes. Also covers chromatography, phase extraction, supercritical fluids, sedimentation, precipitation, electrophoresis, dialysis, affinity techniques, cell separation, application of separations to bioreactors, and comparison of batch and continuous processes. Prereq., senior standing or above in engineering or science. Same as CHEN 5820.

**CHEN 4840 (1-4). Independent Study.** Available to seniors with approval of chemical engineering department. Subject arranged to fit needs of student.

**CHEN 5090-1. Seminar in Chemical Engineering.** Required of all chemical engineering graduate students. Includes reports on research activities and on special current topics.

**CHEN 5210-3. Transport Phenomena.** Considers continuum mechanics, emphasizing fundamental relationships for fluid mechanics and heat transfer and their applications to engineering problems. Prereq., senior or graduate standing and undergraduate courses in fluid mechanics, heat transfer, and differential equations.

**CHEN 5220-3. Mass Transport.** Examines fundamentals of mass transport with particular attention to microscopic balances in complex systems, such as those involving multiple components, chemical reaction, simultaneous heat and mass transport, and/or high mass flux. Prereq., CHEN 5210, undergraduate mass transfer, and familiarity with vector and tensor calculus.

**CHEN 5360-3. Catalysis and Kinetics.** Studies principles of chemical kinetics and catalytic reactions, emphasizing heterogeneous catalysis. Coreq., CHEN 4330, or prereq., CHEM 4551 and instructor consent, or graduate standing in CHEM or CHEN.

**CHEN 5370-3. Intermediate Chemical Engineering Thermodynamics.** Reviews fundamentals of thermodynamics, application to pure fluids and mixtures, and physical equilibrium and changes of state. Examines the equation of state and computation of fluid properties for pure fluids, mixtures, and solutions. Also looks at relations between thermodynamics and statistical mechanics. Prereq., undergraduate thermodynamics (CHEN 3320 or equivalent).

**CHEN 5390-3. Chemical Reactor Engineering.** Studies ideal and nonideal chemical reactors, including unsteady state behavior, mixing effects, reactor stability, residence time distribution, and diffusion effects. Prereq., undergraduate course in chemical reactor design/kinetics.

**CHEN 5420-3. Physical Chemistry and Fluid Mechanics of Interfaces.** Covers thermodynamics of interfaces and surface tension measurement; adsorption at liquid-gas, liquid-liquid, and solid-gas interfaces; monolayers; conservation equations for a fluid interface; rheology of interfaces; surface tension driven flows; contact angle and wettability; and double layer phenomena. Prereq., CHEN 3200 or equivalent.

**CHEN 5450-3. Polymer Chemistry.** Same as CHEN 4450.

**CHEN 5460-3. Polymer Engineering.** Same as CHEN 4460.

**CHEN 5570-3. Digital Computer Process Control.** Studies design and implementation of control systems based on digital computers. Conventional controller algorithms, discrete domain analysis, and high-performance control techniques. Also includes topics in multivariable and adaptive control. Prereq., CHEN 4570 or ECEN 4138.

**CHEN 5580-3. Optimal Control and Identification for Industrial Processes.** Develops optimal control and identification theory using the calculus of variations and Pontryagin's minimum principle. Stresses applications in process situations including chemical, biochemical energy, and microelectronic industries. Prereq., senior or graduate standing.

**CHEN 5670-3. Environmental Separations.** Same as CHEN 4670.

**CHEN 5680-3. Environmental Process Engineering.** Same as CHEN 4680.

**CHEN 5710-3. Molecular Basis of Biological Behavior.** Prereqs., CHEN 3320, 3700, and 4530. Same as CHEN 4710, except that students are expected to participate in an independent research project.

**CHEN 5740-3. Analytical Methods in Chemical Engineering.** Presents applied analytical and numerical mathematical methods in the context of chemical engineering problems. Topics include modeling techniques, algebraic equations, and ordinary and partial differential equations. Prereq., senior or graduate standing; working knowledge of computing, calculus, differential equations, linear algebra, and vector operations; and undergraduate courses in physics, fluid mechanics, heat transfer, and reaction engineering.

**CHEN 5750-3. Numerical Methods in Chemical Engineering.** Covers numerical methods for solving ordinary differential, partial differential, and integral equations. These principles are employed to develop, test, and assess computer programs for solving problems of interest to chemical engineers. Prereq., graduate standing or instructor consent.

**CHEN 5800-3. Bioprocess Engineering.** Same as CHEN 4800, except that a major term report is required.

**CHEN 5820-3. Biochemical Separations.** Same as CHEN 4820, except that reports and extra reading are required.

**CHEN 5830-1. Introduction to Modern Biotechnology.** Introduces students to the biotechnology enterprise. Topics include the biotechnology industry and

profession, the various academic disciplines of biotechnology, intellectual property, financing, and ethics.

**CHEN 5840 (1-4). Independent Study.** Available to MS and PhD students.

**CHEN 5900-3. Pharmaceutical Biotechnology.** Incorporates biochemistry, pharmaceutical science, and engineering for application in the pharmaceutical industry. Emphasizes microscale mechanisms affecting drug delivery, bioavailability, and stability. Specific topics include thermodynamics of macromolecular conformational stability, crystallization kinetics, interfacial phenomena, and industrial protein folding. Prereq., graduate standing.

**CHEN 6210-3. Microhydrodynamics of Suspensions and Colloids.** Focuses on fluid mechanics and colloid science of suspensions of particles, cells, and drops. Covers fundamentals, applications, and research frontiers. Prereq., CHEN 5210 or equivalent.

**CHEN 6820-3. Biochemical Engineering Fundamentals.** Covers design and operation of fermentation processes, microbial and enzyme kinetics, multiple substrate and multiple species of fermentation, regulation of enzyme activity, energetics of cellular growth, immobilized enzyme and cell reactors, and transport phenomena in microbial systems and downstream processing. Prereq., graduate standing in CHEM, CHEN, or MCDB, or instructor consent.

**CHEN 6940. Master's Candidate.**

**CHEN 6950 (1-6). Master's Thesis.**

**CHEN 8990 (1-10). Doctoral Thesis.**

## Laboratories

**CHEN 5831-2. Biotechnology Case Studies.** Capstone course required of all graduate students in the interdisciplinary graduate biotechnology certificate program. Reviews molecular genetics, product synthesis and purification, economics, intellectual property, and business planning. Working in teams, students present a biotechnology product plan. Prereq., CHEN 5830.

## Special Topics

**CHEN 3838-3. Special Topics.** Prereqs., GEEN 1300 and APPM 2360.

**CHEN 4838 (1-4). Special Topics in Chemical Engineering.** Senior topics courses offered upon demand. Prereq., senior standing or instructor consent.

**CHEN 4848-3. Topics: Environmental Chemical Engineering.**

**CHEN 5127-3. Applied Statistics for the Manufacturing and Process Industries.** Discusses the concepts and techniques of applied statistics essential to quality control and product/process improvement. Includes computer control (SQC/SPC), sampling methods and time series analysis, and methods of experimental design. Prereq., MCEN 4120. Same as CVEN 5127 and MCEN 5126.

**CHEN 5128-3. Applied Statistics In Research and Development.** Students learn current and emerging statistical methods that are appropriate to experimentation in research and development activities. Statistical design of experiments and model fitting is emphasized. Prereq., one introductory probability/statistics course. Same as MCEN 5146.

**CHEN 5333-3. Research Methods and Ethics.** Prepares graduate students to carry out independent research. Research ethics, laboratory skills, experimental methods, critical thinking, presentations, proposal preparation and career planning are discussed. Independent research project carried out under direction of chemical engineering faculty. Prereq., graduate standing.

**CHEN 5838 (1-4). Special Topics in Chemical Engineering.** Graduate-selected topics courses offered upon demand. Prereq., graduate standing or instructor consent.

**CHEN 5848-3. Topics: Environmental Chemical Engineering.**

## Civil and Environmental Engineering

### Building Systems

**CVEN 5010-3. HVAC System Controls.** Treats the theoretical and practical design of control systems for heating, ventilating, and air conditioning of both residential and commercial buildings. Discusses computer energy management system design. Prereq., AREN 3010 or equivalent.



**CVEN 5020-3. Building Energy Audits.** Analyzes and measures performance of HVAC systems, envelopes, lighting and hot water systems, and modifications to reduce energy use. Emphasizes existing buildings. Prereq., AREN 3010 or equivalent.

**CVEN 5030-3. Architectural Lighting Equipment Design.** Covers the specification and design of nonimaging optical systems for architectural lighting equipment reflector design. Develops and uses computer software to design optics that are prototyped and tested in the laboratory. Prereq., AREN 3540 or CVEN 5830.

**CVEN 5040-3. Lighting Systems Engineering.** Introduces architectural lighting, including vision and perception, lighting equipment and its characteristics, calculations and analysis, and the process of lighting design.

**CVEN 5050-3. Advanced Solar Design.** Predicts performance and analyzes economics of high temperature, photovoltaic, and other innovative solar systems. Also includes performance prediction methods for solar processes. Prereq., AREN 2010 or equivalent.

**CVEN 5060-3. Advanced Passive Solar Design.** Emphasizes design-oriented treatment of passive solar systems. Treats generic types of systems and their performance and cost. Covers passive system construction and daylighting. Prereq., AREN 2010 or equivalent.

**CVEN 5070-3. Thermal Analysis of Buildings.** Examines response factors, conduction transfer functions, and weighting factors for dynamic analysis of building envelopes. Also studies radiative and convective exchange in buildings, internal gains, and infiltration analysis as modeled in hourly simulations. Prereq., AREN 3010 or equivalent.

**CVEN 5080-3. Computer Simulation of Building Energy Systems.** Introduces major simulation programs for analysis of building energy loads and system performance. Focuses on one hourly simulation program to develop capability for analysis of multizone structure. Prereq., AREN 4110 or CVEN 5110.

**CVEN 5090-1. Building Systems Seminar.**

**CVEN 5110-3. HVAC Design 1.** Explores design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Covers HVAC systems description, load estimating, code compliance, duct design, fan systems, applied psychrometrics, cooling and heating coils, filters, hydronic systems, piping, and pumps. Prereq., AREN 3010 or equivalent. Same as AREN 4110.

**CVEN 5230-3. Acoustic Room Design.** Prereq., AREN 4020. Same as AREN 4030.

**CVEN 5830-3. Special Topics for Seniors/Grads.** Prereq., instructor consent. May be repeated within a term up to 12 total credit hours.

**CVEN 6940-6949-3. Master's Degree Candidate.**

**CVEN 8990-8999 (1-10). Doctoral Thesis.** A minimum of 30 credit hours is required.

## Mechanics

**CVEN 2121-3. Analytical Mechanics 1.** Examines vector treatment of force systems and their resultants; equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; and minimum potential energy and stability. Prereq., PHYS 1110. Prereq. or coreq., APPM 2350.

**CVEN 3111-3. Analytical Mechanics 2.** Examines vector treatment of dynamics of particles and rigid bodies including rectilinear translation, central-force, free and forced vibration, and general motion of particles; kinematics of rigid bodies; the inertia tensor; Euler's equations of motion; and energy and momentum methods for particles, systems of particles, and rigid bodies. Prereqs., CVEN 2121 and APPM 2360. Same as MCEN 3043.

**CVEN 3161-3. Mechanics of Materials 1.** Addresses concepts of stress and strain; material properties, axial loading, torsion, simple bending, and transverse shear; analysis of stress and strain; and deflections of beams. Includes selected experimental and computational laboratories. Prereq., CVEN 2121. Coreq., APPM 2360.

**CVEN 4161-3. Mechanics of Materials 2.** Focuses on concepts of triaxial stress and strain, equilibrium, kinematic relations, basic constitutive relations of engineering materials, strain energy, failure theories, thin and thick-walled cylinders, symmetric/nonsymmetric bending, torsion of thin-walled members, combined loading, buckling of columns, and elastic stability. Includes selected experimental and computational laboratories. Prereq., CVEN 3161.

**CVEN 4511-3. Introduction to Finite Element Analysis.** Systematic formulation of finite element approximation and isoparametric interpolation (weighted

residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems, steady and transient heat conduction, and viscous flow. Prereqs., CVEN 3161, 3525, and APPM 2360. Same as CVEN 5511.

**CVEN 5111-3. Introduction to Structural Dynamics.** Introduces dynamic response of linear elastic single and multiple degree of freedom systems. Includes time and frequency domain analysis. Also analyzes building structures. Prereq., instructor consent.

**CVEN 5131-3. Continuum Mechanics and Elasticity.** Provides foundation for advanced study of structural and material behavior and continuum theories in mechanics. Topics include Cartesian tensors, elements of continuum mechanics, constitutive laws for elastic solids, energy principles, methods of potentials, formulations of 2D and 3D elastostatic problems, and general analytical and numerical solutions.

**CVEN 5161-3. Advanced Mechanics of Materials.** Focuses on energy methods, inelastic behavior, torsion of open and noncircular sections, curved beams, thick-wall pressure vessels, failure theories, and creep and stability.

**CVEN 5511-3. Introduction to Finite Element Analysis.** Prereq., graduate standing. Same as CVEN 4511.

**CVEN 5831-3. Special Topics.**

**CVEN 6161-3. Advanced Mechanics of Materials II.** Fundamentals of continuum mechanics, finite deformations, Lagrangian finite strains, Cauchy and Piola Kirchoff stress tensors, linear thermo-elasticity, elements of damage mechanics, elements of fracture mechanics, rheological and viscoelastic theories, modern experimental techniques, governing equations in plates and shells. Recommended prereq., CVEN 5161.

**CVEN 7111-3. Dynamics of Structures.** Includes general vibrations of civil engineering structures and their response to various types of time-dependent loads. Prereq., CVEN 5111.

**CVEN 7141-3. Plates and Shells.** Teaches mathematical theories of plate and shell structures and their applications. Involves numerical finite element solutions of plates and shells of various shapes under static and dynamic loadings. Prereq., CVEN 5121 or 7131.

**CVEN 7161-3. Buckling in Structures.** Focuses on buckling of columns, beams, frames, plates, and shells in the elastic and plastic range. Other topics include postbuckling strength of plates, beam-columns, and analysis by exact and approximate methods with special emphasis on practical implications and applications of solutions. Prereq., CVEN 4161.

**CVEN 7511-3. Computational Mechanics of Solids and Structures.** Looks at finite element methodology for geometric and material nonlinearities. Involves incremental formulations and iterative solution strategies for truly finite increments and quasistatic and dynamic applications to large deformation and inelastic problems. Prereqs., CVEN 5511 or 6525.

## Surveying and Transportation

**CVEN 2012-3. Plane Surveying.** Observes, analyzes, and presents basic linear, angular, area, and volume field measurements common to civil engineering endeavors. Prereq., APPM 1350 or equivalent.

**CVEN 3022-3. Construction Surveying.** Studies construction and highway surveying, horizontal and vertical curves, earthwork, and analysis of data. Prereq., CVEN 2012.

**CVEN 3032-3. Photogrammetry.** Familiarizes students with characteristics of aerial photographs. Measures and interprets aerial photos for planimetric, topographic, hydrological, soil, and land use surveys. Analyzes and presents field measurements over extensive reaches. Prereq., instructor consent.

**CVEN 3602-3. Transportation Systems.** Introduces technology, operating characteristics, and relative merits of highway, airway, waterway, railroad, pipeline, and conveyor transportation systems. Focuses on evaluation of urban transportation systems and recent transportation innovations.

**CVEN 4822-3. Computerized Land Information Systems.** Theory and use of multipurpose land information systems in civil engineering, environmental studies, natural resources, and other related disciplines. Topics include system design, reference system, spatial data models, data capture, structure and quality, cadastral information, LIS implementation. Laboratory work includes applica-

tions using spatial computer technology. Prereq., CVEN 2012, 2032, or instructor consent. Same as CVEN 5822.

**CVEN 5822-3. Computerized Land Information Systems.** Same as CVEN 4822.

## Fluid Mechanics and Water Resources

**CVEN 3313-3. Theoretical Fluid Mechanics.** Basic principles of fluid mechanics. Covers fluid properties, hydrostatics, fluid flow concepts, including continuity, energy, momentum, boundary-layer theory, and flow in closed conduits. Prereq., CVEN 2121.

**CVEN 3323-3. Hydraulic Engineering.** Reviews basic fluid mechanics, incompressible flow in conduits, pipe system analysis and design, and dimensional analysis and similitude including design aspects, open channel flow, flow measurement, analysis and design of hydraulic machinery, and water resource engineering. Prereq., CVEN 3313.

**CVEN 4147-3. Engineering Economy and System Design.** Theory and application of the principles of engineering economics, and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering. Prereq., senior standing. Same as CVEN 5147.

**CVEN 4323-3. Water Resource Engineering Design.** Design of urban water supply, wastewater, and supply stormwater management system, with demand management as an option. Exploration of the feasibility of recycling and reuse of treated wastewater and stormwater. Prereqs., CVEN 3327 and 4147. Same as CVEN 5423.

**CVEN 4333-3. Engineering Hydrology.** Studies engineering applications of principles of hydrology, including hydrologic cycle, rainfall and runoff, groundwater, storm frequency and duration studies, stream hydrography, flood frequency, and flood routing. Prereqs., CVEN 3227 and 3323.

**CVEN 4343-3. Open Channel Hydraulics.** Studies flow in open channels, natural and constructed. Topics include application of energy equation and momentum relationships, tractive force on erodible boundaries, water surface profiles theory and calculations, and design of transitions. Prereq., CVEN 3313.

**CVEN 4353-3. Groundwater Engineering.** Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems. Prereq., CVEN 3313.

**CVEN 5147-3. Engineering Economics and System Design.** Same as CVEN 4147.

**CVEN 5313-3. Environmental Fluid Mechanics.** Analysis of viscous incompressible flows, with first-principle solutions for environmental fluid flows in oceans, rivers, lakes and the atmosphere. Topics include the Navier-Stokes equations, kinematics, vorticity dynamics, geophysical fluid dynamics, and density stratification. Prereqs., APPM 2350, 2360, CVEN 3313, or equivalents.

**CVEN 5333-3. Hydrology.** Prereq., instructor consent.

**CVEN 5343-3. Transport and Dispersion in Surface Water.** Studies transport and dispersion of introduced contaminants in turbulent surface water flows. Emphasizes developing a physical understanding of fluid processes responsible for turbulent dispersion. Includes analytical development, numerical modeling, and experimental approaches to the problem.

**CVEN 5353-3. Groundwater Hydrology.** Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems.

**CVEN 5363-3. Modeling of Hydrologic Systems.** Introduces students to the techniques used in modeling various processes in the hydrologic cycle. Helps students develop numeric models and computer programs for use in conjunction with existing simulation modes such as HEC1 and HEC2 in a design project. Prereqs., CVEN 3313 and instructor consent.

**CVEN 5373-3. Water Law, Policy, and Institutions.** Discusses contemporary issues in water management based on legal doctrine. Identifies legal issues in water resources problems and discusses in close relationship with technical, economic, and political considerations. Prereq., senior or graduate standing.

**CVEN 5383-3. Applied Groundwater Modeling.** Studies mathematical and numerical techniques needed to develop models to solve problems in water flow and chemical transport in the saturated and unsaturated zones of aquifers. Not only emphasizes the learning of modeling techniques from fundamentals, but

also the application of models and modeling methods to solve problems in groundwater engineering, geo-environmental engineering, hazardous waste management, aquifer remediation design, and aquifer clean-up. Prereqs., CVEN 5353, 5454 or equivalent, and APPM 2360 or equivalent.

**CVEN 5393-3. Water Resources Development and Management.** Explores the principles governing water resources planning and development. Emphasizes the sciences of water (physical, engineering, chemical, biological, and social) and their interrelationships. Prereq., senior or graduate standing. Same as ECON 6555.

**CVEN 5423-3. Water Resource Engineering Design.** Same as CVEN 4323.

**CVEN 6323-3. Urban Stormwater Infrastructure Systems.** Evaluation and design of more sustainable urban stormwater infrastructure systems including street inlets, on-line and off-line surface storage and infiltration systems. Integrated design for major, minor, and micro storms to provide flood control and drainage as well as control of pollution from stormwater runoff. Simulation and optimization models will be used.

**CVEN 6333-3. Introduction to Multi-Scale Variability and Scaling in Hydrology.** Provides a foundational physical understanding of channel networks, runoff, precipitation, and evapotranspiration at multiple spatial scales of drainage basins using modern analytical concepts for understanding non-linear phenomena, e.g., fractals, multifractals, statistical scaling, criticality, and renormalization. Prereq., CVEN 3313, 5333, 5454, and an upper-division course in probability, or equivalents.

**CVEN 6383-3. Flow and Transport through Porous Media.** Studies basic physics of flow and transport of water, air, and other fluid mixtures through a porous medium. Course topics are relevant to applications in contaminant hydrology, contaminant transport in aquifers, hazardous waste management, geohydrology, soil physics, and geoenvironmental engineering.

**CVEN 6393-1. Hydrologic Sciences and Water Resources Engineering Seminar.** Provides a broad introduction to a variety of research topics from hydrologic sciences and water resources engineering. Offered as a one-hour weekly seminar by the departmental water faculty, graduate students, and external speakers. Restricted to graduate students in engineering.

## Environmental

**CVEN 3414-3. Fundamentals of Environmental Engineering.** Introduces environmental protection legislation and various water, air, and hazardous waste problems. Stresses basic geochemical, ecological, mass conservation, and environmental chemistry concepts in relation to solving environmental engineering problems. Prereqs., CHEN 1211, CHEM 1221, and APPM 2350.

**CVEN 3424-3. Water and Wastewater Treatment.** Introduces design and operation of facilities for treatment of municipal water supplies and wastewater. Provides an engineering application of physical, chemical, and biological unit processes and operations for removal of impurities and pollutants. Involves an integrated design of whole treatment systems combining process elements. Prereq., CVEN 3414.

**CVEN 3434-3. Introduction to Applied Ecology.** Emphasizes the integration of physical, chemical, and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project. Prereq., CHEM 1111 or CHEN 1211 and 1221, PHYS 1110 and 1140.

**CVEN 3454-4. Water Chemistry.** Introduces fundamentals of aquatic chemistry of inorganic and organic compounds. Topics include thermodynamics and kinetics of acids and bases, carbonate chemistry, air-water exchange, precipitation and dissolution, complexation, oxidation-reduction, and sorption. Laboratories illustrate concepts through examination of water quality of Boulder Creek and other local waters. Prereq. or coreq., CVEN 3414, or instructor consent.

**CVEN 4424-3. Aquatic Organic Contaminants.** Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes solubility, vapor pressure, air-water exchange, sorption, abiotic and biotic reactions, and photodegradation. Same as CVEN 5424.

**CVEN 4434-3. Environmental Engineering Design.** Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites, and sustainable sanitation in developing countries. Economic, societal, and site specific criteria impacting designs are emphasized. Prereqs., CVEN 3424 and 3454. Same as CVEN 5434.

**CVEN 4474-3. Hazardous and Industrial Waste Management.** Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, and acidic, caustic, and radioactive waste material. Discusses techniques for destruction, immobilization, and resource recovery and assessment of environmental impact of treatment process end products. Prereq., CVEN 3414 and 3424, or equivalent. Same as CVEN 5474.

**CVEN 4484-3. Introduction to Environmental Microbiology.** Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering. Prereq., CHEM 1211, CHEN 1221, APPM 1350, 1360, and 2350.

**CVEN 5323-3. Applied Stream Ecology.** Emphasizes the integration of hydrologic, chemical, and biological processes in controlling stream ecosystems at several spatial scales. Students apply ecosystem concepts to current environmental and water quality problems and learn field methods in field trips and a team project. Prereqs., general chemistry, physics. Recommended prereqs., hydrology, ecology, or environmental chemistry.

**CVEN 5404-3. Environmental Engineering Chemistry.** Comprehensively analyzes the chemistry of natural and polluted waters and the application to environmental engineering problems. Topics include energetic principles, chemical equilibrium, coordination chemistry, adsorption phenomena, solid phase interactions, redox phenomena, natural water models, metal pollution, dynamics in aquatic ecosystems, and biogeochemical and nutrient cycling. Uses computer simulations to illustrate more complex chemical systems. Prereqs., CVEN 3414 and 3424, or instructor consent.

**CVEN 5414-3. Water Chemistry Laboratory.** Uses experimental and analytical laboratory techniques to develop a better understanding of the concepts of aquatic chemistry and to investigate water chemistry in treated and natural water systems. Techniques include titration, spectrophotometry, gas chromatography, other advanced instrumentation, sampling, portable analyses, and basic statistics and experimental design. Course focuses on water chemistry of Boulder Creek and other local waters. Prereq., CVEN 5404 or GEOL 5280. Coreq., CVEN 5424.

**CVEN 5424-3. Aquatic Organic Contaminants.** Same as CVEN 4424.

**CVEN 5434-3. Environmental Engineering Design.** Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites, and sustainable sanitation in developing countries. Economic, societal, and site specific criteria impacting designs are emphasized. Prereq., instructor consent. Recommended prereqs., CVEN 5524, 5534, or 5474. Same as CVEN 4434.

**CVEN 5454-3. Quantitative Methods.** Introduces the use of digital simulation in the analysis of water resources and environmental systems. Develops computer programs for the simulation of reservoir operations, watershed runoff, stream quality, and lake quality, and uses existing software to analyze more complex problems. Prereq., instructor consent.

**CVEN 5474-3. Hazardous and Industrial Waste Management.** Same as CVEN 4474.

**CVEN 5484-3. Introduction to Environmental Microbiology.** Same as CVEN 4484.

**CVEN 5494-3. Surface Water Quality Modeling.** Examines the relationships among air, water, and land pollution, water quality, and beneficial uses. Using models, develops the ability to quantify and predict the impacts of pollutants in the aquatic environment, and to develop approaches to minimize unfavorable water quality conditions. Prereq., instructor consent.

**CVEN 5514-3. Bioremediation.** Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundamentals of phytoremediation; critical reviews of current literature on bioremediation. Prereq., CVEN 4484 or 5484 or instructor consent. Recommended, CVEN 5424.

**CVEN 5524-3. Drinking Water Treatment.** Provides advanced study on theory-of-treatment processes, including design and operation of municipal water supplies. Prereq., graduate standing or instructor consent.

**CVEN 5534-3. Wastewater Treatment.** Offers an advanced analysis of wastewater treatment systems; design and operation of treatment process reactors; factors affecting performance of facilities used for physical separation; and

chemical and biological conversion of wastewater compounds, including nitrogen and phosphorus. Prereq., graduate standing or instructor consent.

**CVEN 5544-3. Solid Waste Management and Resource Recovery.** Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste. Recommended prereq., CVEN 3414.

**CVEN 5834 (1-3). Special Topics.**

**CVEN 6404-3. Advanced Aquatic Chemistry.** Examines aquatic equilibria, corrosion, colloid and polymer chemistry, behavior of natural organic matter in engineered systems, and application of personal computers to model aquatic equilibria. Requires a term project. Prereq., CVEN 5402. Offered in the spring every other year.

**CVEN 6414-3. Aquatic Surfaces and Particles.** Examines the role of surfaces and particles in the fate and transport of contaminants in the aquatic environment. Emphasizes modeling of absorption, dissolution, precipitation, surface-catalyzed reactions, and coagulation and filtration kinetics. Prereqs., CVEN 5404 or GEOL 5280.

**CVEN 6834 (1-3). Special Topics.**

## Structures

**CVEN 3525-3. Structural Analysis.** Studies structural analysis of statically determinate and indeterminate systems, deflections, energy methods, and force method. Prereq., CVEN 3161.

**CVEN 4525-3. Analysis of Framed Structures.** Studies matrix formulation of principles of structural analysis and development of direct stiffness and flexibility methods for analysis of frame and truss structures. Topics include support settlements, thermal loads, and energy formulations of force-displacement relationships. Prereq., CVEN 3535. Same as CVEN 5525.

**CVEN 4545-3. Steel Design.** Applies basic principles to design of steel structures; design of tension members, columns, beams, beam-columns, and connections; continuous beams and frames; and elastic and plastic design methods. One of three capstone courses available to civil engineering majors. Prereq., CVEN 3535.

**CVEN 4555-3. Reinforced Concrete Design.** Focuses on applications to the design of reinforced concrete structures, including design of beams, columns, and slabs; prestressed concrete; footings; continuous beams and frames; buildings; and bridges. One of three capstone courses available to civil engineering majors. Prereq., CVEN 3535.

**CVEN 4565-2. Timber Design.** Applies design methods to beams, columns, trusses, and connections using timber and glued, laminated members. Prereq. or coreq., CVEN 3525.

**CVEN 5525-3. Analysis of Framed Structures.** Same as CVEN 4525.

**CVEN 5555-3. Structural Reliability.** Explores principles and methods of structural reliability, and formulates bases for design to insure adequate safety and performance of elements and structural systems. Prereq., CVEN 3535, 4525, or instructor consent.

**CVEN 5565-3. Life-Cycle Engineering of Civil Infrastructure Systems.** Philosophical and analytical issues for lifetime design and operation of civil systems. Optimization tradeoffs of construction, management, and sustainability. Utility of operation and service, including present-value economic analysis. Decision-making alternatives of safety and performance, including hazards consideration. Recommended prereqs., CVEN 3535 and CVEN 3227 or equivalents.

**CVEN 5575-3. Advanced Topics in Steel Design.** Covers steel structure design and analysis. Includes plate girders, moment connections for beams, design of multistory frames, and other topics determined by class interest. Prereq., CVEN 4545 or equivalent.

**CVEN 5585-3. Advanced Topics in Reinforced Concrete Design.** Covers design and analysis topics for prestressed concrete and/or reinforced concrete structures. Includes review of the current ACI design code, slabs, prestressed concrete, seismic design, folded plates and shells, finite element analysis, and other topics determined by class interest. Prereq., CVEN 4555 or equivalent.

**CVEN 5835-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

**CVEN 6525-3. Finite Element Analysis of Structures.** Reviews membrane, plate, and shell elements; displacement and mixed models; Kirchoff and Mindlin bending formulations; and reduced integration techniques. Introduces nonlinear problems. Provides application to buckling and vibration of structures. Prereq., CVEN 4525 and instructor consent, or CVEN 5511.

**CVEN 6595-3. Earthquake Engineering.** Analyzes and designs structures for earthquake loadings. Gives attention to earthquake ground motions, attenuation laws, and seismic hazard analysis. Also involves numerical methods for time-domain and frequency-domain analysis, response of linear and nonlinear structures, elastic and inelastic response spectra, construction of design spectra, soil-structure interaction analysis, and seismic design methods and building code requirements. Prereq., CVEN 5111 or equivalent.

**CVEN 7545-3. Structural Optimization.** Studies fundamental propositions for the design of skeletal structures, automatic design of optimal structures, life-cycle cost design of deteriorating structures, problem-oriented computer languages, and linear and nonlinear programming methods for structural design. Prereq., CVEN 4525 or equivalent.

**CVEN 7565-3. Inelastic Theory of Structures.** Examines inelastic behavior of materials, including calculation of ultimate capacity of perfectly plastic structures by use of upper- and lower-bound theorems. Looks at theories of inelastic action as applied to structural design in steel and concrete and elements of theory of plasticity with applications in ultimate analysis of plates, shells, and continuous bodies. Prereq., CVEN 3505.

**CVEN 7595-3. Earthquake Engineering.** Analysis and design of structures for earthquake loadings. Earthquake ground motions, attenuation laws, and seismic hazard analysis. Numerical methods for time-domain and frequency-domain analysis response of linear and nonlinear structures. Elastic and inelastic response spectra, and construction of design spectra. Soil-structure interaction analysis. Seismic design methods and building code requirements. Prereq., CVEN 5111 or equivalent.

## Construction

**CVEN 3246-3. Introduction to Construction.** Broad view of concerns, activities, and objectives of people involved in construction: the owner, architect/engineer, contractor, labor, and inspector. Interactive gaming situation relates these people to the construction contract, plans/specifications, estimates/bids, scheduling, law, and financial management. Prereq., junior level standing or instructor consent.

**CVEN 3256-3. Construction Equipment and Methods.** Integrated study of engineering economics, construction equipment and construction methods. Topics include the time value of money, equipment costs, equipment productivity, equipment selection and construction engineering design including concrete formwork, falsework, and temporary construction. Recommended prereq., CVEN 3246.

**CVEN 4266-3. Project Administration.** Comprehensively studies the administrative activities needed to manage modern construction projects. Emphasizes document control, shop drawing management, extra work order monitoring, and RFI procedures. Uses state-of-the-art construction contract management software. Develops negotiation and presentation skills through in-class exercises. Prereqs., CVEN 3246 and AREN 3406.

**CVEN 5206-3. Design Development.** Investigates the interrelationship between design decisions and building costs, and the impact of each major building system and building trade on project budgets and schedules. Gives students the opportunity to prepare technical, marketing, and financial packages for investors as well as regulatory and financial institutions. Culminates with detailed presentations of student-developed project prospectuses. Prereqs., AREN 3406, 4416, CVEN 3246, 246 and 5236, as well as instructor consent.

**CVEN 5226-3. Quality and Safety.** Comprehensively studies quality and safety for construction projects. Extensively reviews OSHA regulations and industry safety programs and the legal and economic ramifications of a safe construction site. Thoroughly reviews quality control and quality assurance topics, including organizations, measurement, and procedures. Briefly reviews ISO 9000 impact on construction projects.

**CVEN 5236-3. Construction Planning and Scheduling.** Comprehensively studies construction management including the contractor's role in preconstruction and construction activities; and the particular application of CPM techniques to the planning, scheduling, and control of a construction project. Applies the techniques of the course to a term project.

**CVEN 5246-3. Engineering Contracts.** Applies law in engineering practice; contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contracts; and legal responsibilities and ethical requirements of the professional engineer. Prereq., graduate standing or instructor consent. Same as CVEN 4087.

**CVEN 5256-3. Strategic Issues in Construction.** Studies and analyzes construction top- and upper- middle management responsibilities, particularly relating to union craft labor, on- and off-site production and workmanship, construction financing, total quality management, value engineering, disputes and claims, and engineering technology. Stresses investigations to improve construction management efficiency. Prereq., graduate standing or instructor consent.

**CVEN 5276-3. Engineering Risk and Decision Analysis.** Acquaints students with the fundamental principles and techniques of risk and decision analysis. Oriented toward project-level decisions in which risk or uncertainty plays a central role. Introduces students to Monte Carlo analyses, influence diagrams, and various types of multicriteria decision analyses. Culminates in a larger term project. Recommended prereq., CVEN 3227.

**CVEN 5286-3. Design Construction Operations.** Considers topics associated with the effective and efficient design of construction operations. Topics include construction productivity measurement systems, methods improvement, and short interval scheduling. Introduces and applies several computer-based simulation techniques to real-world problems. Concludes with a discussion of quality control and quality assurance emphasizing statistical QC procedures. Prereq., graduate standing or instructor consent.

**CVEN 5296-3. Construction Engineering 2.** Provides an advanced study of the application and analysis of construction equipment and methods. Topics include drilling, blasting, tunneling, dewatering foundations, earthmoving, and safety. Applicable to both building and public works construction. Prereq., graduate standing or instructor consent.

**CVEN 5306-3. Building Reuse and Retrofit.** Explores the issue that the building industry in the 21st century will be dominated by reuse and retrofit of existing structures. Analyzes the financial, marketing, design, and construction aspects of retrofitting U.S. building stocks such as the Empire State Building and the Seattle Kingdome. Develops and evaluates appropriate reuse and retrofit schemes through student teamwork. Prereqs., AREN 3406 and CVEN 3246. Same as AREN 4417.

**CVEN 5316-3. Construction Accounting and Financial Management.** Examines the issues that in the 21st century construction companies will be asked to become involved in design/build contracts as well as privatization of what normally would be government-owned projects. Also looks at the issue of the financial liability for these projects becoming the responsibility of architects, engineers, and builders. Studies accounting, financial management, tax consequences, and development. Prereqs., AREN 3406 and CVEN 3246. Same as AREN 4418.

**CVEN 5326-3. Construction Project Controls.** Examines tools and techniques employed to control design processes and construction operations. Students apply advanced scheduling and estimating techniques, culminating in the concept of earned value project management. Introduces high tech project control tools. Recommended prereqs., AREN 4416 and 4466.

**CVEN 5336-3. Construction Project Delivery.** Analysis of construction project delivery, including traditional, design-build, construction management, and multiple prime contractors. Related contractual issues and associated financing are also covered. Focuses on the owner's role in the construction process. Recommended prereqs., AREN 4416 and CVEN 4087.

**CVEN 5836 (1-3). Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

## Miscellaneous

**CVEN 1317-1. Introduction to Civil and Environmental Engineering.** Surveys the broad subject of civil and environmental engineering and professional practice, emphasizing study of construction methods including foundations, structural systems, building materials, and systems applications in building construction. Same as AREN 1316.

**CVEN 3207-2. City Planning.** Explores essential principles of city planning, emphasizing the contribution that can be made by civil engineers. Includes detailed discussion of land use, land use boundaries, transportation, street systems, public buildings, parks and recreation, utility design, and zoning. Also involves two or more problems in individual design. Prereq., junior standing.

**CVEN 3227-3. Probability, Statistics and Decision.** Introduces uncertainty based analysis concepts and applications in the planning and design of civil engineering systems emphasizing probabilistic, statistics, and design concepts and methods. Prereqs., APPM 2360, junior standing.

**CVEN 4087-3. Engineering Contracts.** Applies law in engineering practice: contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contract; and legal responsibilities and ethical requirements of the professional engineer. Prereq., senior standing in civil or architectural engineering or instructor consent.

**CVEN 4537-3. Numerical Methods in Civil Engineering.** Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems. Prereq., senior standing. Same as CVEN 5537.

**CVEN 4837 (1-3). Special Topics.** Prereqs., GEEN 1300, or CSCI 1700 and GEEN 1017.

**CVEN 5537-3. Numerical Methods in Civil Engineering.** Prereq., graduate standing. Same as CVEN 4537.

**CVEN 5540-3. Exterior Lighting Systems.** Engages students in exploring and solving lighting problems for exterior environments. Provides an understanding of the design criteria and lighting equipment used in three primary exterior applications: parking lots and roadways, floodlighting of buildings, and sports facilities. Prereq., AREN 3540. Recommended prereqs., AREN 3140 and 4550. Same as AREN 4540.

**CVEN 5837-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

## Geotechnical

**CVEN 3698-3. Engineering Geology.** Highlights the role of geology in engineering minerals; rocks; surficial deposits; rocks and soils as engineering materials; distribution of rocks at and below the surface; hydrologic influences; geologic exploration of engineering sites; mapping; and geology of underground excavations, slopes, reservoirs, and dam sites. Includes a field trip.

**CVEN 3708-3. Geotechnical Engineering 1.** Studies basic characteristics of geological materials; soil and rock classifications; physical, mechanical, and hydraulic properties; the effective stress principle; soil and rock improvement; seepage, consolidation; stress distribution; and settlement analysis. Selected experimental and computational laboratories. Prereq., CVEN 3161.

**CVEN 3718-3. Geotechnical Engineering 2.** Discusses shear strength, bearing capacity, lateral earth pressures, slope stability, and underground construction. Analyzes and looks at the design of shallow and deep foundations, retaining walls, tunnels, and other earth and rock structures. Selected experimental and computational laboratories. Prereq., CVEN 3708.

**CVEN 4728-3. Foundation Engineering.** Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, group effects, and lateral load capacity of the various foundation types. Additional topics include subsurface exploration, construction of deep foundations, and analysis of pile behavior using wave equation and dynamic monitoring methods. Prereqs., CVEN 3718 or instructor consent. Same as CVEN 5728.

**CVEN 4878 (1-3). Independent Study.** Involves an independent, in-depth study, research, or design in a selected area of civil or environmental engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering. Numbered CVEN 4840–4878.

**CVEN 5678-3. Soil Improvement and Reinforcement.** Provides students with principles and working knowledge of design and construction procedures in soil stabilization, retaining structures, geosynthetics, and soil reinforcement. Prereq., CVEN 3718 or instructor consent.

**CVEN 5688-3. Environmental Geotechnics.** Provides an understanding of the use of geotechnical concepts in the analysis and design of environmental systems. Focus is placed on the evaluation of waste containment facilities. Covers

relevant aspects of mining geotechnics and remediation technologies of contaminated sites.

**CVEN 5708-3. Soil Mechanics.** Offers an advanced course in principles of soil mechanics. Coverage includes topics in continuum mechanics; elasticity, viscoelasticity, and plasticity theories applied to soils; the effective stress principle; consolidation; shear strength; critical state concepts; and constitutive, numerical, and centrifuge modeling. Prereq., CVEN 3718.

**CVEN 5728-3. Foundation Engineering.** Same as CVEN 4728.

**CVEN 5738-3. Applied Geotechnical Analysis.** Studies applications of limiting equilibrium and limit plasticity analysis methods to stability problems in geotechnical engineering, such as slopes, lateral earth pressures on retaining structures, and bearing capacities of foundations. Also includes elastic and consolidation analysis of deformations in soil structures. Prereq., CVEN 5708 or instructor consent.

**CVEN 5748-3. Design of Earth Structures.** Covers theory, design, and construction of earth embankments and waste facilities, including isolation systems. Uses published data, field exploration, and laboratory tests on soils and rock in investigating foundations and construction materials. Involves principles of compaction and settlement, permeability analysis, landslide recognition and control, use of composite clay, and liner systems. Prereq., CVEN 5708 or instructor consent.

**CVEN 5758-3. Flow Processes in Soils.** Examines fundamental principles of flow through porous media and related engineering problems. Topics include the saturated seepage theory and flow nets; the unsaturated flow theory; suction-saturation and saturation-hydraulic conductivity relationships; nonlinear finite strain consolidation and desiccation theory; laboratory and field testing methods for determining material characteristics; and numerical models for flow-related engineering problems. Prereq., CVEN 3718 or instructor consent.

**CVEN 5768-3. Introduction to Rock Mechanics.** Nature of rocks and rock masses; index properties rock and rock mass classifications, deformability and strength, rock hydraulics, mechanical behavior of planes of weakness in rock. Laboratory and situ testing. Prereqs., CVEN 3708 and 3718, or instructor consent.

**CVEN 5778-3. Applied Rock Mechanics.** Studies in situ stresses in rocks and their measurement with application of rock mechanics to rock slope engineering, engineering for underground openings and foundation engineering, and numerical methods in rock mechanics. Prereq., CVEN 5768.

**CVEN 5798-3. Dynamics of Soils and Foundations.** Examines the behavior of soils and foundations subjected to self-excited vibrations and earthquake ground motions. Looks at principles of wave propagation in geologic media; in situ and laboratory determination of engineering properties for dynamic analysis; and applications of these principles and properties in design and analysis of foundations and earth structures subjected to dynamic loading. Prereq., CVEN 5708 or instructor consent.

**CVEN 7718-3. Engineering Properties of Soils.** Considers constitutive behavior of cohesive and cohesionless soils including stress-strain, strength, pore water pressure, and volume change behavior under drained and undrained loading conditions. Also includes linear and nonlinear analysis techniques and determination of constitutive properties in the laboratory. Prereq., CVEN 5708 or instructor consent.

**CVEN 7788-3. Soil Behavior.** Topics include soil mineralogy, formation of soils through sedimentary processes and weathering, determination of soil composition, soil water, colloidal phenomena in soils, fabric property relationships, analysis of mechanical behavior including compressibility, strength and deformation, and conduction phenomena in terms of physicochemical principles. Involves applications for stabilization and improvement of soils, and disposal of waste materials. Prereq., CVEN 3718 or instructor consent.

## Special Topics

**CVEN 4039-1. Senior Seminar.** Lecture series by outstanding university faculty members in the humanities and eminent professional engineers in special fields of practice, particularly on subjects with new developments. The EIT examination is required for successful completion of this course. Prereq., senior standing.

**CVEN 4839 (3-6). Special Topics for Seniors.** Offers a supervised study of special topics, under instructor guidance. Prereq., instructor consent.

**CVEN 5849 (1-6). Independent Study.** Available only through approval of graduate advisor. Subject arranged to fit needs of student.

## Computer Science

### General Computer Science

**CSCI 1200-4. Introduction to Programming.** Presents an introduction to various uses of computers, including text processing, communication, spreadsheets, and database systems as well as an introduction to computer programming.

**CSCI 1300-4. Computer Science 1: Programming.** Instructs students in analyzing problems and synthesizing programs for the solution, emphasizing good engineering practices for program construction, documentation, testing, and debugging. Uses C++ for programming projects.

**CSCI 1700-4. Introduction to Scientific Programming.**

**CSCI 2270-4. Computer Science 2: Data Structures.** Studies data abstractions (e.g., stacks, queues, lists, trees) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Uses Unix systems. Prereqs., CSCI 1300, APPM 1350, or MATH 1300.

**CSCI 2830 (1-3). Special Topics in Computer Science.** Covers topics of interest in computer science at the sophomore level. Content varies from semester to semester. Prereq., instructor consent.

**CSCI 2900 (1-3). Independent Study.** Offers selected topics at the elementary level for students with little or no previous computing experience.

**CSCI 4000-3. Entrepreneurship in Computing.** Taught by an experienced entrepreneur. Examines the development of new venture creation from the entrepreneur's perspective. Provides an understanding of the entire process including opportunity identification, feasibility study, fundraising, organization, team creation, and exit strategies through case studies, oral and written presentations, and outside speakers.

**CSCI 4830-3. Special Topics in Computer Science.** Covers topics of interest in computer science at the senior undergraduate level. Content varies from semester to semester. Prereq., instructor consent.

**CSCI 4900 (1-6). Independent Study.** Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem or tutor lower-division computer science students. Prereq., CSCI 1200 or 1300.

**CSCI 4950 (2-4). Senior Thesis.** Provides an opportunity for senior computer science majors to conduct exploratory research in computer science.

**CSCI 5900 (1-6). Independent Study.** Provides opportunities for independent study at the master's level.

**CSCI 6800-3. Master of Engineering Project.** Students seeking the master of engineering degree must complete a creative investigation project, including a written report, supervised by a member of the graduate faculty. Prereq., completion of 21 hours towards the ME degree.

**CSCI 6940-3. Master's Degree Candidacy.** For students who need to be registered for the purpose of taking the master's comprehensive exam and who are not otherwise registered. Credit does not count toward degree requirements. Graded on a pass/fail basis.

**CSCI 6950 (4-6). Master's Thesis.**

**CSCI 7000-3. Current Topics in Computer Science.** Covers research topics of current interest in computer science that do not fall into a standard subarea. Prereq., instructor consent.

**CSCI 7900 (1-6). Independent Study.** For doctoral students.

**CSCI 8990 (1-10). Doctoral Dissertation.** Investigates some specialized field of computer science. Approved and supervised by faculty members.

### Parallel Processing

**CSCI 5551-3. Parallel Processing.** Examines a range of topics involved in using parallel operations to improve computational performance. Discusses parallel architectures, parallel algorithms, and parallel programming languages. Architectures covered include vector computers, multiprocessors, network computers, and data flow machines. Same as ECEN 5553.

**CSCI 7111-3. Topics in Parallel Processing.** Content varies, but subjects include parallel machine architecture, parallel algorithms, languages for parallel

computation, and applications. Takes subject matter from current research. Prereq., instructor consent.

### Artificial Intelligence

**CSCI 3202-3. Introduction to Artificial Intelligence.** Surveys artificial intelligence techniques of knowledge representation, search, learning, and natural language processing. Introduces artificial intelligence programming in LISP. Prereqs., CSCI 3104 and 3155, or instructor consent.

**CSCI 3702. Cognitive Science.** Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving, and judgment. Emphasizes the nature, implications, and limitations of the computational model of mind. Prereqs., two of the following: PSYC 2145, LING 2000, CSCI 1300, and PHIL 2440. Same as LING 3005, PHIL 3310, and PSYC 3005.

**CSCI 4202-3. Artificial Intelligence 2.** Second course in artificial intelligence. Topics may vary, but typically cover neural networks, natural language processing, and artificial life. Prereq., CSCI 3202 or instructor consent.

**CSCI 5582-3. Artificial Intelligence.** Surveys artificial intelligence methods, theories, and applications. Studies the relationship between artificial intelligence and psychology, linguistics, and philosophy. Introduces artificial intelligence programming. Prereq., CSCI 3155 or equivalent. Same as ECEN 5583.

**CSCI 5622-3. The Connectionist Approach to Artificial Intelligence.** Studies the connectionist (or neural network) approach to artificial intelligence as it explores computation in massively interconnected networks of simple autonomous processing elements. Introduces the principles underlying the connectionist approach, as well as its limitations and weaknesses. Prereq., graduate standing or instructor consent.

**CSCI 5782-1. Survey of Cognitive Science.** Class led by a different faculty member of the Institute of Cognitive Science each week. Introduces graduate students to research in cognitive science currently underway within the institute. Prereq., graduate standing or instructor consent.

**CSCI 5832-3. Natural Language Processing.** Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs. Prereq., graduate standing or instructor consent. Same as CSCI 5832.

**CSCI 6302-3. Speech Recognition and Synthesis.** Introduction to automatic speech recognition and understanding, conversational agents, dialogue systems, and speech synthesis/text-to-speech. Topics include the noisy channel model, Hidden Markov Models, A\* and Viterbi decoding, language modeling (N-grams, entropy), concatenative synthesis, text normalization, dialogue and conversation modeling. Prereqs., CSCI 5582 or 5832, or LING 5200, and graduate standing or instructor consent.

**CSCI 6402-3. Issues and Methods in Cognitive Science.** Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. Prereqs., graduate standing, or at least one course at the 3000-level or higher in computer science, linguistics, philosophy, or psychology. No background in computer science will be presumed. Same as EDUC 6504, LING 6200, PHIL 6310, and PSYC 6200.

**CSCI 6622-3. Advanced Connectionist Modeling.** Evaluates papers from the current research literature, experiments with simulations of connectionist networks, and engages in semester-long research projects applying the connectionist approach to selected problems in machine learning, artificial intelligence, psychology, neurobiology, or linguistics. Prereq., CSCI 5622.

**CSCI 7212-3. Topics in Symbolic Artificial Intelligence.** Topics vary from year to year. Possible topics include search; knowledge representation and natural language understanding; deduction, planning, problem solving, and automatic programming; instruction and cognitive models; vision and speech; and learning, induction, and concept formation. Prereq., CSCI 5582 or instructor consent. Highly recommended prereq., CSCI 5592.

**CSCI 7222-3. Topics in Nonsymbolic Artificial Intelligence.** Topics vary from year to year. Possible topics include human and machine vision, signal and speech processing, artificial life, mathematical foundations of connectionism, and computational learning theory. Prereq., CSCI 5622 or instructor consent.

**CSCI 7412-2. Cognitive Science Research Practicum.** Research project in cognitive science for graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students should obtain commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as LING 7415, PHIL 7415, PSYC 7412, and EDUC 6506.

**CSCI 7422-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as EDUC 6516, LING 7425, PHIL 7425, and PSYC 7425.

**CSCI 7762 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as EDUC 6505, LING 7762, PHIL 7310, and PSYC 7765.

**CSCI 7782-3. Topics in Cognitive Science.** Addresses a different set of one to three topics each year. For each topic, one or two faculty members of the Institute of Cognitive Science present background material and current research. Prereq., graduate standing or instructor consent.

## Operating Systems and Hardware

**CSCI 3753-4. Operating Systems.** For computer science majors. Examines software comprising computing systems as it builds upon hardware to provide a programming environment. Looks at structure and function of editors, compilers/assemblers, linkers, etc. Basic operating systems concepts and systems programming in high-level languages. Prereqs., CSCI 2270 and ECEN 2120.

**CSCI 4113-3. UNIX System Administration.** Introduces the internals of UNIX, trouble shooting system and network problems, hardware and software configuration and installation, and security aspects of hosts on the Internet. Offers students hands-on experience on dedicated laboratory workstations. Prereqs., CSCI 2270 or instructor consent. Recommended prereq., CSCI 3308.

**CSCI 4273-3. Network Systems.** An applied programming course focusing on design and implementation of network programs and systems, including topics in network protocols, file transfer, client-server computing, remote procedure call, and other contemporary network system design and programming techniques. Prereqs., CSCI 3753 or equivalent; familiarity with C and UNIX. Same as CSCI 5273.

**CSCI 4593-3. Computer Organization.** Same as ECEN 4593.

**CSCI 4753-3. Computer Performance Modeling.** Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Topics include system measurement, work load characterization, and analysis of data; design of experiments; simulation; and queuing theory and queuing network models. Prereq., CSCI 3753 or equivalent, and second-semester calculus. Recommended prereq., a course in statistics. Same as CSCI 5753 and ECEN 4753/5753.

**CSCI 5273-3. Network Systems.** Same as CSCI 4273.

**CSCI 5513-3. Real-Time Hardware-Software System Design.** Same as ECEN 5513.

**CSCI 5573-3. Advanced Operating Systems.** Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability, and Internet services. Prereqs., CSCI 3753, 4593, equivalent undergraduate course work in operating systems and computer architecture, or instructor consent.

**CSCI 5593-3. Advanced Computer Architecture.** Same as ECEN 5593.

**CSCI 5673-3. Distributed Systems.** Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics, and social issues. Recommended prereqs., CSCI 5573 or a course in computer networks. Same as ECEN 5675.

**CSCI 5753-3. Computer Performance Modeling.** Same as CSCI 4753.

**CSCI 7123-3. Topics in Operating Systems.** Topics selected by instructor. Possible topics are system design, measurement and evaluation, simulation, mathematical modeling, and parallelism. Prereq., CSCI 5573.

**CSCI 7143-3. Topics in Computer Systems.** Topics selected by instructor. Possible topics are online systems, multiprocessing, microprogramming, architecture, data communications, and computing networks.

## Theory of Computation

**CSCI 3104-4. Algorithms.** Studies how to design and analyze efficient algorithms and how to select algorithms for given tasks. Classes of algorithms include divide-and-conquer algorithms, randomized algorithms, branch-and-bound algorithms, greedy algorithms, and dynamic programming. Prereqs., CSCI 2270 and two semesters of calculus.

**CSCI 3434-3. Computer Science Theory.** Introduces the foundations of formal language theory, computability, and complexity. Shows relationship between automata and various classes of languages. Addresses the issue of which problems can be solved by computational means, and studies complexity of solutions. Prereq., CSCI 3104 and 3155.

**CSCI 5444-3. Introduction to Theory of Computation.** Reviews regular expressions and finite automata. Studies Turing machines and equivalent models of computation, the Chomsky hierarchy, context-free grammars, push-down automata, and computability. Prereq., graduate standing or instructor consent.

**CSCI 5454-3. Design and Analysis of Algorithms.** Techniques for algorithm design, analysis of correctness and efficiency; divide and conquer, dynamic programming, etc. Advanced data structures, algorithms in graph theory, geometry, VLSI, linear algebra, etc. Lower bounds, NP-completeness, intractability. Prereqs., CSCI 2270 or equivalent.

**CSCI 5654-3. Linear Programming.** Presents algorithms, simplex, and modifications. Examines theory—duality and complementary slackness. Involves network flow algorithms. Introduces integer programming. Prereq., linear algebra.

**CSCI 5714-3. Formal Languages.** Explores context-free languages: pumping lemma and variants, closure properties, and decision properties. Involves parsing algorithms, including general and special languages, e.g., LR. Additional topics chosen by instructor. Prereq., CSCI 5444 or instructor consent.

**CSCI 6454-3. Advanced Algorithms.** Topics include matching and network flows, matroids, computational geometry, parallel computation (PRAM, hypercube, mesh). Also includes VLSI, database theory, distributed computation, cryptography, robotics, scheduling, probabilistic algorithms, approximation algorithms, average case, and amortized analysis, time permitting. Prereq., CSCI 5454.

**CSCI 7154-3. Topics in Theory of Computation.** Selected topics of current interest in theory of computation. Prereq., instructor consent.

## Programming Languages

**CSCI 3155-4. Principles of Programming Languages.** Study fundamental concepts on which programming of languages are based, and execution models supporting them. Topics include values, variables, bindings, type systems, control structures, exceptions, concurrency, and modularity. Learn how to select a language and to adapt to a new language. Prereqs., CSCI 2270 and ECEN 2120.

**CSCI 5525-3. Compiler Construction Tools.** Same as ECEN 5523.

**CSCI 5535-3. Fundamental Concepts of Programming Languages.** Same as ECEN 5533.

**CSCI 5565-3. Translation of Programming Languages.** Same as ECEN 5563.

**CSCI 7135-3. Topics in Programming Languages.** Topics selected by instructor. Possible topics are syntax, semantics, metacompilers, compiler design, and translator writing systems. Prereq., instructor consent.

## Numerical Computation

**CSCI 3656-3. Numerical Computation.** Covers development, computer implementation, and analysis of numerical methods for applied mathematical problems. Topics include floating point arithmetic, numerical solution of linear systems of equations, root finding, numerical interpolation, differentiation, and integration. Prereqs., two semesters of calculus, linear algebra, and either CSCI 1200 or 1300.

**CSCI 4446-3. Chaotic Dynamics.** Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension, and Lyapunov exponents. Prereqs., two semesters calculus, CSCI 1200 or equivalent, and PHYS 1110. Recommended prereqs., PHYS 1120, CSCI 3656, and MATH 3130. Same as CSCI 6446.

**CSCI 4576-4. High-Performance Scientific Computing 1.** Introduces computing systems, software, and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer. First course in a two-semester sequence. Prereq., CSCI 3656 or equivalent.

**CSCI 4586-4. High-Performance Scientific Computing 2.** Introduces computing systems, software, and methods to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer. Second course in a two-semester sequence. Prereq., CSCI 4576.

**CSCI 5606-3. Principles of Numerical Computation.** Highlights computer arithmetic, solution of linear systems, least-squares approximations, nonlinear algebraic equations, interpolation, and quadrature. Prereqs., CSCI 3656 and three semesters of calculus, or equivalent.

**CSCI 5626-3. Numerical Solution of Ordinary Differential Equations.** Studies multistep and single-step methods for ODE, two-point boundary value problems, and difference schemes for heat and wave equations, and applications. Prereq., CSCI 5606.

**CSCI 5636-3. Numerical Solution of Partial Differential Equations.** Focuses on finite difference solution for partial differential equations, methods of SOR, ADI, conjugate gradients, finite element method, nonlinear problems, and applications. Prereqs., CSCI 5606.

**CSCI 5646-3. Numerical Linear Algebra.** Offers direct and iterative solutions of linear systems. Also covers eigen value and eigenvector calculations, error analysis, and reduction by orthogonal transformation. Prereqs., CSCI 5606.

**CSCI 6446-3. Chaotic Dynamics.** Same as CSCI 4446.

**CSCI 6676-3. Numerical Methods for Unconstrained Optimization.** Looks at modern computational methods for solution of unconstrained optimization problems, nonlinear least squares, and systems of nonlinear equations. Techniques for building algorithms to solve problems with special structure. Prereq., CSCI 5606.

**CSCI 6686-3. Numerical Methods for Constrained Optimization.** Covers computational methods for constrained optimization. Topics include basic theory, methods for quadratic programming, active set strategies for linear constraints, and penalty and successive quadratic programming methods for nonlinearly constrained problems. Prereq., CSCI 5606.

**CSCI 7176-3. Topics in Numerical Computation.** Topics selected by instructor. Possible topics are numerical linear algebra, solution of differential equations, nonlinear algebra and optimization, data fitting, linear and nonlinear programming, and solution of large problems. Prereq., instructor consent.

## Database Systems

**CSCI 3287-3. Database and Information Systems.** Surveys data management, including file systems, database management systems design, physical data organizations, data models, query languages, concurrency, and database protection. Prereq., CSCI 3104.

**CSCI 5817-3. Database Systems.** Provides an advanced treatment of basic database concepts. Prereq., CSCI 2270 and admission as a graduate student in computer science or electrical engineering. Recommended prereqs., CSCI 3287 and 3753.

**CSCI 5917-3. Database Practicum.** Addresses practical issues in implementation, modeling, and measurement of database systems. Centers around a significant software project. Prereq., CSCI 5817 and significant software experience, or instructor consent.

**CSCI 6817-3. Readings in Database Systems.** Complements CSCI 5817. Introduces graduate students to classic research results and current trends in the database systems area. Prereq., CSCI 5817.

**CSCI 7717-3. Topics in Database Systems.** Studies topics such as distributed databases, database interfaces, data models, database theory, and performance measurement in depth. Prereq., CSCI 5817 or instructor consent.

## Software Engineering

**CSCI 3308-3. Software Engineering Methods and Tools.** Focuses on software engineering methods and tools for application development, including design and system organization; using and creating reusable libraries; building, testing, and debugging; and performance evaluation. Two hours of lecture, three hours of lab per week. Prereq., CSCI 2270.

**CSCI 4308-4. Software Engineering Project 1.** Advanced practicum in which students design, implement, document, and test software systems for use in local industry, university departments, or government laboratories. Offers practical experience by working closely with project sponsors. Also offers extensive experience in oral and written communication through presentations during the software life cycle. Students must take CSCI 4308-4318 continuously, as the project spans entire academic year. Prereqs., CSCI 3104 and 3155 and 3753, and WRTG 3030. Open only to seniors.

**CSCI 4318-4. Software Engineering Project 2.** Design, implement, document, and test software systems for use in local industry, university departments, or government laboratories. Offers local practical experience by working closely with project sponsors. Also offers extensive experience in oral and written communication through presentations during the software life cycle. Students must take CSCI 4308-4318 continuously, as the project spans entire academic year. Prereqs., CSCI 3104 and 3155 and 3753, and WRTG 3030. Open only to seniors.

**CSCI 4448-3. Object-Oriented Analysis and Design.** An applied analysis and design class addressing the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design, and modeling notations. Students apply the techniques in analysis and design projects. Prereq., expertise in one or more object-oriented programming languages, such as C++ or JAVA.

**CSCI 5548-3. Software System Engineering.** Same as ECEN 5543.

**CSCI 5608-3. Software Project Management.** Same as ECEN 5603.

**CSCI 5828-3. Foundations of Software Engineering.** Explores techniques, languages, and tools for development and maintenance of software systems. Topics include specification languages, configuration modeling, testing techniques, process modeling, program annotations, and program proofs.

**CSCI 6268-3. Foundations of Computer and Network Security.** Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction, and unauthorized access. Introduces foundational topics of computer and network security, including security models, cryptography, and authentication protocols.

**CSCI 6448-3. Object-Oriented Analysis and Design.** Applied analysis and design class addressing the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design, and modeling notations. Students apply the techniques in analysis and design projects. Prereq., expertise in one or more object-oriented programming languages, such as C++ or JAVA.

**CSCI 6838-3. User Interface Design.** Covers techniques for creating and evaluating effective user interfaces for computing systems. Introduces relevant findings and theory from psychology and human factors, as well as implementation methods. Prereq., graduate status or instructor consent.

**CSCI 7818-3. Topics in Software Engineering.** Studies selected topics of current interest in software engineering. Prereq., instructor consent.

## Graphics

**CSCI 4229-3. Computer Graphics.** Studies design, analysis, and implementation of computer graphics techniques. Topics include interactive techniques, 2-D and 3-D viewing, clipping, segmentation, translation, rotation, and projection. Also involves removal of hidden edges, shading, and color. Prereqs., knowledge of basic linear algebra and CSCI 2270. Same as CSCI 5229.

**CSCI 5229-3. Computer Graphics.** Same as CSCI 4229.



# Electrical and Computer Engineering

## General

**ECEN 1200-3. Telecommunications 1.** Covers the Internet and World Wide Web. Also introduces the main concepts of telecommunications, electronic publishing, audio, video, coding information theory, cryptography, data storage, and data compression. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**ECEN 1400-3. Method and Problem in ECE.** Explores the different aspects of engineering problem solving via examples from ECE, using computational tools such as Lotus 123 (spreadsheet), MATLAB/MATHCAD (numerical mathematics), MACSYMA (symbolic mathematics), and analytic techniques. The emphasis is on problem solving in a microcomputer environment. Some programming in PASCAL is used. Prereqs., APPM 1350 and CSCI 1300.

**ECEN 1840 (1-3). Independent Study.** Provides an opportunity for freshmen to do independent, creative work. Numbered ECEN 1840 through ECEN 1849. Prereq., instructor consent.

**ECEN 2050-5. Special Topics.**

**ECEN 2060 (1-5). Special Topics.**

**ECEN 2120-5. Computers as Components.** Covers computer usage in system implementation, central processor capabilities, and managing concurrency. Includes computer architecture, instruction sets, programming, input/output, interrupts, block transfers, semaphores, shared procedures, multiple processors, and memory management. Prereq., CSCI 1300 or equivalent.

**ECEN 2250-5. Circuits/Electronics 1.** Introduces linear circuit analysis and design, including extensive use of OP amps. Presents DC networks, including node and mesh analysis with controlled sources. Studies transient analysis of RL and RC circuits using phasors, as if analysis of circuits is sinusoidal steady-state. Integrates laboratory into course. Prereq., APPM 1360. Coreq., APPM 2360.

**ECEN 2260-5. Circuits/Electronics 2.** Continues basic circuit analysis of ECEN 2250: Laplace transform techniques, transfer function, convolution, frequency response, Bode diagrams, resonant circuits, and Fourier series expansions. Includes a hands-on laboratory experience. Prereq., ECEN 2250.

**ECEN 2830 (1-5). Special Topics.**

**ECEN 2840 (1-6). Independent Study.** Offers an opportunity for sophomores to do independent, creative work. Numbered ECEN 2840 through ECEN 2849. Prereq., instructor consent.

**ECEN 3030-3. Electrical/Electronic Circuits Non-Major.** For students not majoring in electrical engineering. Covers analysis of electric circuits by use of ohm's law; network reduction; superposition; node and loop analysis; Thevenin's and Norton's theorems; sinusoidal signals; phasors; power in ac circuits; transient response of simple circuits; operational amplifiers; logic circuits; and flip-flops. Prereq., APPM 2350.

**ECEN 3100-5. Digital Logic.** Studies the design and applications of digital logic, including combinational and sequential logic circuits. Laboratory component introduces simulation and synthesis software and hands-on hardware design. Prereq., CSCI 1300.

**ECEN 3120-3. Statistical Thermodynamics.** Covers a statistical approach to the understanding of thermodynamics, thermal and diffusive equilibrium, interactions of systems with external fields, thermal radiation, thermal vibrations, noise, electrons in metals, semiconductor statistics, heat engines and heat pumps, chemical reactions, and kinetic theory. Prereq., APPM 2360. Prereq. or coreq., PHYS 2130.

**ECEN 3170-3. Energy Conversion 1.** Studies the use of magnetic fields as the transfer medium for electric energy in transformers and for conversion of electrical energy to mechanical torque in rotating machines. Applies basic magnetism theory to inductors, transformers, relays, stepper motors, AC and DC motors, and generators. Prereqs., ECEN 2260 and 3400.

**ECEN 3250-5. Circuits/Electronics 3.** Develops a basic understanding of active semiconductor devices. Focuses on building an understanding of BJT and CMOS devices in both digital and analog application. Prereq., ECEN 2260.

**ECEN 3300-5. Linear Systems.** Characterization of signals and linear systems in time and frequency domains. Both continuous and discrete time systems are considered. Laboratory exercises consider linear filters and applications using computer simulations. The examples

are drawn from communication systems, control systems, and digital signal processing. Prereqs., ECEN 2260 and APPM 2360.

**ECEN 3320-3. Semiconductor Devices.** Highlights the fundamentals of semiconductor materials and devices. Topics include the electrical and optical properties of semiconductors, the theory of PN junctions, bipolar and field-effect transistors, and optoelectronic devices. Prereq., ECEN 3250.

**ECEN 3400-5. Electromagnetic Fields and Waves.** Introduces electromagnetic fields, from electrostatics through DC current, magnetostatics, time-varying magnetic fields, waves on transmission lines, Maxwell's equations, plane waves, and basics of guided waves and antennas. Labs cover EM effects in circuits, four-point probe, ammeters, motors, inductive and capacitive coupling on a PC board, time-domain reflectometry, and antennas. Prereq., ECEN 2260.

**ECEN 3410-3. Electromagnetic Waves and Transmission.** Studies reflected and transmitted plane waves in layered media, Poynting's theorem of electromagnetic power, hollow wave-guides, and two-conductor transmission line theory and practice, Smith chart and impedance matching, and elements of antenna theory. Prereq., ECEN 3400.

**ECEN 3810-3. Introduction to Probability Theory.** Covers the fundamentals of probability theory and random variables. Provides a foundation for study of communication theory, control theory, and reliability theory. Prereqs., APPM 2350 and 2360, or equivalent. Similar to MATH 4510, APPM 3570.

**ECEN 3840 (1-6). Independent Study.** Offers an opportunity for juniors to do independent, creative work. Numbered ECEN 3840 through ECEN 3849. Prereq., instructor consent.

**ECEN 4000-3. Special Topics.** Same as ECEN 5830.

**ECEN 4200-1. Effective Presentation.** Prepares students to make polished and professional oral presentations. Stresses effective use of visual aids. Student presentations are critiqued by class and videotaped.

**ECEN 4410-2. Careers in Electrical and Computer Engineering.** Prepares students for the workplace. Includes how to perform key EE/ECE industrial assignments, engineering management tools and techniques, the job search (tuned to EE/ECE graduates), and lectures by industry practicing engineers.

**ECEN 4610-3. Electrical Engineering Capstone Design Lab.** Teams of three to five students propose, design, document, build, test, and demonstrate a working prototype of an electronic system. Topics can be selected from one or more EE areas, including bioengineering, communications and signal processing, control systems, electromagnetics, optoelectronics, power electronics, solid state materials, and devices. Each team is expected to complete a reliably operating electronic system with publication-quality technical documentation. Projects are demonstrated in an open-lab exposition at the end of the semester.

**ECEN 4840 (1-6). Independent Study.** Offers an opportunity for seniors to do independent, creative work. Numbered ECEN 4840–4849. Prereq., instructor consent.

**ECEN 5830-3. Special Topics.** Same as ECEN 4000.

**ECEN 5840 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the master's level. Numbered ECEN 5840–5849. Prereq., advisor consent.

**ECEN 6800 (0-8). Master of Engineering Report.**

**ECEN 6940-3. Master's Degree Candidate.** Numbered ECEN 6940–6949.

**ECEN 6950 (1-6). Master's Thesis.**

**ECEN 7840 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the doctoral level. Numbered ECEN 7840–7849. Prereq., advisor consent.

**ECEN 8990 (0-10). Doctoral Thesis.**

## Bioengineering

**ECEN 4001 (1-4). Special Topics.** Credit and subject matter to be arranged. Numbered ECEN 4001–4049. Prerequisites vary.

**ECEN 4011 (1-4). Special Topics.** Same as ECEN 5011.

**ECEN 4021 (1-4). Special Topics.**

**ECEN 4811-3. Neural Signals.** Analyzes information processing in the brain and peripheral nervous system in terms of fundamental signaling processes that occur at the neuronal level. Explores biophysical bases for these processes, includ-

ing neural impulse generation, synaptic communication, and sensory reception in terms of molecular and membrane mechanisms. Approaches abstraction of biological neurons into computational neural elements, mainly from the viewpoint of neural networks and other forms of synthetic intelligence. Prereqs., ECEN 2260 or 3030, or instructor consent. Same as ECEN 5811, ASEN 4216, and ASEN 5216.

**ECEN 4821-3. Neural Systems.** Explores the extension of cellular neuroelectric concepts into the arena of integrative neurophysiology and neuroethology. Topics include synaptic modulation of neuronal firing patterns, interactions in dendritic trees, computer simulation of interactive neural nets, the command neuron concept, sensory information processing, and the generation of simple behaviors directly correlated with neural network organization. Prereq., ECEN 2260 or 3030, or instructor consent. Same as ECEN 5821 and ASEN 4426/5426.

**ECEN 4831-3. Brains, Minds, and Computers.** Provides background for the design of artificially intelligent systems based upon our present knowledge of the human brain. Includes similarities and differences between the brain and computers, robots, and common computer models of brain and mind. Emphasizes the neuron as an information processor, and organization of natural as well as synthetic neural networks. Prereq., ECEN 2260 or 3030, or instructor consent. Same as ECEN 5831, ASEN 4436/5436.

**ECEN 5011 (1-4). Special Topics.** Same as ECEN 4011.

**ECEN 5021 (1-4). Special Topics.**

**ECEN 5811-3. Neural Signals.** Same as ECEN 4811 and ASEN 4216/5216.

**ECEN 5821-3. Neural Systems.** Same as ECEN 4821 and ASEN 4426/5426.

**ECEN 5831-3. Brains, Minds, and Computers.** Same as ECEN 4831, and ASEN 4436/5436.

## Communications

**ECEN 3002 (3-5). Special Topics.**

**ECEN 4002 (1-4). Special Topics.**

**ECEN 4012 (1-4). Special Topics.** Covers the analysis and design of FIR and IIR digital filters. Implementations to both software and hardware are discussed. Emphasis on use of the FFT as an analysis tool. Examples in speech processing, noise canceling, and communications. Prereqs., ECEN 3230 and 3810.

**ECEN 4242-3. Communication Theory.** Covers modern digital and analog communication systems, Fourier analysis of signals and systems, signal transmission, amplitude modulation, angle modulation, digital communication systems, and behavior of communication systems in the presence of noise, including both analog and digital systems. Prereqs., ECEN 3300 and 3810 or MATH 4510.

**ECEN 4632-3. Introduction to Digital Filtering.** Covers both the analysis and design of FIR and IIR digital filters. Discusses implementations in both software and hardware. Emphasizes use of the FFT as an analysis tool. Includes examples in speech processing, noise canceling, and communications. Prereq., ECEN 2260 and 3810.

**ECEN 4652-2. Communication Laboratory.** Involves laboratory experiments demonstrating material taught in ECEN 4242. Uses spectrum analysis to study baseband signals and signal processors. Topics include noise, AM, FM, PM, sampling, quantizing/encoding, TDM, FDM, equalizers, and a complete communication system. Prereq. or coreq., ECEN 4242.

**ECEN 5012-3. Special Topics.**

**ECEN 5032-3. Special Topics.**

**ECEN 5612-3. Noise and Random Processes.** Reviews probability theory, convergence and probability bounds, multivariable normal theory, sequences of random variables and stochastic processes, Bernoulli and Poisson processes, wide-sense stationary processes, and correlation functions and power spectra. Also includes linear systems with random inputs and Gauss-Markov processes, first- and second-order properties of ARMA processes, and Markov chains. Prereqs., ECEN 3300 and 3810 or MATH 4510.

**ECEN 5622-3. Information Theory and Coding.** Involves information and entropy, Markov chains, combined systems, continuous systems, coding theory, channel capacity, modulation, and applications to communication engineering. Prereq., ECEN 3810 or MATH 4510 or instructor consent.

**ECEN 5632-3. Theory and Application of Digital Filtering.** Examines the characterization of linear discrete-time circuits by unit-pulse response, transfer functions, and difference equations; use of z-transforms and Fourier analysis;

discrete Fourier transform and fast algorithms (FFT); design of finite and infinite impulse response filters; frequency transformations; and study of least squares filters for deterministic and stochastic inputs. Prereq., ECEN 4632.

**ECEN 5642-3. Modern Methods of Spectral Estimation.** Reviews Fourier analysis for continuous, discrete, sampled-data, PAM, and subsampled signals; quadratic estimators of the power spectrum; autoregressive and autoregressive moving average models; modal analysis; nonstationary spectrum analysis; and least square theory of linear prediction. Covers applications to speech processing, seismic data, and radar and sonar processing. Prereqs., ECEN 5612 and 5632.

**ECEN 5652-3. Detection and Extraction of Signals from Noise.** Introduces detection, estimation, and time series analysis. Topics include hypothesis testing, detection of known form and random signals, least squares parameter estimation, maximum likelihood theory, minimum mean-squared error estimation, Kalman-Wiener filtering, prediction in stationary time series, and modal analysis. Applications include studies in communications, control, and experimental modeling. Prereq., ECEN 5612.

**ECEN 5662-3. Optimal Signal Processing and Stochastic Systems.** Looks at constrained optimization, Kuhn-Tucker conditions, convex programming, and near-point problems in Hilbert Space. Also involves dynamic programming and Markov processes. Applications may include sequential decision theory, trajectory estimation, Wiener and Kalman filtering, data compression, pattern recognition, game theory, and system identification. Prereqs., ECEN 3300 and 3810 or MATH 4510.

**ECEN 5672-3. Digital Image Processing.** Covers image formation and visual perception; digitization of images; transform coding, modeling, and image compression; image enhancement; filtering and image restoration; and reconstruction and tomographic imaging. Prereq., ECEN 5612 or equivalent.

**ECEN 5682-3. Theory and Practice of Error Control Codes.** Studies block codes and convolutional codes for reliable transmission of digital data over unreliable noisy channels. Characterization of cyclic codes like BCH codes and RS codes from an algebraic as well as a digital signal processing point of view. Decoding algorithms for block codes and convolutional codes. Prereq., ECEN 3300.

**ECEN 7632-3. Advanced Digital Signal Processing Methods.** Studies advanced digital signal processing methods to include descriptions for the internal structure of digital filters such as state variable descriptions, primitive signal flow graphs, factored state variable descriptions, optimization of finite register effects in digital filters, digital processing structures for efficient VLSI implementations, adaptive digital filters, and array filtering. Prereq., ECEN 5632.

## Computer and Digital Systems

**ECEN 3003 (3-5). Special Topics.**

**ECEN 4013 (1-4). Special Topics.**

**ECEN 4023 (1-4). Special Topics.** Same as ECEN 5023.

**ECEN 4053 (1-4). Special Topics.** Prereq., CSCI 3155.

**ECEN 4553-3. Introduction to Compiler Construction.** Introduces the basic techniques used in translating programming languages: scanning, parsing, definition table management, operator identification and coercion, code selection and register allocation, error recovery. Students build a complete compiler for a simple language. Prereqs., ECEN 2120 and CSCI 3155.

**ECEN 4573-3. Electrical and Computer Engineering Capstone Design Laboratory.** Studies design and construction of microprocessor systems in measurement and control applications and development of medium-sized systems based upon microprocessors. Student teams develop hardware and software. Requires design reviews and extensive documentation. Prereqs., ECEN 2120, 3100, 3250, 3300, 3400, 3810, and 4593.

**ECEN 4583-3. Software System Development.** Lectures deal with techniques for product requirements definition, project planning, coding, verification, validation, performance evaluation, and maintenance of medium-scale (2-3000 line) systems. Primary emphasis is on practical application of these techniques to a specified software project. Students work in teams to produce appropriate documents for each phase and are responsible for project completion according to specification and schedule. Course project is written in C on a UNIX look-alike system; prior knowledge of C or UNIX is not required. Prereqs., ECEN 3100 and CSCI 2270.

**ECEN 4613-3. Embedded System Design.** Introduces system hardware and firmware design for embedded applications. Students independently design and develop a hardware platform encompassing a microcontroller and peripherals. Firmware is developed in C and assembly. A significant final project is designed, developed, documented, and presented. Prereqs., ECEN 2120 and 3100, or instructor consent. Recommended prereqs., ECEN 3250 and 4593. Same as ECEN 5613.

**ECEN 4623-3. Real-Time Embedded Systems.** Design and build a microprocessor-based embedded system application requiring integration of sensor/actuator devices, a real-time operating system and application firmware and software. Real-time rate monotonic theory and embedded architecture are covered. Prereq., ECEN 3100 or instructor consent. Recommended prereq., ECEN 4613. Same as ECEN 5623.

**ECEN 4633-3. Embedded Systems Laboratory.** Intended for those who are interested in developing projects using Verilog in programmable gate arrays using the PCI bus. Comparison is made to schematic entry and other hardware description languages. Industry standard tools are used for development and debugging. Prereqs., ECEN 4613 and 4623. Same as ECEN 5633.

**ECEN 4703-3. Switch/Fin Automata.** Emphasizes the formal characterization of combinational functions and sequential machines. Topics include fault diagnosis and finite state automata. Enrollment in this course is dependent upon the satisfactory completion of a basic course in logic circuits. Prereqs., ECEN 3100 and 3810.

**ECEN 4753-3. Computer Performance Modeling.** Presents a broad range of system modeling techniques, emphasizing applications to computer systems. Covers stochastic processes, queuing network models, stochastic Petri nets, and simulation (including parallel processing techniques). Prereq., CSCI 3753 or equivalent and second-semester calculus. Recommended prereq., a course in statistics. Same as CSCI 4753, 5753, and ECEN 5753.

**ECEN 5023 (1-4). Special Topics.** Same as ECEN 4023.

**ECEN 5503-3. Computer Systems Design and Architecture.** Covers digital logic circuits, assembly language programming, and gate-level computer design and architecture. Also discusses computer arithmetic algorithms, I/O, peripheral device performance, networking, and the Internet. Limited to graduate students. For ECE/CS majors with nontraditional backgrounds.

**ECEN 5513-3. Real-Time Hardware-Software System Design.** Centers on the design and use of real-time computer systems. Gives special attention to the design, implementation, and testing of concurrent high-level language software in real-time applications. Treats the design of computer/process interfacing systems in the context of representative real-time applications. Reinforces concepts developed during the lecture portion of the class with practical experience in the real-time computing laboratory. Prereqs., ECEN 4593 and experience in programming sequential C or PASCAL. Same as CSCI 5513.

**ECEN 5523-3. Compiler Construction Tools.** Offers practical experience using state-of-the-art CAD tools on high-performance workstations. Provides skills needed to rapidly create little languages for specific problem domains and familiarizes students with automated software development. Same as CSCI 5525.

**ECEN 5533-3. Fundamental Concepts of Programming Languages.** Considers concepts common to a variety of programming languages—how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines. Prereqs., ECEN 3100, CSCI 3155, or instructor consent. Same as CSCI 5535.

**ECEN 5543-3. Software Engineering of Standalone Programs.** Applies engineering principles to phases of software product development, project planning, requirements definition, design, implementation, validation, and maintenance. Emphasizes practical methods for communicating and verifying definitions and designs—prototyping, inspections, and modeling. Includes relation to RTS and object-oriented programming. Prereqs., CSCI 1300, CSCI 2270, or instructor consent.

**ECEN 5553-3. Parallel Processing.** Examines a range of topics involved in using parallel operations to improve computational performance. Discusses parallel architectures, parallel algorithms and parallel programming languages. Architectures covered include vector computers, multiprocessors, network computers, and data flow machines. Prereq., background in computer organization, introduction to programming languages, elementary numerical analysis, ECEN 4593 and CSCI 3656, or instructor consent. Same as CSCI 5551.

**ECEN 5563-3. Translation of Programming Languages.** Studies practical techniques for translating algorithms understood by humans into programs understood by machines. Concentrates on semantic analysis, code generation, and optimization methods supported by tools. Prereq., ECEN 4553, 5533, or instructor consent. Same as CSCI 5565.

**ECEN 5573-3. Advanced Operating Systems.** Same as CSCI 5573.

**ECEN 5583-3. Artificial Intelligence.** Prereq., CSCI 3245 or equivalent. Same as CSCI 5582.

**ECEN 5593-3. Advanced Computer Architecture.** Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a machine and the design of cache memory systems. Also studies current and historically important computer architectures. Prereq., ECEN 4593 or instructor consent. Same as CSCI 5593.

**ECEN 5603-3. Software Project Management.** Presents topics and techniques critical to the management of software product development, including estimating, planning, quality, tracking, reporting, team organization, people management, and legal issues. Gives special attention to problems unique to software projects. Prereqs., ECEN 4583, 5543, and CSCI 4318, or equivalent industrial experience.

**ECEN 5613-3. Embedded System Design.** Same as ECEN 4613.

**ECEN 5623-3. Real-Time Embedded Systems.** Same as ECEN 4623.

**ECEN 5633-3. Embedded Systems Laboratory.** Prereqs., ECEN 4613 or 5613 and ECEN 4623 or 5623. Same as ECEN 4633.

**ECEN 5673-3. Distributed Systems.** Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics, and social issues. Recommended prereq., CSCI 5573 or a course in computer networks. Same as CSCI 5673.

**ECEN 5753-3. Computer Performance Modeling.** Same as ECEN 4753 and CSCI 4753/5753.

## Electromagnetics

**ECEN 3004 (3-5). Special Topics.**

**ECEN 4024 (1-4). Special Topics.** Same as ECEN 5024.

**ECEN 4614-3. Microwaves and Millimeter Waves.** Provides senior students with an overview of devices, circuits, and systems operating in microwave and millimeter wave frequency ranges. Discusses semiconductor devices and vacuum tube sources available at these frequencies, transmission structures and circuit concepts, and system applications. Prereq., ECEN 3410.

**ECEN 4634-2. Transmission Laboratory.** Performs experiments to verify and extend concepts learned in ECEN 3410, including study of UHF and SHF sources and power measurement; coaxial and waveguide slotted-line impedance measurements and matching; transmission line modeling using the artificial line; time-domain reflectometer applications; s-parameter measurements using a network analyzer; microwave superheterodyne receiver characteristics; and antenna pattern measurements. Prereq., ECEN 3410 or equivalent.

**ECEN 5024 (1-4). Special Topics.** Same as ECEN 4024.

**ECEN 5104-3. Computer-Aided Microwave Circuit Design.** Emphasizes the design of strip-line and microstrip circuits, using a CAD package. Discusses design of impedance transformers, amplifiers, switches, phase shifters, etc. Assignments include design of typical circuits and their analysis using a microwave circuit analysis program. Laboratory includes measurements using a network analyzer facility on a typical circuit designed and fabricated by students. Prereq., ECEN 3410.

**ECEN 5124-3. Computer-Aided Microstrip Antenna Design.** Studies modeling, analysis, and computer-aided design of microstrip patch antennas and arrays, including circular polarized and active antennas. Emphasizes use of design software developed at CU for practical microstrip antennas and their feed networks. Prereq., ECEN 3410 or equivalent.

**ECEN 5134-3. Electromagnetic Radiation and Antennas.** Covers elementary antenna source, cylindrical wire antennas, loop antennas, radiation patterns and antenna gain, aperture sources such as horns and dishes, linear arrays,

mutual effects, ray formulations, antenna noise and temperature, and transmission formulations. Prereq., ECEN 3410.

**ECEN 5144-3. Electromagnetic Boundary Problems.** Provides mathematical and physical fundamentals necessary for the systematic analysis of electromagnetic fields problems. Requires some maturity in electromagnetics. Prereq., ECEN 5114 or 5134 or instructor consent.

**ECEN 5154-3. Computational Electromagnetics.** Provides a computational study of microwave circuits and antennas, using finite-difference, finite-element, and moment methods. Requires students to develop algorithms, write and execute programs, and prepare reports analyzing results. Circuits include waveguides, microstrip lines, and center-fed dipole antennas. Prereq., ECEN 3410.

**ECEN 5254-3. Radar and Remote Sensing.** Examines active techniques of remote sensing, wave propagation in the Earth's atmosphere, and signal-to-noise ratio in radio and radar. Looks at pulse-doppler, FW-CW, chirp, and synthetic aperture radars. Also includes scattering processes and applications of radar to remote sensing of the atmosphere, sea, and land. Prereqs., ECEN 3300 and 3410 or instructor consent. Same as ASEN 5245.

**ECEN 5264-3. Propagation Effects on Satellite and Deep-Space Telecommunications.** Studies the role of propagation effects in design of Earth-space telecommunication systems. Looks at effects dependent upon total electron content (TEC) along path, including Faraday rotation and range delay. Also covers ionospheric and interplanetary scintillation; tropospheric clear-air effects, including refraction, ducting, and range delay; absorption, scatter, and cross polarization due to precipitation and clouds. Prereq., ECEN 3410.

**ECEN 5274-3. Radar Science and Techniques.** Studies atmospheric radar fundamentals. Examines scattering by precipitation and atmospheric turbulence; long-wavelength radars and the dynamics of the middle and upper atmosphere; design of meteorological and clear-air radars; profiling tropospheric winds, temperature, and humidity by radar and radiometry; and ionospheric sounding using ionosondes and incoherent-scatter radars. Prereq., ECEN 5254 or instructor consent.

**ECEN 5734-3. Advanced Machine Dynamics (UCD).** Review of steady-state performance of synchronous and induction machines, effect of saturation, two-reactance theory, generalized machine theory, linear transformation, d-q transformation, unbalanced operation and breaking. Other topics include speed control of induction motors, transients and negative-sequence conditions in AC machines. This course is offered by CATECS and originates from CU-Denver. Prereq., undergraduate course in electric machines and laboratory, basic understanding of modern power systems.

**ECEN 5774-3. Power System Protection and Relays (UCD).** Examines system protection philosophy and an understanding of the types of relays used to protect parts of the system, such as generators, transformers, transmission and distribution lines, medium and low voltage switchgear. This course is offered by CATECS and originates from CU-Denver. Prereq., undergraduate course work in circuit analysis, energy conversion, and linear systems, or consent of instructor.

**ECEN 7014-3. Analysis of Techniques of Guided Wave Emag.** Covers singular integral equations, Wiener-Hopf techniques, Floquet theorem, conformal mapping, and modified residue calculus techniques as they apply to guided wave application problems. Prereq., ECEN 7904.

## Materials and Devices

**ECEN 4345-3. Introduction to Solid State.** Covers basic crystallography, lattice vibrations, free electron theory, energy band theory, and semiconducting, dielectric, and optical and superconducting materials and devices, emphasizing properties relevant to solid state electronics and optoelectronics. Prereq., ECEN 3400.

**ECEN 4375-3. Microstructures Laboratory.** Offers experience in monolithic silicon integrated circuit fabrication techniques, including IC layout, pattern compiling and generation, mask making, oxidation, photolithography, diffusion, implantation, metallization, bonding, process analysis, and testing. Includes design project. Prereq., ECEN 3320. Same as ECEN 5375.

**ECEN 5005 (1-4). Special Topics.** Study of the fundamental principles of mass transport, surface reactions, diffusion phenomena, and metal deposition as related to semiconductor device processing. Primary emphasis in the laboratory is on silicon technology. Students are required to process a basic device structure through a complete set of processes. A study of the correlation of fundamental principles with device measurements is made. Prereq., instructor consent.

**ECEN 5345-3. Introduction to Solid State.** Core course for further studies in solid state materials and devices. Covers crystal and reciprocal lattices; phonons; electrons in three dimensional solids and nanostructures; energy band structure of semiconductors, electron transport, optical properties; and basics of quantum wells. Course uses quantum mechanical methods. Prereqs., ECEN 3400 and basic quantum mechanics or instructor consent.

**ECEN 5355-3. Principles of Electronic Devices 1.** Relates performance and limitations of solid state devices to their structures and technology. Examines semiconductor physics and technology. Includes PN-junction, MOS, and optoelectronic devices. For both advance circuit and device engineers. Prereq., ECEN 3320 or instructor consent.

**ECEN 5365-3. Semiconductor Materials and Devices 1.** Includes an introduction to time-independent quantum mechanics and perturbation theory, tunneling, application to quantum-well electronic and optical devices, electrons in a crystalline solid, Bloch's theorem, energy bands and energy gaps, the effective mass approximation, a survey of energy bands for real crystals: Si, Ge, GaAs, InP, Al-GaAs, etc., band structure engineering, and the electrical and optical properties of compound semiconductors. Prereq., ECEN 3120, and ECEN 4345 or 5345.

**ECEN 5375-3. Microstructures Laboratory.** Same as ECEN 4375.

**ECEN 5385-3. Optical Properties of Materials.** Surveys optical properties of materials important in optoelectronic and optical devices. Covers the relationships between optical constants, optical properties of semiconductors, dielectrics, ferroelectrics, liquid crystals, and metals. Prereq., ECEN 4345 and 5345, or PHYS 4340, or equivalent.

**ECEN 5645-3. Introduction to Optical Electronics.** Introduces lasers, Gaussian optics, modulators, nonlinear optics, optical detectors, and other related devices. Prereq., ECEN 3410.

**ECEN 6355-3. Principles of Electronic Devices 2.** Studies advanced topics related to electronic devices, including semiconductor device aspects of heterojunction and optoelectronic devices. Involves abrupt and graded hetero-interfaces, photodiodes, LEDs, semiconductor laser diodes, HBJTs, and hetero field-effect transistors. For both advance circuit and device engineers. Prereq., ECEN 5355 or instructor consent.

## Optics

**ECEN 4006 (1-4). Special Topics.**

**ECEN 4016 (1-4). Special Topics.**

**ECEN 4106-3. Applied Optics/Optics Instruments.** Introduction to applied optics and optical instruments, emphasizing optical engineering. Topics covered include ray optics, wave phenomena, polarization, holography, electro- and magneto-optics and introduction to nonlinear optics. Prereqs., ECEN 3140 and 3310.

**ECEN 4616-3. Optoelectric System Design.** Examines optics, optical systems, and electro-optics devices with the goal of integrating optical and electro-optical devices into optoelectronic systems. System design is covered with emphasis given to resolution, field of view, signal-to-noise ratio, speed of operation, and other system constraints. Prereqs., ECEN 3140 and 4242. Same as ECEN 5616.

**ECEN 5016 (1-4). Special Topics.**

**ECEN 5156-3. Physical Optics.** Core course for the optics program. Covers the application of Maxwell's equations to optical waves and media. Topics include polarization, dispersion, geometrical optics, interference, partial coherence, and diffraction. Prereq., ECEN 3410.

**ECEN 5166-3. Guided Wave Optics.** Builds up the concepts necessary to understand guided wave optical systems. Topics include slab wave-guides, semiconductor lasers, fiber optics, and integrated optics. Prereqs., ECEN 4645 or 5645, and ECEN 5156.

**ECEN 5606-3. Optics Laboratory.** Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers, and holograms, and experimentation of fiber optics and Fourier optics. Prereq., undergraduate optics course such as PHYS 4510. Same as PHYS 5606.

**ECEN 5616-3. Optoelectric System Design.** Same as ECEN 4616.

**ECEN 5696-3. Fourier Optics and Holography.** Topics include holography, Fourier transform properties of lenses, two-dimensional convolution and correlation functions, spatial filtering, and optical computing techniques. Also covers coher-

ent and incoherent imaging techniques, tomography, and synthetic aperture radar. Prereqs., ECEN 3300, 3410, and 4106, or instructor consent.

**ECEN 6016 (1-3). Special Topics.**

## Power

**ECEN 4017 (1-4). Special Topics.**

**ECEN 4167-3. Energy Conversion 2.** Studies the derivation of the dynamic equations of motion of electromechanical systems, e.g., relays, transducers, loudspeakers and microphones, linear and rotary motion machines based on variational principles and basic force laws (e.g., Newton's law, Kirchoff's laws, etc.). Looks at equivalent circuits in abc and dqo coordinates for AC and DC machines. Discusses conditions under which an electromagnetic torque can be produced. Applies theory to the most important modes of steady-state and transient operation of electrical energy converters. Prereq., ECEN 3170.

**ECEN 4517-2. Power Laboratory 1.** Explores basic concepts concerning electromagnetic energy conversion principles as related to practical devices. Provides an overview of magnetics, transformers, and rotating machinery. Emphasizes measurement techniques in power circuits. Prereq., ECEN 3170.

**ECEN 5737-3. Adjustable-Speed AC Drives.** Presents unified treatment of complete electrical drive systems: mechanical load, electrical machine, power converter, and control equipment. Emphasizes induction, synchronous, and permanent-magnet drives. Uses simulation programs (e.g., SPICE, Finite Element/Difference Program) to simulate drive system components (e.g., gating, inverter, electric machine). Prereq., ECEN 3170.

**ECEN 5747-3. Synchronous Machines.** Reviews equivalent circuit of synchronous machines in abc and dqo coordinates; phasor diagram; steady-state, transient and subtransient operating conditions; calculation and physical interpretation of reactances; and application of theory to short circuits, synchronization, damping torques, hunting, governor action, starting, etc. Discusses standard test procedures. Prereq., ECEN 3170.

**ECEN 5777-3. Power System Protection.** Concepts of power system operation and the use of r-x diagrams in selection of protection needs. Comparison of electromechanical and static protection systems. Review of problem areas such as system stability, loss-of-excitation, and EHV line protection. Prereqs., ECEN 2260 and 3170 or instructor consent.

**ECEN 5787-3. Power Quality Phenomena Power Systems.** Single-time and periodic disturbances of power systems and their causes and effects on sensitive (electronic) end-use devices and power system components are studied and modeled. Measurement techniques of the impact of such disturbances (power quality phenomena) on devices as well as prevention and mitigating techniques are addressed. Prereq., ECEN 3170.

**ECEN 5797-3. Power Electronics 1.** Introduces use of repetitively switched electronic circuits for conversion and regulation of electrical power. Analyzes basic converters and their steady-state operations. Provides dynamic modeling and analysis using state-space averaging method. Also involves fundamentals of inductor, transformer, and semiconductor switch design. Prereqs., ECEN 3170 and 3250, or instructor consent.

**ECEN 5807-3. Power Electronics 2.** Studies advanced topics of current interest in the power electronics field including control of power converters, current-programmed mode, series and parallel resonant converters, and resonant switch converters. Prereq., ECEN 5797.

## Systems and Electronics

**ECEN 4018 (1-4). Special Topics.**

**ECEN 4028 (1-4). Special Topics.**

**ECEN 4138-3. Control Systems Analysis.** Provides modeling of dynamic systems for electrical, chemical, hydraulic, and mechanical systems using block diagrams and signal flow graphs. Compares open and closed-loop configurations. Prereq., senior standing with background of Laplace transforms, linear algebra, and ordinary differential equations; ECEN 3300.

**ECEN 5008 (1-4). Special Topics.**

**ECEN 5018 (1-4). Special Topics.**

**ECEN 5028 (1-4). Special Topics.**

**ECEN 5438-3. Robot Control.** Provides a comprehensive treatment of the mathematical modeling of robot mechanisms and the analysis methods used to design control laws for these mechanisms. Prereqs., ECEN 4138 and PHYS 1110.

**ECEN 5448-3. Advanced Linear Systems.** Offers a state space approach to analysis and synthesis of linear systems, state transition matrix, controllability and observability, system transformation, minimal realization, and analysis and synthesis of multi-input and multi-output systems. Prereq., ECEN 3300 and 4138.

**ECEN 5458-3. Sampled-Data and Digital Control Systems 1.** Provides an analysis and synthesis of discrete-time systems. Studies sampling theorem and sampling process characterization, z-transform theory and z-transfer function, and stability theory. Involves data converters (A/D and D/A), dead-beat design, and digital controller design. Prereqs., ECEN 3300 and 4138.

**ECEN 7438-3. Theory of Nonlinear Systems.** Similar to ECEN 5438 except at a more advanced level and with more topics covered: limit cycles, functional analysis approach to input-output stability, analysis and synthesis of time-varying systems, feedback linearization and its applications, and bang-bang control. Prereqs., ECEN 5418 and 5448.

## VLSI CAD Methods

**ECEN 4009 (1-4). Special Topics.**

**ECEN 4049 (1-4). Special Topics.**

**ECEN 4109-3. Very Large Scale Integrated (VLSI) Systems Design.** Understand how very large digital circuits are implemented at the IC level. Techniques for implementing large digital systems in NMOS and CMOS technology are presented, including a discussion of tradeoffs made to achieve high performance designs. Entails layout and design projects using a set of layout and simulation tools. Prereqs., ECEN 3100, 3250.

**ECEN 5049 (1-4). Special Topics.**

**ECEN 5109-3. Very Large Scale Integrated (VLSI) Systems Design.** Understand how very large digital circuits are implemented at the IC level. Techniques for implementing large digital systems in NMOS and CMOS technology are presented, including a discussion of tradeoffs made to achieve high performance designs. Entails layout and design projects using a set of layout and simulation tools.

**ECEN 5129-3. Simulation Tools for VLSI Systems.** Develops foundations of VLSI simulation—numerical analysis, linear algebra, data structures, language theory, and digital and analog circuits. Student teams write simulation packages. Covers simulation from the switch level to the behavioral level, including fault simulation. Prereq., instructor consent.

**ECEN 5139-3. Formal Verification of VLSI Systems.** Covers two-level and multi-level minimization, optimization via expert systems, algebraic and Boolean decomposition, layout methodologies, state assignment, encoding and minimization, silicon compilation. Prereqs., ECEN 4703 and general proficiency in discrete mathematics and programming.

**ECEN 6139-3. Logic Synthesis of VLSI Systems.** Studies synthesis and optimization of sequential circuits, including retiming transformations and don't care sequences. Gives attention to hardware description languages and their application to finite state systems. Also includes synthesis for testability and performance, algorithms for test generation, formal verification of sequential systems, and synthesis of asynchronous circuits. Prereqs., ECEN 5129, 5139, and CSCI 5454.

**ECEN 7849 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the doctoral level. Numbered ECEN 7840–7849. Prereq., advisor consent.

## Engineering Management

**EMEN 5000-3. Engineering Analysis.** Provides an introduction to the logical and systematic thinking required to evaluate and solve typical engineering problems in mechanics, electricity, thermodynamics, fluid mechanics, and light. Emphasizes understanding the physical behavior of systems and applying the principles and laws from the physical sciences to analyze these systems. Required for nonengineers seeking admission to the graduate technology management curriculum track. Not for degree credit; CATECS course.

**EMEN 5010-3. Introduction to Engineering Management.** Provides an overview of the concepts and philosophy of technical management. Includes leadership, knowledge management, strategic planning, human resources, process management, total quality, and customer satisfaction. Required for all degree students.

**EMEN 5020-3. Finance and Accounting for Engineering Managers.** Provides the concepts and skills necessary to financially analyze project and assess financial performance and status of an organization. Includes the time value of money, comparison of alternatives, taxes, risk management, cash flow, and financial cash statements. Required for all degree students. Prereq., EMEN 5010 or instructor consent.

**EMEN 5030-3. Project Management.** Presents the basic skills required to manage a wide range of technical projects. Topics include selecting project alternatives, managing project teams, developing project plan elements, risk management, monitoring and controlling projects, and financial analysis of projects. Skills learned are applied to a representative project. Prereq., EMEN 5020. Same as BADM 6920.

**EMEN 5031-3. Software Project Management.** Understand unique considerations of the software life cycle that impact project management. Emphasize configuration management, code reviews, architectural influences, and quality assurance with automated testing. Explore Capability Maturity Model (CMM) and Unified Modeling Language (UML) impact on project success. Recommended prereq., some software development experience.

**EMEN 5032-3. Advanced Topics in Project Management.** Covers advanced topics in project management from a systems view based on the Project Management Body of Knowledge (PMBOK); spans the entire project life cycle. Prereq., EMEN 5030 or equivalent.

**EMEN 5040-3. Quality, Strategy, and Value Creation.** Establishes the foundations to understand the urgency for quality improvement and excellence goals as an executive priority based on the teachings of W. Edwards Deming. Covers the systems approach, theory of variation, theory of knowledge, and psychology relating to these goals. Provides links to continuing discovery within the learning organization, and the value creating the underpinnings of intellectual capital. Prereq., EMEN 5010 or instructor consent. Similar to EMEN 4040 and SYST 6030.

**EMEN 5042-3. Methods for Quality Improvement.** Addresses today's global economic environment in that product, service, and process improvement are the platforms for innovation and value creation. Examines methods for linking customer needs and wants with products and services, as well as process development, control, and improvement. Methods covered include quality function deployment, statistical process control, and design of experiments.

**EMEN 5050-3. Leadership and Management.** Provides working engineers a background in leadership and management theory and enables them to develop practical skills in leading and managing. Topics include managerial styles, organizational factors, communications, ethics, change management and conflict resolution. Required for all degree students. Prereq., EMEN 5010 or instructor consent.

**EMEN 5300-3. Management of Research and Development.** Explores how research and development contribute to technological innovation and how they are conducted and managed in American universities, government laboratories, and industry. Topics include research and development strategies, innovation and creativity concepts, the research and development process, and management of research and development organizations and personnel. Prereq., EMEN 5010, or instructor consent.

**EMEN 5400-3. Principles of Product Management.** Explores the methodology for the management of new products from idea inception to product discontinuation. Emphasizes product development and market analysis in traditional and entrepreneurial company settings. Lessons are applied to a product introduction project. Prereq., EMEN 5010, or instructor consent.

**EMEN 5430-3. Software Product Management.** Explores software product management activities from product concept to launch while ensuring both market visibility and customer satisfaction. Includes market research and opportunity analysis, software requirements, pricing and profitability, alpha-beta program feedback, operational readiness, sales channels and partner strategies. Recommended prereq., some software development experience.

**EMEN 5500-3. Operations Management.** Recommended prereq., EMEN 5010 or instructor consent. Same as EMEN 4500. Similar to SYST 6080.

**EMEN 5600-3. Survey of Operations Research.** Applications-oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, decision analysis, Markov chain and Markovian decision models, queuing theory, and simulation. Same as SYST 6070.

**EMEN 5825-3. Entrepreneurial Business Plan Preparation.** Same as EMEN 4825.

**EMEN 5840 (1-3). Independent Study Project.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Prereq., EMEN 5010.

**EMEN 5900-3. Research Techniques in Engineering Management.** Provides both quantitative and qualitative techniques for use in capstone projects, master's theses, and PhD dissertations. Explores how these techniques are applicable to management issues in for-profit and not-for-profit organizations. Develops an understanding of how to identify research topics, research questions, and appropriate research methods. Topics include the craft of research, research methods for managers, and the research knowledge base.

**EMEN 6800-3. Master of Engineering Project.** Students seeking the ME degree must complete an individual capstone project covering an original, creative investigation that may be related to the student's professional work. A graduate faculty member supervises the student.

**EMEN 6830-3. Project Management Capstone.** Evaluate project management practices in the student's work unit, company, or in another organization. Identify strengths and weaknesses of the major product management processes as outlined in the Project Management Body of Knowledge (PMBOK). Opportunities for improvement and methods for implementation are expected. Prereqs., EMEN 5030 and 5032 and acceptance into the Project Management Certification option.

## Engineering Physics

*See Physics in the College of Arts and Sciences.*

## Environmental Engineering

**EVEN 1000-1. First Year Seminar in Environmental Engineering.** Introduction to environmental engineering. Introduces the field, including specialties such as air and water pollution control and site remediation. Learn about career opportunities and professional ethics through guest lectures and case study. Develop a goals statement and degree plan.

**EVEN 2840 (1-3). Independent Study—General Topics.** General topics relating to environmental engineering. One-on-one assistance with an instructor.

**EVEN 4840 (1-4). Independent Study—General Topics.** General topics relating to environmental engineering. One-on-one assistance with an instructor. May be repeated up to 4 total credit hours.

## General Engineering

**GEEN 1100-3. Social Impact of Technology.** Introduces undergraduate students to the social impact of technology and how technology impacts all aspects of life, the health of planet Earth, and how people interact with each other. Fulfills Engineering social science requirements.

**GEEN 1300-3. Introduction to Engineering Computing.** Introduces the use of computers in engineering problem solving and elementary numerical methods. Learn programming fundamentals, including data and algorithm structure, and modular programming. Numerical methods learned include solving single, nonlinear equations, fixed-point iteration, Gaussian elimination, and linear regression. Software vehicles include Excel/VBA, MathCAD, and Matlab. Coreq., APPM 1350.

**GEEN 1340-3. Special Topics.**

**GEEN 1342-3. Special Topics.**

**GEEN 1345-3. Special Topics.**

**GEEN 1350-1. Calculus 1 Work Group.** Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential. Grading under pass/fail option only; cannot be used to meet engineering degree requirements. Coreq., APPM 1350 or MATH 1300.

**GEEN 1360-1. Calculus 2 Work Group.** Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator. Grading under pass/fail option only; cannot be used to meet engineering degree requirements. Coreq., APPM 1360 or MATH 2300.

**GEEN 1400-3. Engineering Projects.** Provides first-year engineering students with opportunity to apply mathematical and scientific skills in interdisciplinary engineering projects. Students work in teams to design and build engineering projects under guidance of engineering faculty. Prototype projects are exhibited at an end-of-semester design expo.

**GEEN 1500-1. Introduction to Engineering.** Provides an introduction to the profession of engineering, to include its historical development, ethical expectations, and an examination of its current discipline specialization. Provides sufficient knowledge of the engineering disciplines necessary to make an informed career choice.

**GEEN 1510-2. Self Management and Leadership Principles 1.** Develops group cohesiveness, mutual support, multicultural awareness, and leadership skills. Topics include collaborative learning, motivation, time management and study skills, personal assertiveness, and career awareness. Open to new freshmen and transfer students. Controlled enrollment. Fulfills one credit hour of the Engineering social science requirement.

**GEEN 1520-1. Self Management and Leadership Principles 2.** Continuation of GEEN 1510. Controlled enrollment. Prereq., GEEN 1510.

**GEEN 3400-3. Invention and Innovation.** Introduction to invention and product innovation. Students explore the invention process, learn engineering skills, and explore entrepreneurship (patenting, intellectual property, marketing, raising capital). Student teams design, build, and test a potentially commercial product, and exhibit at an end-of-semester design expo. Prereq., PHYS 1110.

**GEEN 3500-0. Cooperative Education.** Assists students in maintaining enrollment at the university when participating in a previously arranged school-sponsored cooperative education program.

**GEEN 3860-3. Special Topics.**

**GEEN 4830-3. Special Topics.** May be repeated up to 6 total credit hours. Restricted to engineering students.

## Herbst Program of Humanities

**HUEN 1010-3. Introduction to the Humanities.** Explores a wide variety of challenging, interesting, and relevant humanistic expressions (fiction, philosophy, plays, poetry, art, music, etc.). Classes are small and discussion-based in order to focus on the practical skills needed to excel in both remaining humanities and social science electives and as a professional engineer. Prereq., freshman standing.

**HUEN 1100-3. History of Science and Technology.** Addresses a broad range of technological achievement from prehistory to the 21st century. Also considers related social, philosophical, and political issues. Prereq., freshman standing.

**HUEN 2843-3. Special Topics.** Students should check with the department for specific semester topics. Prereq., sophomore standing.

**HUEN 3100-3. Humanities for Engineers 1.** First course in four-semester sequence of Herbst Humanities Program for engineering students. Discusses culturally and historically significant readings in small group seminars. Prereq., junior standing and program approval.

**HUEN 3200-3. Humanities for Engineers 2.** Continuation of HUEN 3100. Discusses culturally and historically significant readings in small-group seminars. May be repeated up to 6 total credit hours. Prereq., HUEN 3100.

**HUEN 3840 (1-3). Independent Study.** Counts toward the humanities and social science degree requirements for a BS in the college of engineering. May be repeated up to 3 total credit hours. Prereq., instructor consent.

**HUEN 4100-3. Humanities for Engineers 3.** Continuation of HUEN 3100 and 3200. Focuses on humanities themes or texts of increased complexity, often in comparative perspective, including nonliterary works. Prereqs., HUEN 3100 and 3200.

**HUEN 4200-3. Humanities for Engineers 4.** Continuation of HUEN 4100. Provides opportunity to pursue a variety of humanistic themes related to Herbst Humanities Program. Prereq., HUEN 4100.

**HUEN 4700-3. International Study for Engineers.** Intense block seminar conducted during Maymester at a single location abroad (such as Florence). Combines industrial archaeology, current affairs, and fine arts and architecture. While grading and some preparatory work will take place at CU-Boulder, the bulk of the course takes place on location, abroad. Prereqs., senior status and instructor consent. Recommended prereqs., HUEN 3100 and 3200.

## Mechanical Engineering

### Math

**MCEN 1000-1. Introduction to Mechanical Engineering.** Introduces facets of mechanical engineering including history of the profession, mechanical engineering curriculum, industries in which mechanical engineers practice, and expectations and tools for academic success. Students participate in hands-on experiences, visit industry, make oral presentations, meet faculty and practicing professionals, and develop goal statements.

**MCEN 4030-3. Computational Methods.** Studies numerical techniques for solution of commonly encountered engineering problems. Includes methods for solving algebraic, ordinary, and partial differential equations; curve fitting; numerical integration; and optimization. Also involves extensive computer use. Prereqs., GEEN 1300 and APPM 2360.

**MCEN 4120-3. Engineering Statistics.** Focuses on probability and statistics, emphasizing engineering applications. Studies frequency distributions; statistical hypotheses and estimation; nonparametric, linear regression, and correlation; nonlinear and multiple regression; analysis of variance; and quality control. Prereq., APPM 2360.

**MCEN 5020-3. Methods of Engineering Analysis 1.** Studies selected topics from linear algebra, ordinary differential equations, and Fourier series. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prereq., APPM 2360 or equivalent.

**MCEN 5040-3. Methods of Engineering Analysis 2.** Studies selected topics from the theory of complex variables, integral transform methods, partial differential equations, and variational methods. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prereq., MCEN 5020 or equivalent.

**MCEN 7120-3. Perturbation Methods.** Teaches regular and singular perturbation methods for solving ordinary and partial differential equations and for evaluating integrals. Emphasizes formulation of mathematical models in fluid mechanics, combustion, heat transfer, solid mechanics, dynamics, and wave propagation. Prereq., MCEN 5020 and 5040, or equivalent.

### Fluids

**MCEN 3021-3. Fluid Mechanics.** Examines fundamentals of fluid flow with application to engineering problems. Explores fluid statics and kinematics; conservation equations for mass, momentum, and energy; Bernoulli and Euler equations; potential flow; laminar and turbulent viscous boundary layers; laminar and turbulent pipe flow; and compressible fluid flow. Prereqs., APPM 2360 and MCEN 2023.

**MCEN 4131-3. Air Pollution Control Engineering.** Introduces air quality regulations, meteorology, and modeling; methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen; and control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects. Prereq., MCEN 3021 or equivalent. Same as MCEN 5131.

**MCEN 4141-3. Indoor Air Pollution.** Air pollutants cause material damage and adversely affect human health. People spend over 80 per cent of their time indoors; often, air pollutant levels are higher indoors than outdoors. In this course we study air pollution in indoor environments and design appropriate control technologies. Prereqs., MCEN 3021 and 3022.

**MCEN 5021-3. Introduction to Fluid Dynamics.** Focuses on physical properties of gases and liquids, and kinematics of flow fields. Analyzes stress; viscous, heat-conducting Newtonian fluids; and capillary effects and surface-tension-driven flow. Other topics include vorticity and circulation, ideal fluid flow theory in two and three dimensions, Schwartz-Christoffel transformations, free streamline theory, and internal and free-surface waves. Coreq., MCEN 5020 or equivalent.

**MCEN 5041-3. Viscous Flow.** Highlights exact solution of Navier-Stokes equations and fundamentals of rotating fluids. Considers Low Reynolds number flow; similarity solutions; viscous boundary layers, jets, and wakes; and unsteady viscous flow. Prereq., MCEN 5021 or equivalent.

**MCEN 5121-3. Compressible Flow.** Applies energy, continuity, and momentum principles to compressible flow. Topics include normal and oblique shocks; Prandtl-Meyer expansion; methods of characteristics; and one-, two-, and three-dimensional subsonic, supersonic, and hypersonic flows. Prereq., MCEN 5021 or equivalent.

**MCEN 5131-3. Air Pollution Control Engineering.** Same as MCEN 4131.

**MCEN 5141-3. Indoor Air Pollution.** Same as MCEN 4141.

**MCEN 7221-3. Turbulence.** Hydrodynamic stability theory, equations for turbulent flows, free shear flows and boundary layers, homogeneous and isotropic turbulence, overview of turbulent combustion, reaction kinetics, energy equation, Favre averaging, PDFs, premixed and nonpremixed flame modeling, and recent developments.

## Thermal

**MCEN 3012-3. Thermodynamics.** Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions, cycles, mixtures, and chemical and phase equilibrium. Prereq., APPM 2350.

**MCEN 3022-3. Heat Transfer.** Studies fundamentals of heat transfer by conduction, convection, and radiation. Provides applications to heat exchangers, solar panels, and boiling and mass transfer. Also covers numerical methods for solving heat transfer problems and design of engineering equipment involving heat transfer processes. Prereqs., MCEN 3012 and 3021.

**MCEN 4042-3. Thermal Systems Design.** Covers thermodynamics and principles of thermal systems; performance and analysis of thermal system components; system simulation; and thermal system design methodology. Includes a significant open-ended design project. Prereqs., MCEN 3021 and 3022. Restricted to senior MCEN majors.

**MCEN 4122-3. Thermodynamics 2.** Offers advanced topics and applications, including thermodynamics of state, entropy and probability, thermodynamic cycles, and reacting and nonreacting mixtures. Provides application to engines and power generation by conventional and alternative energy technologies. Most assignments are design oriented. Prereq., MCEN 3012.

**MCEN 4152-3. Introduction to Combustion.** Description of the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine, and power plant combustion systems. Consideration of combustion-generated air pollution, fire safety, and combustion efficiency. Prereq., MCEN 3012. Recommended prereqs., MCEN 3021 and 3022. Same as MCEN 5152.

**MCEN 4162-3. Energy Conversion.** Examines common energy-conversion methods and devices. Topics include power-cycle thermodynamics, turbocompressor and expander processes, combustion systems, and applications and limitations of direct energy-conversion systems. Prereq., MCEN 3012.

**MCEN 5022-3. Thermodynamics.** Offers a comprehensive presentation of macroscopic and statistical thermodynamics and representative applications, from an axiomatic formulation designed to develop and clarify thermodynamic property relationships. Includes thermodynamic functions and derivatives, quantum mechanics, kinetic theory of gases, black body radiation, chemical equilibrium, and molecular spectroscopy.

**MCEN 5042-3. Heat Transfer.** Studies development of equations governing transport of heat by conduction, convection, and radiation, and their solution. Includes analytical and numerical solution of initial and boundary value problems representative of heat conduction in solids. Describes heat transfer in free and forced convection, including laminar and turbulent flow. Also involves radiation properties of solids, liquids, and gases and transport of heat by radiation.

**MCEN 5122-3. Thermodynamics 2.** Same as MCEN 4122.

**MCEN 5142-3. Computational Fluid Dynamics, Heat Transfer, and Combustion.** Finite difference, finite volume, finite element, and spectral methods, consistency, stability and convergence of numerical schemes, governing equations for reacting flows, convection, diffusion, convection-diffusion problems, matrix solution methods-cyclic reduction, Fourier, Jacobin, Gauss Siedel, SOR, ADI,

Chebyshev acceleration, Lax-Wendroff scheme, McCormack scheme, transonic small disturbance equation solution, staggered grids, simple scheme, discrete Fourier transform. Students work on two substantial projects using commercial software.

**MCEN 5152-3. Introduction to Combustion.** Same as MCEN 4152.

**MCEN 7122-3. Combustion Phenomena.** Applies multicomponent fluid equations of motion and chemical thermodynamics to a variety of combustion problems. Covers droplet combustion, premixed and diffusion flames, boundary layer combustion, detonation wave theory, topics related to internal combustion engines, and liquid and solid rockets. Prereq., MCEN 3012 and 3021.

## Solids

**MCEN 2023-3. Statics and Structures.** Covers vector algebra; equilibrium of particle systems and rigid bodies; free-body diagrams and equilibrium of rigid bodies; distributed forces; analysis of structures; friction; tension, compression, and shear; axially-loaded members—deformation and stress; and virtual work. Introduces matrix analysis of truss structures. Lectures and homework assignments involve computer work and hands-on laboratory work in the Integrated Teaching and Learning Laboratory (ITLL), documented by written reports. Prereq., APPM 1360.

**MCEN 2063-3. Mechanics of Solids.** Covers shear force and bending moment, torsion, stresses in beams, deflection of beams, matrix analysis of frame structures, analysis of stress and strain in 2-D and 3-D (field equations, transformations), energy methods, stress concentrations, and columns. Lectures and homework assignments involve computer work and hands-on laboratory work in the ITLL, documented by written reports. Prereq., MCEN 2023.

**MCEN 3043-3. Dynamics.** Covers dynamic behavior of particle systems and rigid bodies; 2-D and 3-D kinematics and kinetics; impulse, momentum, potential, and kinetic energy; and work, collision, and vibration. Lectures and homework assignments involve computer work and hands-on laboratory work in the ITLL, documented by written reports. Prereqs., MCEN 2023 and APPM 2350.

**MCEN 4043-3. System Dynamics.** Covers linear dynamic systems and mathematical tools for understanding them, input-output relationships, modeling templates, complex variables, Laplace transform, time-harmonic forcing and response, Fourier series and discrete Fourier transform, and coupled systems. Prereqs., MCEN 3017, 3043, 3022, and 3025.

**MCEN 4123-3. Vibration Analysis.** Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems. Prereq., MCEN 4030. Same as MCEN 5123.

**MCEN 4173-3. Finite Element Analysis.** Introductory course covering the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua, and heat conduction. Prereq., MCEN 2023 and 2063, or equivalents. Same as MCEN 5173.

**MCEN 4183-3. Mechanics of Composite Materials.** Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies. Prereq., MCEN 2063 and 3024, or equivalents. Same as MCEN 5183.

**MCEN 5023-3. Solid Mechanics 1.** Introduces stress, strain, and motion of a continuous system. Discusses material derivative; fundamental laws of mass, momentum, energy, and entropy; constitutive equations and applications to elastic and plastic materials. Prereq., MCEN 2063 or equivalent; coreq., MCEN 5020 or equivalent. Similar to ASEN 5012.

**MCEN 5123-3. Theory of Vibration.** Same as MCEN 4123.

**MCEN 5173-3. Finite Element Analysis.** Same as MCEN 4173.

**MCEN 5183-3. Mechanics of Composite Materials.** Same as MCEN 4183.

**MCEN 6163-3. Elastic Waves.** Effect of transient localized sources or dislocations in an elastic medium is studied. Modeling and application of waves in rods, beams, and plates is emphasized. In addition, ultrasonic, nondestructive evaluation and seismological problems are discussed. Prereq., MCEN 5023 or equivalent. Recommended MCEN 5040 or equivalent.

**MCEN 7123-3. Dynamics of Continuous Media.** Reflects upon derivation of wave equations from the basic equations of dynamic elasticity. Topics include propagation of elastic waves in infinite and partially bounded media, Rayleigh



waves and Love waves, Pochhammer solution for a rod, and waves in plates and in layered and anisotropic media. Prereq., MCEN 5020, 5040, and 5043, or equivalents. Same as PHYS 6680 and GEOL 6680.

## Materials

**MCEN 2024-3. Materials Science.** Structure, properties, and processing of metallic, polymeric, ceramic, and composite materials. Perfect and imperfect solids; phase equilibria; transformation kinetics; mechanical behavior; material degradation. Approach incorporates both materials science and materials engineering components.

**MCEN 4124-3. Mechanical Behavior of Materials.** Addresses the relationship between material structure and the fundamental processes of deformation, yield, and fracture. Examines elements of elasticity theory, introduction to plasticity, and formulation of failure criteria. Studies basic deformation processes in terms of dislocation mechanics and macroscopic mechanical behavior. Takes into consideration the influence of compositional and processing strengthening mechanisms on mechanical properties. Prereq., MCEN 2063 and 3024.

**MCEN 4134-3. Biomechanics.** Considers the mechanical behavior of biological materials and emphasizes the relationship between structural characteristics and macroscopic behavior. Focuses first on the mechanical behavior of microscopic protein and polysaccharide elements and then on larger scale soft and hard tissue structures. Prereq., MCEN 3024 or equivalent. MCEN 4124 recommended.

**MCEN 4174-3. Failure of Engineering Materials.** Examines the failure of materials used in engineering design through a series of real world case studies. Example failure modes considered include overload, fatigue, creep, and corrosion. Example case studies include failure of aircraft, mountaineering ropes, weight training frames, and toilets. Prereqs., MCEN 2024 and 2063. Same as MCEN 5174.

**MCEN 5024-3. Materials Science 1: Principles.** Provides a unified presentation of scientific principles applicable to all materials systems. Topics include concepts of material structure from localized interatomic bonding to short- and long-range order in crystalline and noncrystalline solids; the nature and consequences of imperfections in solids; phase equilibria; and transformation kinetics. Considers metallic, polymeric, and ceramic materials. Prereq., MCEN 2024 or equivalent.

**MCEN 5044-3. Materials Science 2: Behavior.** Applies principles of materials science developed in MCEN 5024 to the study of physical and mechanical behavior of metals, polymers, ceramics, and their composites. Emphasizes structure-property relationships, use of primary and secondary processing steps to control material behavior, and influence of environment on in-service performance. Prereq., MCEN 5024 or equivalent.

**MCEN 5164-3. Fracture.** Focuses on basic mechanisms controlling fracture in brittle materials, reduction of capacity for plastic deformation in engineering materials used at high-strength levels, and selection of materials in terms of toughness as well as strength. Prereq., MCEN 4124 and 5044, or equivalent.

**MCEN 5174-3. Failure of Engineering Materials.** Same as MCEN 4174.

**MCEN 6184-3. Structure and Properties of Polymers.** Emphasizes the relationship between molecular structure and macroscopic properties. Structural aspects include chain conformation, configuration, and the crystalline and amorphous states. Discusses physical and mechanical properties with a focus on solution and phase behavior, transitions of bulk polymers, and rubber and viscoelastic behavior. Prereq., graduate standing and MCEN 5024 and 5044, or equivalent.

## Design

**MCEN 1025-3. Computer-Aided Drawing and Fabrication.** Discusses basic techniques in mechanical drawing and subsequent transformation into a product. Looks at pictorial representation (orthographic projection, isometric views, dimensioning, work drawings), computer-aided drafting, and computer-aided manufacturing. Uses CAD software and a CNC machine for a design/manufacturing project.

**MCEN 3025-3. Component Design.** Application of mechanics, thermal science, and materials science to the detailed design of various machine elements including shafts bearings, gears, brakes, springs, and fasteners. Emphasizes application and open-ended design problems. Computers are used extensively. Prereq., MCEN 2063.

**MCEN 4045-3. Mechanical Engineering Design Project 1.** First part of a two-course capstone design experience in mechanical engineering. Covers problem definition, determining design requirements, alternative design concepts,

engineering analysis, proof-of-concept prototype, and CAD drawings. Students make several oral design reviews, a final design presentation, and prepare a written report. Prereq., MCEN 3025. Coreq., MCEN 4026.

**MCEN 4085-4. Mechanical Engineering Design Project 2.** Second part of a two-course capstone design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. Prereq., MCEN 4026 and 4045.

**MCEN 5025-3. Computer-Aided Design of Mechanical Systems.** Instructs students in displacement, velocity, and accelerations matrix formulation of mechanisms. Emphasizes numerical methods to solve simultaneous nonlinear algebraic and differential equations modeling mechanical devices. Involves analysis and synthesis of mechanical components and systems, including planar and spatial linkages, cams, springs, shafts, and gear trains. Prereq., MCEN 4030 or equivalent, and MCEN 3025.

**MCEN 5045-3. Design for Manufacturability.** Topics include general design guidelines for manufacturability; aspects of manufacturing processes that affect design decisions; design rules to maximize manufacturability; statistical considerations; value engineering and design for assembly (manual, robotic, and automatic). Presents case studies of successful products exhibiting DFM. Prereq., MCEN 4026 or equivalent.

**MCEN 5125-3. Optimal Design of Mechanical Components.** Applies linear and nonlinear optimization methods to the design of mechanical components and systems. Examines unconstrained and constrained optimization as well as formulation of objective functions, including cost, weight, response time, and deflection. Applies knowledge to gears, springs, cams, and linkages. Prereq., MCEN 3025 and 4030 or equivalent.

## Manufacturing and Systems

**MCEN 4026-3. Manufacturing Processes and Systems.** Engineering-science design course that examines manufacturing processes for metals, polymers, and composites as well as manufacturing systems that integrate these processes. Lecture topics include: forming, machining, joining, assembling, process integration, computer-aided manufacturing, and manufacturing system engineering. Prereq., MCEN 2024 or MCEN 3024.

**MCEN 5066-3. Principles and Practices of World Class Manufacturing.** Introduces manufacturing principles and practices that are essential to competing successfully in a global environment. Topics include manufacturing as a competitive tool, total quality management, process control, benchmarking, total productive maintenance, just in time, design of experiments, flexible manufacturing, and case studies.

**MCEN 5126-3. Applied Statistics for the Manufacturing and Process Industries.** Discusses the concepts and techniques of applied statistics essential to quality control and product/process improvement. Includes computer control (SQC/SPC), sampling methods and time series analysis, and methods of experimental design. Prereq., MCEN 4120. Same as CHEN 5127 and CVEN 5127.

**MCEN 5146-3. Applied Statistics in Research and Development.** Same as CHEN 5128.

**MCEN 5166-3. Electronics Packaging and Manufacturing.** To provide basic knowledge of the technologies and processes required for the packaging and manufacturing of electronic products. Topics covered include wafer fabrication, different levels of packaging, thermal management, life cycle engineering, printed wiring board assembly processes, and process control.

**MCEN 5636-3. Micro-Electro-Mechanical Systems 1.** Addresses issues of micro-electro-mechanical systems (MEMS) modeling, design, and fabrication. Emphasizes the design and fabrication of sensors and actuators due to significance of these devices in optics, medical instruments, navigation components, communications, and robotics. Prereq., instructor consent.

## Miscellaneous

**MCEN 3017-3. Circuits and Electronics.** Introductory course covers analysis of electric circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Prereqs., APPM 2360 and PHYS 1140.

**MCEN 3027-3. Measurements Lab.** Fundamentals of measurements: resolution, frequency response, calibration, and digital data acquisition. Uncertainty analysis. Comparison of measurements with empirical first- and second-order models. Written and oral technical communication. One hour of lecture and six hours of hands-on laboratory experience in teams. Prereqs., PHYS 1140, WRTG 3030, and either MCEN 3017 or ECEN 2250.

**MCEN 4027-3. Mechanical Engineering Laboratory.** One lecture and six hours of lab per week. Gives students the opportunity to participate in laboratory projects that extend over several weeks. Takes experiments from solid mechanics, fluid mechanics, thermal science, and materials science. Emphasizes planning an experiment, applying sound experimental procedures, keeping proper records, and communicating results orally and in lab reports. Includes a library research project that is presented orally to the class. Prereqs., MCEN 2063, 3022, 3024, and 3027.

**MCEN 5027-1. Graduate Seminar.** Offers weekly presentations by visiting speakers, faculty, and students.

## Special Topics

**MCEN 1208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 1208–1298. Prereq., instructor consent.

**MCEN 3208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 3208–3298. Prereq., instructor consent.

**MCEN 4128-3. Special Topics.** Prereq., MCEN 4025 or equivalent.

**MCEN 4208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 4208–4298. Prereq., instructor consent.

**MCEN 4228 (1-4). Special Topics.** Same as MCEN 5228.

**MCEN 4278-3. Special Topics.** Same as MCEN 5268.

**MCEN 4848 (1-6). Independent Study.** Subjects arranged in consultation with undergraduate advisor to fit the needs of the particular student. Numbered MCEN 4848–4898. Prereq., senior standing.

**MCEN 5208 (1-4). Special Topics.** Credit hours and subject matter to be arranged. Numbered MCEN 5208–5298.

**MCEN 5228 (1-4). Special Topics.** Same as MCEN 4228.

**MCEN 5248 (1-3). Special Topics.**

**MCEN 5268-3. Special Topics.** Same as MCEN 4278.

**MCEN 5848 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 5848–5898. Prereq., graduate standing.

**MCEN 5898 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 5848–5898. Prereq., graduate standing.

**MCEN 6228-3. Special Topics.**

**MCEN 6278-3. Special Topics.**

**MCEN 6848 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 6848–6898. Prereq., graduate standing.

**MCEN 6898 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 6848–6898. Prereq., graduate standing.

**MCEN 7208 (1-4). Special Topics.** Credit and subject matter to be arranged. Numbered MCEN 7208–7298.

## Thesis

**MCEN 6949 (1-3). Master's Degree Candidacy.**

**MCEN 6959 (1-6). Master's Thesis.**

**MCEN 8999 (16-24). Doctoral Thesis.**

## Telecommunications

**TLEN 4830-3. Making Waves: Telecommunications and Society.** Investigates relationships between human communications and technological innovation, with an emphasis on the intimate coupling between science and the cultural aspects of society. Covers historical to future perspectives on the intended and unintended consequences of technology.

**TLEN 5010-3. Telecommunications Finance.** Introduces various economic principles and models used to undertake cost and financial analysis of engineering projects, especially those involved within the telecom sector. Topics include time value of money, valuation, risk-return, cost of capital, asset pricing aggregation, real options theory, and telecom cost modeling. Prereq., TLEN 5835 and graduate standing.

**TLEN 5106-3. International Telecommunications Policy.** Institutions that affect the use of telecommunications are introduced, including various parts of the federal government such as the Department of Commerce, the FCC, and the Department of State. The major thrust of the seminar, however, is the role of international institutions, including the ITU, various satellite organizations, and the World Trade Organization. Prereq., TLEN 5835.

**TLEN 5120-3. Telecom Policy: Historical Perspectives.** Major issues in telecommunications policy. The public policy concept and process employed by regulators to develop telecommunications policy is reviewed. A multidisciplinary approach is employed, and topics are drawn from all areas of telecommunications policy.

**TLEN 5130-3. Strategic Planning in Telecommunications.** Topics include the fundamentals of strategic planning. Strategic plans for actual companies are analyzed and developed based on the contemporary competitive environment involving economic, political, technological, and human factors. Highly recommended for students interested in managerial or leadership positions. Prereq., TLEN 5835.

**TLEN 5190-3. Telecommunications Standards.** Current issues in the standardization of telecommunications and information technologies. Covers topics on the importance of standards, government and private sector perspectives, and impact of information age technologies on standards development. Special emphasis given to key national and international organizations. Prereq., TLEN 5835.

**TLEN 5240-3. Law and Regulation.** Same as LAWS 7241.

**TLEN 5300-3. Telecommunications Theory and Applications.** Examines the mathematical and physical theory of telecommunications. Deals with the fundamental concepts related to a wide range of topics including physical units, numbering systems, trigonometric functions, logarithms, indices, decibels, complex numbers, calculus, elementary probability, and power and circuit analysis.

**TLEN 5310-3. Telecommunications Systems.** Examines current, future, and basic technical concepts and related telecommunications operations. Includes in-depth look at basic telecommunications terminology and concepts, introductions to voice and data networks, signaling, and modulation/multiplexing. Topics include frequency band and propagation characteristics, spectral analysis of signals, modulation (AM, FM, PM, and PCM), digital coding, modulation multiplexing, detection, transmission systems, and switching systems. Provides an introduction to different network configurations, the OSI model, and traffic analysis. Core class required of all telecommunications degree students. Prereq., TLEN 5300, or equivalent with instructor consent.

**TLEN 5320-3. Telecommunications Lab.**

**TLEN 5330-3. Data Communications 1.** Introduces data and computer communications terminology, standards, and network models, routing and switching technologies, and communications and network protocols that apply to WANs, MANs, and LANs. Studies therefore focus on asynchronous and synchronous wide area networks such as Frame Relay and SONET, the Internet, routers, selected Internet applications, and Ethernets. Includes selected network laboratory experiments and trouble-shooting. Core class required of all telecommunications degree students. Prereq., TLEN 5310.

**TLEN 5340-3. Digital Telecommunication Networks.** Discusses digital networks providing voice and data communications over a wide area. Emphasis on understanding requirements for a network and how they can be realized with current and future technologies. Topics include the fundamental requirements for voice communication and processing, multiplexing, synchronization, switch architecture and subscriber access. Transport and access technologies discussed include ISDN, Frame Relay, Asynchronous Transfer Mode, ADSL, SONET, and Signaling System No. 7. Packet speech services, protocols and operation over Frame Relay, ATM and Internet protocol are also considered. Prereq., TLEN 5310.

**TLEN 5350-3. Satellite Communication Systems.** Discusses fundamental concepts and communication satellites. Topics covered include orbital mechanics, spacecraft and earth station system configuration, link budgets, propagation issues, and modulation/multiplexing techniques, multiple access schemes (FDMA, TDMA, CDMA), orbit selection, error control coding, and satellite network architecture. Also, examines current and future issues in commercial GEO, MEO, and LEO systems. Aimed at a high level fundamental understanding of satellite communications. Prereq., TLEN 5310, or equivalent with instructor consent.

**TLEN 5360-3. Telephone Systems.** Gives students an understanding of the technological manifestations, marketplace, and regulatory arenas surrounding today's telephone industry. Presents switching and transmission system technologies in moderate depth. Explains and applies principles in traffic theory along with telephone system design and evaluation techniques. Presents Key Systems, PBXs, and modern inside wiring schemes. Prereq., TLEN 5310.

**TLEN 5370-3. IP Routing Protocols.** Breaks IP routing technologies into two fundamental pieces: an in-depth study of interior and then exterior gateway protocols. Prereq., TLEN 5330. Recommended prereq., TLEN 5460.

**TLEN 5400-3. Traffic and Queuing Theory.** Provides analysis and methods of determining equipment requirements for telecommunications systems. Provides a fundamental understanding of traffic engineering concepts and an introduction to engineering data networks. Emphasizes the practical application of mathematical models for determining telecommunications equipment requirements and expected blocking and/or delays. Prereq., TLEN 5310 or equivalent with instructor consent.

**TLEN 5430-3. Data Communications 2.** Expands on the topics associated with Internet protocols, processes, and selected applications. Covers the application layer (HTTP, FTP, SMTP, DNS, and sockets), the transport layer (UDP, TCP), routing (RIP, OSPF, ICMP, IGMP), multimedia (RTSP, RSVP), network security (DES, RSA, SSL, AH), and network management (SNMP). Prereqs., TLEN 5310 and 5330, or instructor consent.

**TLEN 5440-3. Packet Telephony and Multimedia Communications.** Provides a foundation for assessing alternatives for telephony and multimedia communication using packet technology. It discusses the requirements of speech and video coding as applied to packet transport and the design of systems to provide these services. Prereq., TLEN 5310. Recommended prereq., TLEN 5330.

**TLEN 5460-3. Telecommunication Systems Laboratory.** Provides direct experience with telecommunications functions and equipment through experiments and demonstrations. Student teams learn the fundamental techniques of signal transmission and impairment measurement, voice and data switching, and systems administration, and the fundamental functions of data networking and services. Each experiment is designed to focus on some particular aspect of system management, development, or maintenance for either enterprise telecommunications customers or telecommunication service providers. Procedures require the use of actual commercial equipment, services, observation, reporting of behavior, and performance, compared to specified requirements. Student teams and laboratory periods for the semester are established during the first class lecture meeting. Prereqs., TLEN 5310 and 5330.

**TLEN 5470-3. Signaling Protocols.** Signaling in this context is the exchange of information associated with the establishment and control of a connection. Students will gain an understanding of modern signaling protocols and differences among these protocols. Students will gain an appreciation of actually implementing signaling protocols in the Internet Protocol environment. Prereqs., TLEN 5330 and C/C++. Recommended prereq., Java programming.

**TLEN 5500-3. Cable Television.** Explores the technical, regulatory, and management aspects of the cable TV and video delivery industries. Topics include analog and digital television systems, traditional and advanced cable systems, DBS systems, and the growing field of cable modems and two-way, interactive, digital broadband delivery architectures. Course may be counted as either a policy or technical elective. Prereqs., TLEN 5310 and 5835, or instructor consent.

**TLEN 5510-3. Wireless and Cellular Communications.** Presents in detail the technologies and architectures employed in cellular and other modern wireless systems and discusses regulatory and other industry issues. Major topics include radio technology, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Prereq., TLEN 5310 or instructor consent.

**TLEN 5600-1. Telecommunications Seminar.** Provides a series of weekly lectures with questions and discussion. Many of the speakers are nationally known experts in telecommunications. Fall and spring seminars are for 1 credit hour each, and attendance is required.

**TLEN 5700-1. Capstone Seminar/Project.**

**TLEN 5830 (1-6). Special Topics.**

**TLEN 5831–5839 (3). Special Topics.**

**TLEN 5920 (1-6). Independent Study.**

**TLEN 6940 (1-3). Candidate for Degree.**

**TLEN 6950-6. Master's Thesis.**

**TLEN 6960-3. Telecommunications Project.**

# School of Journalism and Mass Communication

## Core Curriculum and General Electives

**JOUR 1001-3. Contemporary Mass Media.** Examines mass media's interaction with society and looks at journalism and mass media in historical, intellectual, economic, political, and social contexts.

**JOUR 1871 (1-3). Special Topics.**

**JOUR 2011-3. Media and Public Culture.** Introduces the rise and development of mediated communication and its impact on and role within the formation of modern culture and public life.

**JOUR 3001-3. Public Affairs Reporting.** Grounds students in basic reporting and writing skills necessary to become competent journalists. Prereqs., JOUR 1002, junior standing. May be limited to majors.

**JOUR 3771-3. Mass Communication History.** Discusses major trends in the development of contemporary American journalism, its role in United States history, famous journalists, and foundations and evolution of freedom of the press. Prereq., junior or senior standing. May be limited to majors.

**JOUR 4201-3. International Mass Communication.** Covers mass media in the international system, including comparative examinations of national and international press organizations, methods, and content. Also looks at the role of mass media in developed and developing countries and the international flow of news and opinion.

**JOUR 4301-3. Media Ethics and Professional Practice.** Provides a theoretical framework within which to spot and analyze ethical issues in the mass media. Awakens students to ethical issues; allows them to question the profession's conventional wisdom; and teaches them how to change those conventions. Same as JOUR 5301.

**JOUR 4311-3. Mass Communication Criticism.** Introduces students to the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism, etc. Texts from contemporary print and broadcast media.

**JOUR 4321-3. Media Institutions and Economics.** Introduces the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations and the contemporary issues surrounding them. Same as JOUR 5321.

**JOUR 4331-3. Women and Popular Culture.** Studies how women are portrayed in mass media, particularly advertising, television, film, and contemporary popular literature. Uses critical methods with a focus on producing responsible viewers and readers. Same as JOUR 5331.

**JOUR 4651-3. Mass Communication Law.** Studies state and federal laws and court decisions that affect mass communication in order to develop knowledge of mass media rights and responsibilities and an understanding of the legal system. Same as JOUR 5651.

**JOUR 4661-3. Newspaper Management.** Covers management and organization of newspapers, including an understanding of daily management considerations and what is involved in being an employee in today's newspaper environment. Same as JOUR 5661.

**JOUR 4711-3. Mass Media and Culture.** Examines culture in the form of discourse, symbols, and texts transmitted through mass media. Explores the relationship between such mediated culture and social myth and ideology.

**JOUR 4791-3. Mass Communication and Public Opinion.** Topics include opinion-shaping role of the mass media, theories of public opinion and propaganda, polling, communication effects, and communication theories. Same as JOUR 5791.

**JOUR 4831-3. Publication Design and Production.** Explores fundamentals of design, typography, composition, color, and print media, with an emphasis on both the design process and presentation comps. The focus is on the design of niche and consumer audience publications, such as newsletters, magazines, and collateral print. May be limited to majors. Same as JOUR 5831.

**JOUR 4841 (1-3). Undergraduate Independent Study.**

**JOUR 4871 (1-3). Special Topics.**

**JOUR 4931 (1-3). Internship.**

**JOUR 5001 (1-4). Research in Journalism.** Offers students the opportunity to participate in research projects with faculty members or pursue their own primary research interests.

**JOUR 5201-3. International Mass Communication.** Same as JOUR 4201.

**JOUR 5301-3. Media Ethics and Professional Practice.** Same as JOUR 4301.

**JOUR 5321-3. Media Institutions and Economics.** Same as JOUR 4321.

**JOUR 5331-3. Women and Popular Culture.** Same as JOUR 4331.

**JOUR 5511-3. Newsgathering 1.** Covers problems and practice in reporting news of government, politics, the courts, and industry, business, science, and other areas involving public issues. For graduate students only.

**JOUR 5521-3. Precision Journalism.** Instructs students in computer-assisted reporting, including a knowledge of electronic mail, bulletin boards, commercial databases, and global information networks such as the Internet as well as the use of spreadsheets to analyze census data and the like.

**JOUR 5651-3. Mass Communication Law.** Same as JOUR 4651.

**JOUR 5661-3. Newspaper Management.** Same as JOUR 4661.

**JOUR 5711-3. Mass Media and Culture.** Examines how various communication channels such as television, advertising, film, newspapers, magazines, and popular music interact with culture. Looks at media not only as conduits of cultural values, but also as industries, and at the audiences and the role they play in creating meaning from media texts.

**JOUR 5791-3. Mass Communication and Public Opinion.** Same as JOUR 4791.

**JOUR 5831-3. Publication Design and Production.** Same as JOUR 4831.

**JOUR 5841 (1-3). Graduate Independent Study.**

**JOUR 5851 (1-3). Graduate Professional Project.**

**JOUR 5861-3. Visual Communication.** Visual communication involves understanding both perception of messages and construction of them. Students analyze their visual thinking abilities and develop habits of visual analysis and criticism, as well as visual communication skills.

**JOUR 5871 (1-3). Special Topics.**

**JOUR 5931 (1-3). Internship.**

**JOUR 6051-3. Theories of Mass Communication.** Studies theories and perspectives of mass communication and explores the role of mass media in society.

**JOUR 6061-3. Methods of Mass Communication Research.** Continuation of JOUR 6051, emphasizing experimental and survey research methods.

**JOUR 6071-3. Critical Theories of Media and Culture.** Introduction to critical theories and analysis of media and popular culture. Examines major theoretical traditions and/or theorists that significantly inform media studies (e.g., culturalism, structuralism, Marxism, critical theory, feminism, psychoanalysis, post-structuralism) and applies these to media analysis and criticism.

**JOUR 6201-3. Readings in International Mass Communication.** Covers mass communication within the international system, including similarities and differences in functions, facilities, and content; social theories of the press; and the international flow of mass communication.

**JOUR 6211-3. New Media and Development.** Studies and analyzes communications technologies and techniques used in addressing social problems in developing countries.

**JOUR 6301-3. Communication, Media, and Concepts of the Public.** Introduces students to historical and contemporary uses of fundamental concepts in research and theory about media institutions, particularly public, community, mass, publicity, public space, public opinion, public interest, and the public sphere.

**JOUR 6311-3. Seminar: Freedom of Expression.** Studies free-speech issues in the context of current and historical philosophical foundations for freedom of expression.

**JOUR 6321-3. Literary Journalism.** Analyzes the work of journalists who became some of the greatest fiction writers of the 19th and 20th centuries, and examines the increasingly indistinct lines between journalism and narrative fiction.

**JOUR 6551-3. Telecommunication Policy.** Surveys historical and contemporary developments in telecommunications policy, emphasizing social and cultural dimensions, and focusing primarily on the context of the United States.

**JOUR 6651-3. Press and the Constitution.** Graduate seminar in communications law. Studies changing law and applied legal research techniques.

**JOUR 6661-3. Media Ethics and Responsibility.** Develops a theoretical framework with which to recognize and analyze ethical issues as they arise in the mass media.

**JOUR 6671-3. Media, Myth, and Ritual.** Anthropological and interpretative exploration of cultural practices of media audiences. Addresses theoretical and methodological implications of studying audiences from a culturalist perspective, with particular focus on media audience practices. Students engage in field research projects related to course content.

**JOUR 6711-3. Mass Communication and the Arts.** Inquiry into relationship of the arts and the mass media, including study of critics, their function, and their works.

**JOUR 6721-3. Message Effectiveness.** Investigates how mass media messages work in terms of such effects as perception, learning and comprehension, and persuasion. Effectiveness is analyzed in terms of how well mass communication messages meet their objectives.

**JOUR 6771-3. Readings in the History of Mass Communication.** Examines specialized areas in the history of mass communication.

**JOUR 6781-3. Economic and Political Aspects of Mass Communication.** Discusses economic problems and political issues relevant to newspapers, magazines, broadcasting, and CATV. Examines problems of telecommunications and the impact of future technology on mass communication.

**JOUR 6951 (1-6). Master's Thesis.**

**JOUR 7011-3. Proseminar in Communication Theory 1.** Introduces the principal concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities.

**JOUR 7021-3. Proseminar in Communication Theory 2.** Continuation of JOUR 7011. Prereq., JOUR 7011.

**JOUR 7051-3. Qualitative Research Methods in Mass Communication.** Examines various methods of qualitative data gathering and analysis in the mass media context.

**JOUR 7061-3. Quantitative Research Methods in Mass Communication.** Examines various methods of quantitative data gathering methods and analysis in the mass media context.

**JOUR 7871-3. Special Topics.**

**JOUR 8991 (1-10). Doctoral Thesis.**

## News-Editorial

**JOUR 1002-3. Critical Thinking and Writing.** Reviews grammatical and organizational principles, experiments with several rhetorical modes, summarizes and analyzes media texts, and teaches techniques for writing and editing clearly and effectively. Uses library resources and computer databases to conduct basic research. Students study personal writing, informative writing, persuasive writing, and promotional writing.

**JOUR 2002-3. Electronic Information Strategies.** Helps students develop a research strategy, become familiar with the essential tools of computer-assisted research, and comprehend statistical data as a basis for good communication of information. Covers what information is needed for stories, reports, or other copy, and how to find and evaluate it efficiently and by the deadline.

**JOUR 3102-3. Press Photography.** Covers the camera as a reporting tool, training in the use of cameras, composition, and darkroom procedures. Prereq., JOUR 1002. May be limited to majors.

**JOUR 3552-3. News Editing.** Discusses principles and practice in copy editing and writing headlines for local and wire stories. Practice in page makeup, picture editing, and electronic editing. Prereq., JOUR 3001. Restricted to majors.

**JOUR 3902 (1-3). Newspaper Practicum.** Gives students the opportunity to participate in news work on *Campus Press*. May be repeated up to 6 total credit hours.

**JOUR 4002-3. Reporting 2.** Assumes mastery of basic reporting and writing skills. Students produce more sophisticated stories on a variety of topics. Prereq., JOUR 3001.

**JOUR 4102-3. Advanced Photography.** Explores advanced camera and darkroom techniques, the picture story, picture editing, trends in pictorial journalism, and individual projects. Prereq., JOUR 3102. Same as JOUR 5102.

**JOUR 4272-3. Public Relations.** Surveys public relations in America. Includes case studies and individual projects. Same as JOUR 5272.

**JOUR 4282-3. Public Relations Programs.** Develops and applies public relations programs, from identification of the problem through execution of public relations techniques. Prereq., JOUR 4272. Same as JOUR 5282.

**JOUR 4502-3. Reporting 3.** Involves writing news and features about actual events for publication under deadline pressure. Lab to be arranged. Prereqs., JOUR 3552 and 4002, and senior standing. Restricted to majors. Same as JOUR 5502.

**JOUR 4552 (1-3). Advanced Editing.** Highlights copy editing, headline writing, page designing, and news evaluating. Emphasizes day-to-day newsroom operations in a newsroom environment. Students edit the *Campus Press*.

**JOUR 4562-3. Electronic Journalism.** Involves studying and writing about existing electronic publications and online publishing policies. Teaches methods of electronic journalism from simple text to the more sophisticated graphics, photos, movies, and sound and text presentations. Same as JOUR 5562.

**JOUR 4602-3. Editorial and Opinion Writing.** Concentrates on several of the subjective areas of journalism. Emphasizes editorial writing, editorial pages, critics, and criticism of the performing arts. Same as JOUR 5602.

**JOUR 4702-3. Critical Writing for the Journalist.** Analyzes the entertainment area, especially as it pertains to the print media. Emphasizes the composition of criticism and attitudes and writing techniques of individual critics. Prereq., JOUR 3001. Same as JOUR 5702.

**JOUR 4802-3. Magazine and Feature Writing.** Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and marketing. Prereq., JOUR 3001. Same as JOUR 5802.

**JOUR 4822-3. Reporting on the Environment.** Involves reporting and writing about the environment by taking into account the scientific, technological, political, economic, and cultural dimensions of environmental subjects. Same as JOUR 5822.

**JOUR 4872-3. Special Topics—Print.** Same as JOUR 5872.

**JOUR 5102-3. Advanced Photography.** Same as JOUR 4102.

**JOUR 5272-3. Introduction to Public Relations.** Same as JOUR 4272.

**JOUR 5282-3. Public Relations Programs.** Prereq., JOUR 5272 or instructor consent. Same as JOUR 4282.

**JOUR 5502-3. Newsgathering.** Prereqs., JOUR 5511 and 5552. Restricted to majors. Same as JOUR 4502.

**JOUR 5512-3. In-Depth Reporting.** Shows how to dig beneath the surface of issues and events. Focuses on research, interviewing, and writing. Prereq., JOUR 5511.

**JOUR 5552-3. News Editing.** Same as JOUR 3552.

**JOUR 5562-3. Electronic Journalism.** Same as JOUR 4562.

**JOUR 5602-3. Editorial and Opinion Writing.** Same as JOUR 4602.

**JOUR 5702-3. Critical Writing for the Journalist.** Same as JOUR 4702.

**JOUR 5802-3. Magazine and Feature Writing.** Same as JOUR 4802.

**JOUR 5812-3. Science Writing.** Helps students acquire the basic skills and knowledge required of science journalists. Also examines the scientific method, the nature of scientific knowledge, and how the media covers science.

**JOUR 5822-3. Reporting on the Environment.** Same as JOUR 4822.

**JOUR 5872-3. Special Topics—Print.** Same as JOUR 4872.

**JOUR 7872 (1-3). Special Topics.** Special topics offered in the media studies PhD program. Check the schedule of courses each semester for topics being offered.

## Advertising

**JOUR 2403-3. Principles of Advertising.** Covers basic principles of publication, radio, and television advertising. Analyzes consumers, markets, and media. Organizes advertising departments and agencies.

**JOUR 3453-3. Advertising Copy and Layout.** Provides experience in creating advertising copy and layout and analyzing consumer and product appeals. Students prepare copy for various media: newspapers, magazines, radio, and television. Prereq., JOUR 2403.

**JOUR 3463-3. Advertising Media.** Studies media, markets, and audiences, and their relationships to advertising messages. Prereq., JOUR 2403.

**JOUR 3473-3. Advertising Research.** Introduces students to applied research methods and provides practice in using research in marketing and advertising decision making. Prereq., JOUR 2403.

**JOUR 3503-3. Intermediate Creative Concepts.** Provides experience in how to develop concepts large enough to be the basis of a multi-ad campaign. Learn how to give individual ads in each campaign a consistent look and tone. Prereq., JOUR 3453.

**JOUR 3913 (1-3). Advertising Practicum.** Provides the opportunity to do advertising work for the *Campus Press* and the virtual mall. May be repeated up to 6 total credit hours.

**JOUR 4403-4. Advertising Campaigns.** Discusses advanced copy and layout. Emphasizes planning integrated advertising campaigns for national and regional audiences. Prereqs. JOUR 3453, 3463, and 3473.

**JOUR 4453-3. Advertising and Society.** Examines criticisms and contributions of advertising in society and the economy. Same as JOUR 5453.

**JOUR 4503-3. Advanced Creative Concepts.** Shows how to apply skills learned in JOUR 3503 to specific product areas. Learn how to extend a campaign idea across various media. Portfolios are developed with a range of products for a variety of print media venues. Prereq., JOUR 3503.

**JOUR 4513-3. Introduction to Art Direction.** Helps students strengthen their understanding of design and type. Emphasis is also placed on the visual imagination and helping students learn to use images to express their ideas. Prereq., instructor consent.

**JOUR 4523-3. Portfolio.** Develop new campaigns; select, edit, and fine tune ideas with the most portfolio potential; and execute work on computer until each campaign has the finished quality of professional work. Students complete portfolios. Prereq., instructor consent.

**JOUR 4873-3. Special Topics.** Prereqs., JOUR 3453, 3463, and 3473.

**JOUR 5453-3. Advertising and Society.** Same as JOUR 4453.

**JOUR 5513-2. International Marketing Communication.** Examines integrated marketing communications from a global perspective, such as how to build stockholder relationships and corporate reputation across borders.

**JOUR 5533-3. Brand Strategy.** Examines the theory of branding: what brands are, how brands are created and measured, as well as strategies for managing brands and brand communication.

**JOUR 5873-3. Special Topics—Advertising.**

## Broadcast

**JOUR 3604-3. Radio and Television News.** Covers principles and techniques involved in the preparation of news for broadcasting. Prereq., JOUR 1002.

**JOUR 3614-3. Radio Programming and Production.** Introduces audio console, microphones, turntables, tape recorders, tape editing, timing, and combo operation. Emphasizes applying the basic principles to professional production of radio programs.

**JOUR 3644-3. Principles of Broadcast Production.** Introduces the use of television equipment. Emphasizes applying the basic principles to professional program production. Prereq., JOUR 1002.

**JOUR 3674-3. Television Production 2.** Covers studio productions for “NewsTeam Boulder.” Students also do field projects to sharpen their writing, video production, and editing skills. Prereq., JOUR 3644.

**JOUR 4344-3. TV Documentary.** Designed to give advanced broadcast students the opportunity to create through research, writing, videotaping, and editing a long-form, nonfiction television program. Prereq., JOUR 3644. Same as JOUR 5344.

**JOUR 4354-3. TV Reporting.** Students learn basic broadcast reporting skills—where to find news and how to cover it, how to analyze and organize news stories. Skills are linked with advanced concepts of shooting and editing videotape in order to produce news stories on deadline. Prereqs., JOUR 3604 and 3644.

**JOUR 4614 (1-3). Advanced Radio Practices.** Applies the theory of radio programming and production. Assignments include producing radio programming for radio stations in Colorado and weekly discussion-critique sessions. Prereq., JOUR 3614. Same as JOUR 5344.

**JOUR 4624-3. NewsTeam.** Students participate in “NewsTeam Boulder” by preparing and performing newscasts for Boulder Cable Channel 62. Prereqs., JOUR 3604, 3644, and 4354. Same as JOUR 5624.

**JOUR 4634 (1-3). Broadcast Projects.** Covers interpretation, preparation, and/or reporting in programs for broadcast media. Prepares radio or television documentaries and informational/entertainment programs. Prereqs., JOUR 3604 and 3644, or instructor consent.

**JOUR 4644-3. Electronic Media Management.** Analyzes station operations, public relations, personnel, financing, labor relations, and laws and regulations as well as the manager’s ethical and social responsibilities. Same as JOUR 5644.

**JOUR 4674 (1-3). Television Production 3.** Provides in-depth experience in directing and producing television programs. Prereq., JOUR 3674.

**JOUR 5204-3. International Mass Communication.** Same as JOUR 4201.

**JOUR 5344-3. TV Documentary.** Same as JOUR 4344.

**JOUR 5514-3. Newsgathering for Television.** Covers principles and techniques involved in the preparation of news for broadcasting. Introduces the use of television equipment.

**JOUR 5524-3. Television Investigative Reporting.** Covers how to produce quality, substantive, in-depth stories for television. Covers the basics of investigative reporting, research, and working with sources.

**JOUR 5624-3. NewsTeam.** Prereqs., JOUR 5511 and 5514. Same as JOUR 4624.

**JOUR 5634 (1-3). Broadcast Projects.** Prereq., instructor consent. Same as JOUR 4634.

**JOUR 5644-3. Electronic Media Management.** Same as JOUR 4644.

**JOUR 5874 (1-3). Special Topics—Electronic Media.**

**JOUR 6940-3. Master’s Degree Candidate.**

# School of Law

## International

**LAWS 6210-3. Comparative Law.** Considers foreign solutions to certain key legal problems. Focuses on general problems of legal process, rather than on substantive rules. Topics include the role of lawyers, civil dispute resolution, criminal procedure, and employment discrimination. Covers different legal systems in different years.

**LAWS 6400 (2-3) International Law.** Examines the nature and sources of international law, relationship between international law and domestic U.S. law, role of international organizations such as the United Nations, methods of resolving international disputes, bases of international jurisdiction, and select substantive areas of international law, including laws governing the use of force and the protection of human rights.

**LAWS 6510 (2-3). International Environmental Law.** Examines international environmental law, including transboundary impacts and global issues. Addresses such issues as intergenerational equities, principles of compensation, and if international environmental norms should receive special environmental norm consideration. A course in public international law is not a prerequisite, but students who have not taken such a course will probably find it useful to do some additional background reading. Offered in alternate years.

**LAWS 7200-3. Anthropology of Law.** Reviews the relationship between the social and cultural features of both developed and developing country societies and the formal and informal legal institutions within them. Considers the nature of social control and constraint, judicial reasoning, fact finding, conciliation, mediation and arbitration, and legal discourse.

**LAWS 7300 (2-3). International Litigation.** Examines the special issues that arise in litigation in U.S. courts when one or more of the parties is a foreign individual, corporation, or government, or when the subject of the litigation concerns events occurring wholly or partly outside of this country. Includes personal jurisdiction over foreign defendants, extraterritorial service of process and evidence gathering, choice of forum, foreign sovereign immunity, the act of state doctrine, extraterritorial application of U.S. law, and recognition of enforcement of foreign judgments.

**LAWS 7310-2. International Dispute Settlement.** Examines various mechanisms for the settlement of international disputes. Includes negotiation, inquiry, mediation, conciliation, arbitration, and adjudication. Focuses on intergovernmental dispute resolution.

**LAWS 7440-3. International Human Rights Law.** Surveys international human rights both in law and in philosophy.

**LAWS 8310-2. Seminar: International Crimes Punishment.** Addresses issues in international criminal law in three parts: 1) basic contents of international law, 2) international criminal tribunals that enforce international criminal law, and 3) national efforts to bring international criminal prosecutions. Recommended prereqs., LAWS 6400 and 7440.

**LAWS 8440-2. Seminar: International Human Rights.** Investigates the sources of international human rights law and issues of jurisdiction to prescribe, adjudicate, and enforce norms. Students study treaties and reservations, customary law, declarations, resolutions, and the U.S. courts' and activists' use of materials. Topics include sovereignty and self-determination, culture, privacy, right to equality, language and speech rights, right to development, immigration, workers and globalization, and citizenship.

## Business

**LAWS 5101-3. Contracts 1.** Covers basic principles of contract liability, offer, acceptance and consideration, statute of frauds, contract remedies, the parol evidence rule, performance of contracts, conditions, effect of changed circumstances, third-party beneficiaries, assignment, and specific performance.

**LAWS 5111-3. Contracts 2.** Covers basic principles of contract liability, offer, acceptance and consideration, statute of frauds, contract remedies, the parol evidence rule, performance of contracts, conditions, effect of changed circumstances, third-party beneficiaries, assignment, and specific performance.

**LAWS 6011-3. Payment Systems.** Examines the methodology and policies of Articles 3 and 4 of the Uniform Commercial Code, dealing with such topics as

negotiable instruments, bank deposits, collections, letters of credit, and electronic fund transfers.

**LAWS 6021-3. Secured Transactions.** Explores the methodology and policies of Article 9 of the Uniform Commercial Code, dealing with financing transactions in personal property.

**LAWS 6031. Consumer Protection Laws and Policies.** Focuses on deceptive trade practices and consumer rights. Reviews the law of deception/misrepresentation at common law, and federal and state laws regarding unfair acts and practices. Covers credit practices, environmental and health claims, and telecommunications and privacy. Discusses remedies, including governmental enforcement actions, and individual and class actions.

**LAWS 6201 (3-4). Agency, Partnership, and the LLC.** Surveys agency law whose principles are important in many other areas of law. Studies the legal organizations commonly used by small businesses: partnerships and limited liability companies (LLCs).

**LAWS 6211-3. Corporations.** Covers formation of corporations and their management; relations between shareholders, officers, and directors; the impact of federal legislation on directors' duties; and the special problems of closed corporations.

**LAWS 6251-4. Corporations.** Covers formation of corporations and their management; relations between shareholders, officers, and directors; the impact of federal legislation on directors' duties; and the special problems of closed corporations.

**LAWS 6281-3. Accounting Issues for Lawyers.** Studies accounting and auditing problems in the form they are placed before the lawyer, including a succinct study of basic bookkeeping, in-depth legal analysis of the major current problems of financial accounting, and consideration of the conduct of the financial affairs of business.

**LAWS 6501-3. Labor and Employment Law.** Covers decisions and statutes concerning the employment relationship, including issues such as employment-at-will; health and safety; drug testing; job security; and the rights of employers, unions, and employees under the National Labor Relations Act and related legislation.

**LAWS 6511-3. Labor Law.** Includes the subjects of evolution of labor relations laws; how a collective bargaining relationship is established; negotiation of the collective bargaining agreement; labor and the antitrust laws; and rights of the individual worker. Course materials frame the issue of how a developed or postindustrial democracy deals with the problems that arise out of the employment relationship: of the choices between laissez-faire, substantive regulation, and the private ordering of the employment relationship through the collective bargaining process.

**LAWS 7011-3. Creditors' Remedies and Debtors' Protection.** Examines typical state rights and procedures for the enforcement of claims and federal and state law limitations providing protection to debtors in the process. Includes prejudgment remedies, statutory and equitable remedies, fraudulent conveyance principles, and exemptions and other judicial protections afforded debtors.

**LAWS 7021-3. Bankruptcy.** Briefly examines nonbankruptcy business rehabilitation devices, followed by basic principles of federal bankruptcy law and the bankruptcy court system. Concludes with attention to business reorganizations under Chapter 11 of the Bankruptcy Code. Recommended prereq., LAWS 6001 and 7011.

**LAWS 7201-3. Antitrust.** Studies American competition policy: collaborations among competitors, including agreements on price and boycotts, definition of agreement, monopolization, vertical restraints such as resale price maintenance, and territorial confinement of dealers. Offered in alternate years.

**LAWS 7241-3. Telecommunications Law and Policy.** Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular, and other wireless systems, and the Internet.

**LAWS 7301 (2-3). Copyright.** Examines state and federal laws relating to the protection of works of authorship ranging from traditional works to computer programs. Studies the 1976 Copyright Act as well as relevant earlier acts. Gives attention to state laws, such as interference with contractual relations, the right of publicity, moral right, protection of ideas, and misappropriation of trade values, that supplement federal copyright.

**LAWS 7311 (2-3). Patent Law.** Covers selected topics such as patentable subject matter, patentability, and use of patent rights through licensing and in-

fringement litigation. Also covers practice and procedure of the Patent and Trademark Office.

**LAWS 7331-2. Sports Law.** Covers the application of rules from agency, antitrust, contracts, constitutional law (including sex discrimination), labor law, property, torts, unincorporated associations, and other subjects to those persons involved in the production and delivery of athletic competition to consumers. Explores the development of the application of these rules to a sports setting and related economic issues.

**LAWS 7341-3. Trademark and Unfair Competition Law.** Examines trademark protection, the interaction of trademark and unfair competition law with other intellectual property doctrines, the requirements for acquiring and retaining federal trademark rights, false advertising and other misrepresentations, the right of publicity and related claims, remedies for infringement, and international aspects of trademark protection.

**LAWS 7401-3. Securities Regulation.** Stresses statutory interpretation of the various federal statutes regulating the issue of corporate securities and the cases and regulations that have arisen out of those statutes.

**LAWS 7411-3. Mergers, Acquisitions, and Reorganizations.** Studies the planning of corporate mergers, acquisitions, and reorganizations, examining the application and integration of state corporate law, federal securities law, accounting principles, tax law, labor law, products liability law, environmental law, ERISA, and antitrust law.

**LAWS 7451-3. Law and Finance for Entrepreneurs.** Studies unique legal problems faced by entrepreneurs, including formation issues (choice of entity, rights of the founders, initial investors), operation issues (governance, key employees, intellectual property, financing), IPOs, and buy-outs.

**LAWS 7541-3. Employment Discrimination.** Examines statutory and constitutional prohibitions of discrimination in employment on the basis of race, gender, age, religion, national origin, and disability.

**LAWS 7601-3. Business Transactions.** Provides a practical understanding of how to apply the law in both transactional and litigation settings. Gives an interdisciplinary look at how various areas of the law are brought together in common factual settings. Teaches students to negotiate, document, and close the acquisition of a business covering the areas of practice of corporate, contracts, real property, secured transactions, and bankruptcy law. Tests, in a litigation setting, the decisions made during the acquisition stage.

**LAWS 7611 (2-3). International Business Transactions.** Examines the sources of international business law, the relationship between such law and the U.S. legal system, the choice of law in international business disputes, the special issues that arise when doing business with foreign governments, the law governing international sales and the shipment of goods, and international intellectual property protection. Offered in alternate years.

**LAWS 7751-3. Commercial Arbitration.** Discusses the nature of arbitration, tactical considerations in whether to use this form or another form of dispute resolution, the drafting of effective contracts to arbitrate the enforceability of these contracts, and the enforcement of arbitration awards. Covers the preclusive effect of arbitration proceedings, multiparty arbitration, and choice of law. Students conduct simulated arbitrations.

**LAWS 8251-2. Seminar: Advanced Corporate Law.** Explores current issues in corporate and securities law, including developments in fiduciary duties of officers and directors, corporate governance, executive compensation, revisions to the model business corporation act, and state and federal litigation reform.

**LAWS 8341-3. Seminar: Law and Economics of the Information Age.** Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the “networked” information industries, the proper role of “unbundling” policies to advance competition, and how intellectual property and antitrust rules should be developed. Prereq., LAWS 7201, 7241, or 7301.

**LAWS 8421-2. Seminar: Duties of the Professional Advisor.** Studies ethical and legal regulation of lawyers, auditors, and investment bankers, who have been described as “gatekeepers” to the investment markets. Considers changes in ethical and legal regulation that can be adopted to restore a sense of integrity for these professionals.

**LAWS 8521-2. Seminar: Comparative Labor Law.** Explores the laws and economic transformations that affect labor relations on a global scale.

**LAWS 8531-2. Seminar: Labor and Employment in Transportation.** Explores legal, social, and economic issues arising from labor relations in the industries transporting goods and people by road, rail, air, and water, among the most critical sectors of the economy.

## Natural Resources

**LAWS 6002-3. Public Land Law.** Deals with the legal status and management of resources on federal lands, including national forests, parks, and BLM lands. Explores federal law, policy, and agency practice affecting the use of mineral, timber, range, water, wildlife, and wilderness resources on public lands.

**LAWS 6112-3. Foundations of Natural Resources Law and Policy.** Introduces students to the law of natural resources. Examines the legal, historical, political, and intellectual influences that shape resources development and conservation.

**LAWS 6302-3. Water Resources.** Analyzes regional and national water problems, including the legal methods by which surface and ground water supplies are allocated, managed, and protected.

**LAWS 7122 (2-3) Mining and Energy Law.** Addresses major issues affecting the development of mineral resources through mining activity. Includes the regulation of the impacts of mining on the environment on both public and private land. Covers the Mining Law of 1872, the Federal Coal Leasing Amendments, and state regulation of the impacts of mining on the environment.

**LAWS 7202-3. Environmental Law.** Examines and analyzes important federal pollution control statutes, including the National Environmental Policy Act, the Clean Air Act and Clean Water Act, Solid Waste Act, and Superfund. Considers related economic theory, ethics, and policy issues.

**LAWS 7402-2. Environmental and Toxic Torts.** Examines statutorily imposed responsibility and common-law tort and product liability exposure related to the growing problem of the handling and disposal of toxic substances and hazardous waste as they impact public health and the environment. Focuses on federal law and that of several states regulating chemicals and toxic substances, hazardous waste disposal, and clean-up of contaminated sites.

**LAWS 8112 (2-3). Seminar: Advanced Natural Resources Law.** Studies historical, literary, and scientific materials and analyzes current problems of natural resource law. Requires additional field trip expenses for students. May be repeated up to 5 total credit hours.

**LAWS 8122-2. Seminar: Mineral Development.** Deals with legal and policy issues surrounding mineral development and its environmental impacts. Emphasizes the problems associated with hard rock minerals and coal development, with some treatment of oil and gas leasing and development issues. Focuses on western public lands with some discussion of international and private lands issues.

**LAWS 8202-2. Seminar: Environmental Policy.** Examines issues of environmental justice, including the disparate impacts of pollution and land use controls on certain communities and ethnic groups. Topics may include concentration of waste facilities in neighborhoods occupied by poor and minority populations, adequate protection of migrant farm workers from the impacts of pesticide hazards, and environmental controls that inhibit economic growth and development sought by Indian tribes.

**LAWS 8212-2. Seminar: Environmental Law Practice and Policy.** Focuses on the translation of environmental policies and purposes into environmental law and practice. Investigates policy issues on prevention of significant deterioration of air quality (PSD), the particulate matter national ambient air quality standard (PM NAAQS), and global climate changes. Emphasizes legal structure issues, including the role of national, state, and local governments in implementing environmental law and policy as well as counterpart global structures and mechanisms for responding to global or transboundary environmental problems. Prereq., LAWS 7202.

**LAWS 8222-2. Seminar: Environmental Philosophy and Law.** Investigates the changing philosophical underpinnings of U.S. environmental law and policy and how philosophy and legal institutions interact.

**LAWS 8302-2. Seminar: Advanced Problems in Water Resources Law.** Explores the use of watersheds as geographic and political entities for addressing water-related issues and how laws and institutions facilitate or impede watershed-based problem solving.



## Practice and Procedure

**LAWS 5223-2. Appellate Court Advocacy.** Students prepare appellate briefs and related documents and deliver oral arguments before a three-judge court composed of faculty, upper-division students, and practicing attorneys. Practice arguments are videotaped and critiqued.

**LAWS 5303 (2-3). Civil Procedure 1.** Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.

**LAWS 5313-3. Civil Procedure 2.** Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.

**LAWS 5503-4. Criminal Law.** Statutory and common law of crimes and defenses, procedures by which the law makes judgments as to criminality of conduct, purposes of criminal law, and constitutional limits upon it.

**LAWS 6103 (2-3). Professional Responsibility.** Examines the legal profession as an institution, its history and traditions, and the ethics of the bar with particular emphasis on the professional responsibilities of the lawyer. Discusses the Model Rules of Professional Conduct.

**LAWS 6353-3. Evidence.** Studies the methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges.

**LAWS 7003-3. Federal Courts.** Looks at structure and jurisdiction of the federal courts, emphasizing problems of federalism and separation of powers and their relationship to resolution of substantive disputes.

**LAWS 7013-2. Supreme Court Decision Making.** Students deliberate over several important cases as “justices” of the Supreme Court. Class is divided into three “courts” with the first hour spent in deliberation and the second hour in discussion of the deliberative process as well as the substantive issues.

**LAWS 7303-3. Complex Civil Litigation.** Covers civil procedure in modern complex multiparty suits, including class actions in such settings as employment discrimination and mass torts, and problems in discovery, joinder, res judicata, collateral estoppel, and judicial management in such suits. Offered in alternate years.

**LAWS 7523-2. Juvenile Law.** Takes a critical look at the juvenile justice system and how it responds to the needs of juveniles who are either delinquents and/or victims of abuse. Issues include the rights and responsibility of parents, parental responsibility programs, delinquents, and the future of our juvenile courts.

**LAWS 8103-2. Seminar: Alternative Dispute Resolution Ethics.** Explores the ethics of mediators and other alternative dispute resolvers and facilitators, of attorneys representing clients in alternative dispute resolution processes, and of judges serving in alternative roles. Issues include confidentiality, providing appropriate notice to those concerned, and avoidance of conflicts of interest.

**LAWS 8613-2. Seminar: Civil Liberties Litigation.** Studies issues unique to the prosecution and defense of civil liberties lawsuits. Discusses litigation strategies with reference to lawsuits currently pending in the federal courts.

## Property

**LAWS 5624-3. Property 1.** Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.

**LAWS 5634-3. Property 2.** Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.

**LAWS 6024-3. Real Property Security.** Examines basic mortgage law, including use of mortgage substitutes (e.g., deeds of trusts and installment land contracts). Covers foreclosure and redemption and related problems; special priority problems in land acquisitions and construction financing; special financing devices, including variable-interest and wraparound mortgages; and problems relating to the transfer of the mortgagor’s and mortgagee’s respective interests.

**LAWS 6104-3. Wills and Trusts.** Covers intestate succession; family protection; execution of wills; revocation and revival; will contracts and will substitutes; creation of trusts; modification and termination; charitable trusts; fiduciary administration, including probate and contest of wills; and construction problems in estate distribution.

**LAWS 7024-3. Real Estate Planning.** Considers various contemporary legal problems involved in the ownership, use, development, and operation of real estate. Emphasizes the income tax and financing aspects of commercial and residential use and development such as shopping plazas and apartment buildings.

**LAWS 8154-2. Seminar: Land Use Planning.** Discusses public control of private land uses through planning, zoning, and regulation of land development, including consideration of constitutional and statutory limitations on legislatively created techniques. Offered in alternate years.

## Public

**LAWS 5425-4. Torts.** Studies nonconsensual allocation of losses for civil wrongs, focusing primarily on concepts of negligence and strict liability.

**LAWS 6005-4. Constitutional Law.** Studies constitutional structure: judicial review, federalism, separation of powers; and constitutional rights of due process and equal protection.

**LAWS 6045-3. Criminal Procedure.** Focuses primarily on the constitutional limitations applicable to such police investigative techniques as arrest, search, seizure, electronic surveillance, interrogation, and lineup identification.

**LAWS 7005-3. Media Law.** Surveys common, statutory, and regulatory law as applied to the mass media. Focuses on the law as it affects the gathering and publishing of news. Also examines the regulation of the electronic media.

**LAWS 7015-3. First Amendment.** Examines speech and religion clauses of the First Amendment. Includes the philosophical foundation of free expression, analytical problems in First Amendment jurisprudence, and the relationships between free exercise of religion and the separation of church and state.

**LAWS 7025-3. Civil Rights Legislation.** Presents a comprehensive study of federal civil rights statutes briefly reviewed in other courses (e.g., Constitutional Law or Federal Courts). Studies federal civil rights statutes, their judicial application, and their interrelationships as a discretely significant body of law of increasing theoretical interest and practical importance.

**LAWS 7045-3. Criminal Procedure: Adjudicative Process.** Focuses primarily on criminal procedure at and after trial. Looks at bail, prosecutorial discretion, discovery, plea bargaining, speedy trial, jury trial, the right to counsel at trial, double jeopardy, appeal, and federal habeas corpus.

**LAWS 7055-3. Education Law.** Considers issues raised by the interaction of law and education. Issues may include the legitimacy of compulsory schooling, alternatives to public schools, socialization and discipline in the schools, and questions of equal educational opportunities.

**LAWS 7065-3. Immigration and Citizenship Law.** Covers legal issues pertaining to noncitizens of the United States, especially their right to enter and remain as immigrants and nonimmigrants. Topics include admission and exclusion, deportation, and refugees and political asylum. Approaches topics from various perspectives, including constitutional law, statutory interpretation, planning, ethics, history, and policy.

**LAWS 7095-2. Women in Law.** Explores the role of women in the legal system by looking at women as parties, jurors, witnesses, lawyers, law professors, and judges. Explores the relationship of law and society to women as victims and offenders. Investigates law and society’s response to adoption, lesbian/gay issues, rape, surrogate and bad mothers, and sexual harassment.

**LAWS 7105-3. Domestic Relations.** Focuses on nature of marriage, actions for annulment and divorce, problems of alimony and property division, separation agreements, and custody of children. Also considers illegitimacy, abortion, contraception, the status of married women in common law and under modern statutes, and relations of parent and child.

**LAWS 7115-2. Legal Rights of Children.** Covers a wide array of issues dealing with the legal rights of the unborn, children, and juveniles. Covers the legal status of parent-child abuse, delinquency and crime, and emancipation.

**LAWS 7125-2. Advanced Domestic Relations.** Offers advanced study of several domestic relations subjects, including both theoretical and lawyering

issues. Tentative subjects include discovery, client interviewing and deposition preparation, asset valuation, working with expert witnesses, children as clients, and alternative dispute resolution. Recommended prereq., LAWS 7105.

**LAWS 7205-3. Administrative Law.** Covers practices and procedures of administrative agencies and limitations thereon, including the Federal Administrative Procedure Act, and the relationship between courts and agencies.

**LAWS 7255-3. Local Government.** Studies state legislative and judicial control of the activities, powers, and duties of local governmental units, including home-rule cities and counties, and some problems of federal, state, and local constitutional and statutory limitations on governmental powers when exercised by local governmental units (e.g., the powers to regulate private activities, tax, spend, borrow money, and condemn private property for public uses). Offered in alternate years.

**LAWS 7345-2. Comparative Criminal Procedure.** Takes an in-depth look at some of the basic features of modern criminal justice systems that share the civil law tradition with the hope that such study will provide a vehicle for a deeper understanding of the strengths and weaknesses of the American system of criminal justice. Prereq., LAWS 6045.

**LAWS 7375 (2-3). U.S. Races and Justice Systems.** Examines the unique but related legal, social, and economic problems and accomplishments of those persons in this country whose ancestry originated in Africa, Asia, Latin America, or North America, and explores the developing literature on whites and whiteness.

**LAWS 7425 (2-3). Health Law.** Acquaints students with the issues arising at the interface between law and medicine through analysis of cases and other materials. Critically analyzes methods used by courts and legislatures to address medical/legal problems in an effort to determine whether the legal resolution was reasonable and appropriate in light of medical, social, and political considerations. Offered in alternate years.

**LAWS 7475-2. Advanced Torts.** Studies selected tort actions and theories. Topics covered may include "dignitary torts" (e.g., defamation, privacy, etc.), business torts, and product liability. Offered in alternate years.

**LAWS 7725-3. American Indian Law.** Investigates the federal statutory, decisional, and constitutional law that bears upon American Indians, tribal governments, and Indian reservation transactions.

**LAWS 7735-2. Advanced American Indian Law.** Examines selected issues in the field emphasizing major emerging problems and reform proposals. Examples of issues include Alaska development and the Indian Child Welfare Act.

**LAWS 8015-3. Seminar: Constitutional Theory.** Examines the role of the courts and the other branches of government in defining and enforcing constitutional values. Relevant readings are from philosophy, social sciences, and legal scholarship, as well as cases.

**LAWS 8075-2. Seminar: Race, Racism, and American Law.** Focuses on issues of race reform law, in particular the group of issues dealing with Black Americans. (Students of all hues and persuasions are welcome.) Offers an interpretive or critical dimension, rather than a litigation-oriented one. Helps students understand how race reform law works and how attitudes and historical forces have shaped that body of law.

**LAWS 8125-2. Seminar: Law and the Politics of Family Law.** Examines issues that have been raised under the United States Constitution with respect to state regulation of families. Topics include questions of family and individual privacy, the status of children, procreation, marriage and divorce, the definition of family relationships, and problems of federalism and the role of the Supreme Court in the regulation of families.

**LAWS 8135-2. Seminar: Gender, Work, and Family.** Explores the social and legal problems that develop at the intersection of work and family, and considers legal/non-legal solutions that have been and could be used to accommodate both women and men in their efforts to deal with these problems.

**LAWS 8315-2. Seminar: Advanced Criminal Justice.** Studies policy and practice issues rather than case law. Focuses primarily on how American criminal justice is dispensed in cases that do not reach trial, including police behavior, prosecutorial discretion, defense services, bail, plea bargaining, and sentencing.

**LAWS 8325-2. Seminar: Reforming Criminal Trials.** Starts from the premise that reform of our criminal trial system to make it less complicated, less expensive, and more reliable should be considered. Examines trial systems in other countries and U.S. changes over recent decades. Student papers make and defend proposals for reform.

**LAWS 8355-2. Seminar: Sentencing Law and Policy.** Studies sentencing law against the backdrop of criminal justice policy and concerns of public policy. Covers theories of punishment, the merits of indeterminate sentencing, sentencing guidelines, and nonincarcerative sanctions. Confronts problems of race, class, and other disparities in criminal sentencing.

**LAWS 8375-2. Seminar: Advanced Immigration and Citizenship.** Explores the law and policy of citizenship in the United States, starting with legal questions regarding acquisition and loss of citizenship as well as the consequences of citizenship, but also examines the fundamental premises underlying American citizenship and the concept of citizenship generally.

**LAWS 8415-2. Seminar: Bioethics and Law.** Focuses on legal, moral, and economic analyses of problems posed or soon to be posed by advances in biomedical technologies.

**LAWS 8535-2. Seminar: Class and Law.** Explores issues relating social class to such areas as labor relations, law enforcement, controls on radical movements, and the distribution of wealth and power. Considers problems defining social class.

**LAWS 8725-2. Seminar: Advanced American Indian Law.** Examines selected issues in the field, emphasizing major emerging problems and reform proposals. Examples include Alaska development and the Indian Child Welfare Act.

**LAWS 8765-2. Seminar: Gender Law.** Examines the relationship of law and gender in areas of criminal law, employment, education and constitutional law, using feminist theoretical perspectives as the organizing principle. Each perspective is applied to cases and materials on topics such as violence against women, female prisoners, sexual harassment, discrimination in education and employment, prostitution and pornography. Students of both sexes and all political views are encouraged to enroll.

## Research and Writing

**LAWS 5226-2. Legal Writing.** Provides an intensive introduction to the resources available for legal research. Students also prepare written material of various kinds designed to develop research skills, legal writing style, and analysis of legal problems.

**LAWS 6856-2. Advanced Legal Research.** Offers an in-depth look at research resources and methods. Includes sources from the judicial, legislative, and executive branches of federal and state government; research in topical areas such as environmental law, taxation, and international law; and extensive coverage of secondary and nonlaw resources. Covers both print and electronic sources.

**LAWS 7106 (1-2). Rothgerber Moot Court Competition.** Offers an intensive involvement in legal research, appellate brief writing, and oral arguments in a competitive context. Student finalists may continue involvement in regional and national competitions.

**LAWS 7406-1. International Moot Court Competition.** Open only to students who actively participate in the seminar preparing for the competition, in the preparation of memorials for the competition, and in the practice of oral arguments or regional oral arguments.

**LAWS 7846-1. Independent Legal Research.** Involves independent study and preparation of a research paper under faculty supervision. Students produce a research paper equivalent to a seminar research paper. A draft is submitted, subjected to critique by the faculty member, and redrafted. Available during or after the fifth semester of law school. Prereq., instructor consent.

**LAWS 7896-1. Independent Legal Research: Law Review.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *University of Colorado Law Review*.

**LAWS 7906-2. Independent Legal Research: Law Review.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *University of Colorado Law Review*.

**LAWS 7916-1. Independent Legal Research: Journal of International Environmental Law and Policy.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Colorado Journal of International Environmental Law and Policy*.

**LAWS 7926-2. Independent Legal Research: Journal of International Environmental Law and Policy.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Colorado Journal of International Environmental Law and Policy*.

**LAWS 7936-1. Independent Legal Research: *Journal of Telecommunications and High Technology Law*.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Journal of Telecommunications and High Technology Law*.

**LAWS 7946-2. Independent Legal Research: *Journal of Telecommunications and High Technology Law*.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Journal of Telecommunications and High Technology Law*.

## Taxation

**LAWS 6007-4. Income Taxation.** Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.

**LAWS 6157-3. Corporate Taxation.** Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests, and liquidation.

**LAWS 6167-3. Taxation of Conduit Entities.** Studies federal income taxation of pass-through entities such as are used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests, and liquidation.

**LAWS 7207-3. Federal Estate and Gift Tax.** Analyzes federal estate and gift taxation of inter vivos and testamentary transfers, introduces income taxation of estates and trusts, and involves elementary estate planning.

**LAWS 7217-2. Estate Planning.** Discusses problems and solutions for owners of various-sized estates and different types of assets including jointly-held property, stock in closely-held corporations and farms, analysis of federal taxation of generation-skipping transfers in trust, postmortem estate planning, and drafting of trusts and wills. Prereqs., LAWS 6104 and LAWS 7207.

**LAWS 7307-3. Taxation of Natural Resources.** Considers the federal income tax aspects applicable to the exploration for, the development of, and the operation of natural resources, as well as the financing thereof. Also considers oil and gas, hard minerals, timber, and water. Offered in alternate years. Recommended prereq., LAWS 6007.

**LAWS 7617-3. International Taxation.** Covers basic aspects of the United States taxation of income earned abroad by its citizens and the taxation of income derived by foreign persons from U.S. sources, including the implications of income tax treaties.

**LAWS 8407-2. Seminar: Tax Policy.** Considers questions of fairness, efficiency, and promotion of social goals as they arise in federal, state, and local systems of raising revenue through user fees and through taxation of income, sales, property, and estates and gifts. Past seminar papers have covered the taxation of business organizations, the value added tax, the social security tax, the taxation of farming, and the tax exemption of religion. Offered in alternate years.

## Jurisprudence and Perspective Courses

**LAWS 6128-3. Legislation.** Examines theories of legislation and the relation between legislatures and courts, emphasizing problems of statutory interpretation and other issues in the judicial use or misuse of statutes.

**LAWS 6138-3. Federal Tax Politics.** Studies the tax system as the nexus of politics and economics. Examines how various interests and entities use the many tools of political power to shape the tax system. Intended for those interested in politics and legislation, rather than for the tax specialist.

**LAWS 6318-3. Law and Economics.** Introduces the basic elements of economic theory and emphasizes demand and utility, cost, and optimality.

**LAWS 7128-3. Jurisprudence.** Considers a variety of themes and issues central to legal thought, including the controversy between positivism and natural law, the meaning of "interpretation" in law, the nature of judicial decision making, and the strengths and weaknesses of "policy" or "rights," and other approaches to legal problems.

**LAWS 7228-2. Intellectual Origins of the Constitution.** Examines the views of the Constitution's framers as expressed in contemporaneous and antecedent writings and debates. Offered in alternate years.

**LAWS 7248-3. History of Criminal Justice.** Explores the social, cultural, and legal history of Anglo-American criminal justice from the 17th to the 20th cen-

uries. Also examines tensions between various methods that historians employ to study crime and law.

**LAWS 7458-2. Law and Literature.** Focuses on the question of what literature can teach lawyers through a variety of literary works and films. Covers traditional works by Shakespeare, Tolstoy, Camus, Kafka, and Melville, as well as more contemporary works by Toni Morrison and Norman Mailer. Several short reflection papers, a journal, and a final eight page paper are required.

**LAWS 8128-3. Seminar: Jurisprudence.** Considers some major jurisprudential themes using classical and more contemporary materials. Includes the positivist, natural law, and common law conceptions of law, the nature of legal authority, and the problem of legal interpretation.

**LAWS 8318-2. Seminar: Law and Economics.** Introduces the uses and limitations of microeconomic theory for understanding and resolving legal problems. Emphasizes concepts prominent in the law and economics literature such as cost, transaction costs, utility, and rational self interest.

**LAWS 8428-2. Seminar: Women in Law and Literature.** Considers both legal and literary depictions of women and their legal and extralegal situations. Topics may include women as mothers, women as sexual beings, women's silence, women's violence and women as criminals, women at work, and women as the "other" in law and literature.

**LAWS 8548-2. Seminar: Theory of Punishment.** Explores the various justifications that philosophers have developed to explain why we have the right to punish. Examines the historical evolution of our punishment system and focuses on the death penalty as a critical contemporary issue in the debate about the proper role of punishment in our society.

**LAWS 8608-2. Seminar: Power, Ethics, and Professionalism.** Examines critically the possibility and character of ethical reasoning within the legal profession in light of its institutional structures. Explores descriptive/normative accounts of the profession's structure, "professionalism," and individual conscience. Put simply, the seminar explores whether it is possible to be a good lawyer and ethical person.

**LAWS 8628-2. Seminar: Law, Power, and Politics.** Draws upon various works of political theory, social theory, and jurisprudence to examine different conceptualizations of politics, power, law, and their relations.

**LAWS 8718-2. Seminar: Modern Theorists and Law.** Considers the work of Levi-Strauss, Steven Lukes, Pierre Bordieu, Alfred Schutz, Anthony Giddens, Culler, David Harvey, Denis Cosgrove, Michel Foucault, and Emily Martin with respect to social control and law. Focuses on the way in which social control is exercised through the organization of space, time, and the human body. Topics include consideration of meaning, intersubjectivity in the law, social construction of time, and the body as a real and cultural artifact.

## Practice—Clinical

**LAWS 6009-4. Legal Aid Civil Practice 1.** Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6019-3. Legal Aid Civil Practice 2.** Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6029-4. Legal Aid Criminal Practice 1.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6039-3. Legal Aid Criminal Practice 2.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6059 (2-3). Legal Aid and Defender.**

**LAWS 6069-4. Legal Aid Civil Practice.** Emphasizes procedural and practical remedies and defenses available in civil litigation. Students are assigned civil cases related to the course material. Develops working knowledge of courtroom skills. Concludes with full mock trial. Prereq. or coreq., LAWS 6353.

**LAWS 6079-4. Legal Aid Criminal Practice.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants. Develops working knowledge of courtroom skills, advocacy, and evidence presentation. Concludes with full mock trial. Prereq. or coreq., LAWS 6353.

**LAWS 6109-2. Trial Advocacy.** Focuses on voir dire, opening statement, direct examination of witnesses, and cross examination.

**LAWS 6179-2. Trial Practice.** Students apply the rules and doctrine of evidence in simulated trial settings. Must be taken with the corresponding section of Evidence. Enrollment is to 24. Satisfies the trial practice requirement and counts 2 hours toward the 14 credit hour maximum of clinical hours counted toward graduation. Graded course; not pass/fail.

**LAWS 7029-3. Appellate Advocacy Clinic.** Provides a clinical course that enables students to work on briefs of criminal cases being handled by the Appellate Division of the Public Defender or Attorney General's Office. Instruction in oral advocacy is given. Enrollment limited to eight students.

**LAWS 7079-2. Wrongful Convictions.** Focuses on the issues and remedies in cases of people who have been convicted, whose traditional appellate remedies have been exhausted, and who continue to claim actual innocence. Preference given to those who have taken or are taking more criminal procedure courses.

**LAWS 7159-2. Advanced Trial Advocacy.** Offers an advanced course covering trial practice elements. Open only to students who have taken LAWS 6109.

**LAWS 7169-2. Motions Advocacy.** Provides practical training in preparing and arguing pretrial, post-trial, and chambers motions to an experienced federal judge based on materials from actual case files. Assigns some research papers. Limited to 15 third-year students with interest in trial advocacy and willingness to participate in confrontational exercises. Counts as practice hours.

**LAWS 7209-3. Natural Resources Litigation Clinic.** Offers hands-on experience in the practice of natural resources law in the Rocky Mountain region to a select number of clinic students. The clinic's docket of active cases focuses on public land law and the environmental statutes protecting those lands and their resources. Students participate in projects that test the full range of lawyering skills, including traditional litigation, administrative advocacy, legislative drafting, and the conduct of complex negotiations and settlements.

**LAWS 7309 (2-3). American Indian Law Clinic.** Offers a clinical education course involving participation in the representation and advocacy of Indian causes—land or water claims, Indian religious freedom, job or other discrimination based on race, and issues implicating tribal sovereignty. Recommended prereq., LAWS 7725.

**LAWS 7409-3. Legal Negotiation.** Explores the fundamentals of effective negotiation techniques and policies for lawyers. Students engage in mock negotiations of several legal disputes. Credit is not given for both LAWS 7419 Legal Negotiation and Dispute Resolution and this course.

**LAWS 7419 (2-3). Legal Negotiation and Dispute Resolution.** Explores the fundamentals of effective negotiation techniques and policies for lawyers. Engages students in mock negotiations of several legal disputes. Examines a variety of dispute-resolution processes, such as mediation, arbitration, minitrials, and court-annexed settlement procedures, as alternatives to traditional court adjudication.

**LAWS 7429-2. Alternative Dispute Resolution.** Examines a variety of dispute resolution processes, such as mediation, arbitration, minitrials, and court-annexed settlement procedures, as alternatives to traditional court adjudication. Credit not given for both LAWS 7419 Legal Negotiation and Dispute Resolution and this course.

**LAWS 7439 (2-3). Mediation.** Explores mediation, one of the more important methods of alternative dispute resolution, and the legal issues that may arise related to mediation. Considers what kinds of persons and disputes are most appropriate for mediation. Includes role playing.

**LAWS 7509-1. Trial Competition.** Student teams further develop trial and advocacy skills in a competitive mock-trial format involving two or more rounds of trials. Requires preparation of trial briefs and drafting other court pleadings and documents. Credit is limited to the top two teams (six students). Student finalists may continue involvement in regional and national competitions. May be repeated within the term up to 4 total credit hours.

**LAWS 7529-1. Appellate Advocacy Competition.** Gives students the opportunity to participate in an intermural appellate advocacy competition, in which a brief must be filed and reviewed, critiqued, and deemed credit-worthy by a member of the faculty. (Law School Rule 3-2-9 (b) should be consulted prior to enrollment.)

**LAWS 7609-1. Law Practice Management.** Studies the establishment of a solo or small-firm legal practice. Topics include the business structure (PC, LLC, etc.), office systems, marketing and development, staffing, liability insurance, managing time, technology, and billing. (This practice course counts toward the 14 credit hour maximum of practice hours.) Course supported by the Section of Law Practice Management of the ABA in memory of Harold A. Feder, CU Law '59.

**LAWS 7619-2. Entrepreneurial Law Clinic.** Advise indigent clients who need legal services in the founding of their business or not-for-profit firms, registering LLCs, and drafting employment and intellectual property agreements. Prereq., two of the following courses: Agency Partnership and the LLC, Corporations, Securities, Seminar on Corporate Law, Law and Finance for Entrepreneurs, Accounting Issues for Lawyers, Patent Law, Trademark, and International Business Transactions.

**LAWS 7939 (1-7). Extern Program.** Extern credit may be earned for uncompensated work for a sponsor, which may be any lawyer, judge, or organization that employs lawyers or judges and is approved by the Academic and Student Affairs Committee. Work is done under the direction of a field instructor (a lawyer or judge as the sponsor) and a member of the law faculty. Requires a substantial writing component and 50 hours of working time per credit hour. A minimum of 1 and a maximum of 7 credit hours may be earned. Classified as practice credit.

# College of Music

## Elective Music

**EMUS 1081-3. Basic Music Theory.** Introduction to music notation, meter and rhythm, scales, intervals, triads, seventh chords, fundamentals of harmonic progression, voice leading, aural skills, and composition. For nonmusic majors who have little or no previous background in the subject. Offered fall and spring.

**EMUS 1115-2. Piano Class 1.** Introduces the keyboard and music reading for nonmusic majors with no prior keyboard experience. Studies very easy classical and pop repertoire. Prereq., no prior keyboard experience; or instructor consent.

**EMUS 1125-2. Piano Class 2.** Continuation of EMUS 1115. Focuses on development of music reading. Studies technical patterns, easy classical and pop repertoire, and improvisation. Prereq., EMUS 1115.

**EMUS 1184-1. Voice Class.** Involves basic vocal technique and easy solo repertoire taught through a group medium, for beginner and intermediate level students.

**EMUS 1832-3. Appreciation of Music.** Provides a basic knowledge of music literature and development of discriminating listening habits. Offered fall and spring. Does not meet requirements in music degree. Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 2184-1. Voice Class.** Continuation of EMUS 1184, with more advanced repertoire and vocal techniques. Prereq., EMUS 1184.

**EMUS 2752-3. Music in American Culture.** Offers a stylistic and historical examination of trends that have influenced present day American music. Offered fall and spring. Approved for arts and sciences core curriculum: United States context.

**EMUS 2762-3. Music and Drama.** Explores techniques used in combining music and dramatic arts through examples from musical and dramatic literature of the West from circa 1000 to present. Approved for arts and sciences core curriculum: literature and the arts. Offered spring only.

**EMUS 2772-3. World Musics.** Highlights music outside western art tradition, using current ethnomusicological materials. Spring semester focuses on musical cultures of the Americas, Africa, and Europe; fall semester focuses on musical cultures of Asia and Oceania. May be repeated up to 6 total credit hours. Approved for arts and sciences core curriculum: cultural and gender diversity.

**EMUS 2842-3. American Musical Theatre.** Provides an overview of the role of musical theatre in U.S. culture, emphasizing the 20th century Broadway musical.

**EMUS 2852-3. Music of the Rock Era.** Examines American popular music, concentrating on music after 1950. Considers precursor styles (e.g., blues and folk) and contributions to the new rock style; discusses the evolution of rock style from 1960 through the 1990s. Offered spring only.

**EMUS 2862-3. American Film Musical, 1926–1954.** Examines the development of filmed musicals from the beginning of sound movies through the Golden Age of Musicals. Emphasizes analysis and relationships of characters, songs, and incidental music. Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 3051-2. Basic Composition.** Introduces the processes, materials, and forms of composition through the writing and performance of short musical works. Open to any student who already has rudimentary musical knowledge.

**EMUS 3203-1. Music for Classroom Teaching.** Provides an overview of children's musical growth. Considers development of strategies to integrate music across the curriculum. Emphasizes refining personal knowledge and skills in order to become an advocate for music in children's lives.

**EMUS 3642-3. History of Jazz.** Studies origins, development, and current trends. Offered fall and spring.

**EMUS 3822-3. Music Literature 1.** Studies music literature from choral, orchestra, chamber music, and operatic repertoire. Offered fall only. For nonmusic majors only. Approved for arts and sciences core curriculum: literature and the arts.

**EMUS 3832-3. Music Literature 2.** Continuation of MUSC 3822. Approved for arts and sciences core curriculum: literature and the arts. Offered spring only.

**EMUS 4012 (3-6). African Music.** Studies the musics, dances, and cultures of various peoples of Africa. Includes African diaspora music and Afro-pop.

## Music Ensembles

*Both large and small ensembles are offered fall and spring semesters for 1 credit each. They are open to all university students. Participation in all ensembles is by audition.*

**Bands:** Concert Band, Court Players, Marching Band (fall only), Symphonic Band, Wind Symphony.

**Choirs:** Collegiate Chorale, University Choir, University Singers, Women's Chorus, and Men's Chorus.

**Orchestras:** Chamber Orchestra, Symphony Orchestra.

**Ensembles:** Bell, Early Music Ensemble, Electronic Music Ensemble, Guitar, Jazz, New Music, Percussion, World Music.

**Chamber Music:** Brass, Piano, String, Woodwind.

**Opera:** Opera Practicum, Opera Theatre.

## Music

### Theory and Composition

**MUSC 1081-3. Basic Music Theory for Music Majors.** Introduces tools used in notating, performing, creating, and listening to music. Coreq., MUSC 1011. Open to music majors only. Offered fall only.

**MUSC 1101-2. Semester 1 Theory.** Introduces the fundamentals of tonal harmony and voice leading, focusing on four-voice writing and analysis of excerpts from music literature. Coreq., MUSC 1121 or 1081. For music majors only. Offered fall only.

**MUSC 1111-2. Semester 2 Theory.** Continuation of MUSC 1101. Covers principles of harmony and voice leading, using all common diatonic triads and seventh chords. Introduces modulation, contrapuntal chord functions, and elementary structural analysis of excerpts from music literature. Prereq., MUSC 1101 and 1121. Coreq., MUSC 1131. Offered spring only.

**MUSC 1121-1. Aural Skills Lab, Semester 1.** Focuses on sight singing and dictation of diatonic melodies in major and minor keys (treble, alto, and bass clefs). Covers identification of scale types, intervals, triads, and dominant seventh chords. Studies harmonic dictation using chords from MUSC 1101. Coreq., MUSC 1101. Offered fall only.

**MUSC 1131-1. Aural Skills Lab, Semester 2.** Acquaints students with sight singing in major and minor keys (treble, alto, tenor, and bass clefs). Includes dictation of one- and two-voice examples. Studies harmonic dictation using vocabulary from MUSC 1111. Considers detection of pitch and rhythm errors in performed examples. Prereqs., MUSC 1101 and 1121. Coreq., MUSC 1111. Offered spring only.

**MUSC 2071-2. Instrumentation.** Introduces and studies the instruments of the orchestra and problems of scoring for diverse choirs and full orchestra. Prereqs., MUSC 2101 and 2121. Offered spring only.

**MUSC 2081-2. Prepared for the Soundcheck.** Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies.

**MUSC 2091-2. Recording Techniques.** Provides hands-on training in various audio recording techniques, acoustics, and sound reinforcement, studio maintenance, and troubleshooting. Real-world experience is gained through individual recording projects and College of Music events. Prereq., MUSC 2081 or instructor consent.

**MUSC 2101-2. Semester 3 Theory.** Continuation of MUSC 1111. Reviews melodic and rhythmic figuration. Covers dissonance and chromaticism, including modal mixture, seventh chords with added dissonance, neapolitan sixth chord, and augmented sixth chords. Provides structural analysis of musical excerpts. Prereqs., MUSC 1111 and 1131. Coreq., MUSC 2121. Offered fall only.

**MUSC 2111-2. Semester 4 Theory.** Continuation of MUSC 2101. Focuses on advanced chromaticism including modal mixture, altered dominants, voice leading, and chromatic harmony in larger contexts. Also examines impressionism, neoclassicism, and jazz. Prereqs., MUSC 2101 and 2121. Coreq., MUSC 2131. Offered spring only.

**MUSC 2121-1. Aural Skills Lab, Semester 3.** Continuation of MUSC 1131. Studies sight singing of chromatic melodies in major and minor keys (in four clefs). Includes dictation of one- through three-voice examples. Studies harmonic dictation using vocabulary from MUSC 2101. Considers detection of pitch and rhythm performance errors. Prereqs., MUSC 1111 and 1131. Coreq., MUSC 2101. Offered fall only.

**MUSC 2131-1. Aural Skills Lab, Semester 4.** Continuation of MUSC 2121. Studies sight singing of chromatic and atonal melodies. Includes dictation of one-through three-voice examples. Identifies sonorities studied in MUSC 2111. Considers detection of pitch and rhythm performance errors. Prereqs., MUSC 2101 and 2121. Coreq., MUSC 2111. Offered spring only.

**MUSC 3051-2. Beginning Composition.** For noncomposition majors. Introduction to the craft of musical composition with analysis and writing in various styles. Open to music majors only.

**MUSC 3061-2. Jazz Improvisation I.** Develops skills in jazz improvisation through practical application of chord/scale relationship, transcription, repertoire, and analysis. Open to all instruments. Prereq., MUSC 3081. Offered fall only.

**MUSC 3071-2. Jazz Improvisation II.** Expands upon the material presented in MUSC 3061. Deals in depth with contemporary trends in modern jazz such as modality, free jazz, and the works of modern jazz legends including John Coltrane, Wayne Shorter, and Herbie Hancock. Prereq., MUSC 3061 or instructor consent. Offered spring only.

**MUSC 3081-3. Jazz Theory and Aural Foundations.** Presents the grammar and syntax of jazz. Acquaints the student with the language of jazz improvisation and various jazz styles. The musician's most valuable tool—the ear, is developed through an in-depth analytical study of jazz masters through harmonic dictation/identification. Prereq., MUSC 2101. Offered spring only.

**MUSC 4001-2. New Musical Styles and Practices.** Studies current styles of composition and theories that underlie them. Students write (and perform, if possible) short representative exercises in recent musical idioms. Prereqs., MUSC 4071. Offered fall only.

**MUSC 4011-2. 16th Century Counterpoint.** Studies the style of Palestrina and his contemporaries through analysis and written examples. Prereqs., MUSC 2111 and 2131. Offered spring only.

**MUSC 4021-2. 18th Century Counterpoint.** Provides a stylistic study of main contrapuntal forms of the period including invention, suite, and fugue. Stresses analysis and written examples. Prereqs., MUSC 2111 and 2131. Offered fall only.

**MUSC 4031-2. Jazz Scoring and Arranging.** Practical problems, creative arranging, and scoring for various jazz instrumental groups. Prereqs., MUSC 2111 and 2131. Offered fall only.

**MUSC 4041-2. Orchestration.** Studies advanced orchestration techniques through score analysis and student projects. Prereq., MUSC 2071 or instructor consent. Offered fall only.

**MUSC 4061-2. Tonal Analysis.** Surveys tonal analytical techniques, covering selected works from the 18th and 19th centuries. Prereqs., MUSC 2111 and 2131. Offered fall only.

**MUSC 4071-2. Post-Tonal Theory and Analysis.** Introduces 20th century analysis by looking at selected works. Prereqs., MUSC 2111 and 2131. Offered spring only.

**MUSC 4081-3. Introduction to Music Technology.** Topics include basic synthesis, musical instrument digital interface (MIDI) sequencing, and music notation by computer. Prereq., MUSC 2111 or instructor consent. Offered fall and spring.

**MUSC 4101 (1-3). Theory and Aural Skills Review.** Reviews tonal harmony, voice leading, and essential aural skills. Includes diatonic triads and seventh chords, modulation, chromaticism, and structural analysis of representative compositions. Prepares graduate students for more advanced work in music theory. Students may register for aural skills only (1 credit), theory only (2 credits), or both theory and aural skills (3 credits). May be repeated within a term up to 3 credit hours. May not be taken pass/fail. For graduate students only. Offered summer and fall.

**MUSC 4111-2. Computer Programming for Musicians.** Designed for musicians with no prior programming knowledge. Covers basic and intermediate programming techniques. Students design software such as a simple MIDI sequencer, computer-aided instruction program, and interactive performance software. Prereq., MUSC 4081.

**MUSC 4121-3. Intermediate Music Technology.** Explores more sophisticated uses for technology in composing, arranging, and performance. Topics include advanced sequencing techniques, Finale music processing software, alternative MIDI performance devices, SMPTE, and multitrack recording. Prereq., MUSC 4081.

**MUSC 4131-2. Advanced Sound Synthesis.** Explores the principal sound synthesis techniques available to contemporary musicians. Prereq., MUSC 4121.

**MUSC 4181-2. Technology in Music and Visual Media.** Investigates various aesthetics and techniques of composing for film and dance. Students learn by composing short scores for prerecorded video and dance using a wide variety of methods. Prereq., MUSC 4081.

**MUSC 5041-2. Advanced Orchestration.** Provides an advanced study of orchestration techniques through score analysis and student projects. For graduate students. Offered only in fall.

**MUSC 5061-3. Advanced Tonal Analysis.** Surveys tonal analytical techniques. For graduate students. Offered fall only.

**MUSC 5071-3. Advanced Post-tonal Theory and Analysis.** Surveys analytical techniques applicable to 20th century music. For graduate students. Offered spring only.

**MUSC 5081-3. Applications in Music Technology.** Presents advanced strategies for applying computer technology in several musical disciplines. Emphasizes the use of technology in composition, music theory, and music education. Offered fall only.

**MUSC 5091-3. Contemporary Jazz Theory.** Studies contemporary jazz improvisation and compositional techniques, including formal jazz structures (blues, song form), harmonic practices, rhythmic devices, and melodic analysis. Prereq., MUSC 3081 or instructor consent. Offered fall only.

**MUSC 5151-3. Topics in Music Analysis.** Analytical study of a specific topic to be determined by the instructor (e.g., German lieder, Bartok quartets, tonal rhythm, Schenker, etc). Study published analyses representing a variety of methodologies, and produce original analyses. Prereq., MUSC 4061 (tonal analysis), MUSC 4071 (post-tonal analysis) or equivalents, as appropriate to topic. Instructor consent required for students not having equivalent courses. Recommended prereqs., MUSC 5061, 5071, as appropriate to topic.

**MUSC 6041-3. Orchestration since 1940.** Studies significant and distinctive orchestration techniques of the 20th century, concentrating on works written since 1940. Open to doctoral students only. Prereq., MUSC 5041 or equivalent.

**MUSC 6051-3. Pedagogy of Music Theory.** Studies methods and materials for teaching undergraduate music theory, aural skills, and analysis.

**MUSC 6801-3. Advanced Topics in Music Theory.** Intensive study of a specialized topic in theory and analysis. Students will be guided in critical reading and analysis, class presentations, and independent research. Prereqs., graduate preliminary exams passed, and 6 credit hours of graduate-level theory. Restricted to MUSD and MUAD students.

**MUSC 7801-3. Doctoral Seminar in Music Theory.** Provides advanced study in theory. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires a major paper or project.

## Musicology

**MUSC 1802-3. Introduction to Musical Styles and Ideas.** Introduces the study of music including bibliographic, listening, score reading, critical reading, and writing skills; music terminology; a survey of selected music genres (symphonic and chamber music); and building of general music repertory. Offered fall only.

**MUSC 3802-3. History of Music 1.** Surveys western art music with stylistic analysis of representative works from all major periods through the Baroque. See also MUSC 3812. Prereqs., MUSC 1802, 1111 and 1131.

**MUSC 3812-3. History of Music 2.** Surveys western art music with stylistic analysis of representative works from all major periods after the Baroque. See also MUSC 3802. Prereq., MUSC 2111 or instructor consent.

**MUSC 4012-3. African Music.** Studies the musics, dances, and cultures of various peoples of Africa. Includes African diaspora music and Afro-pop. Offered fall only.

**MUSC 4112-3. Ethnomusicology.** Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures. Prereqs., MUSC 3802 and 3812. Recommended prereq., EMUS 2772.

**MUSC 4142-3. American Indian Music.** Studies Native North American musical cultures, with an emphasis on music as an integral part of religious expression and community life. Prereq., MUSC 3812 or instructor consent.

**MUSC 4752-3. Women Composers.** Examines the historical contributions of women composers, principally in the western tradition. Investigates the reception of women's work by historians, critics, audiences, performers, and patrons.

**MUSC 4772-3. History of Opera.** Surveys operatic literature from early Baroque to contemporary productions. Prereq., MUSC 3812. Same as MUSC 5772.

**MUSC 4792-3. 20th Century Music.** Explores major trends and developments while focusing on specific compositions of significant composers. Prereq., MUSC 3812 or instructor consent.

**MUSC 4812-3. Symphonic Literature.** Studies literature for orchestra, band, and other symphonic ensembles, including pre-Classical, Classical, Romantic, and 20th century.

**MUSC 4852-3. 17th and Early 18th Century Music.** Studies style and repertory of music from 1580 to 1750. Prereq., MUSC 3812 or instructor consent.

**MUSC 4872-3. Late 18th and 19th Century Music.** Examines music and writings about music during the Classical and Romantic eras of the Western tradition, 1750–1900. Emphasizes historical and stylistic analysis and current musicological research. Prereq. or coreq., MUSC 3812.

**MUSC 4892-3. Latin American Music.** Explores music of cultures south of the United States: Mexico, Peru, Brazil, Cuba, and other countries having substantial musical heritage, emphasizing relationship of folk, popular and art styles. Prereq., MUSC 3812 or instructor consent.

**MUSC 5012-3. West African Music and Dance.** Studies musical and dance traditions and current practices. Prereqs., MUSC 4012 or EMUS 4012 or instructor consent.

**MUSC 5112-3. Ethnomusicology.** Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.

**MUSC 5642-3. Jazz History and Literature.** Studies musical trends and cultural forces influencing jazz, with analysis of scales, improvisational styles, melodic and motivic variations, transcriptions, and orchestrations from significant periods in its history. Offered spring only. Prereq., EMUS 3642 or instructor consent.

**MUSC 5712-3. Renaissance Music.** Provides a repertory and analysis of polyphonic music 1400–1600.

**MUSC 5742-3. Performance Practice of Early Music.** Examines instrumental and vocal performance practices through the 18th century. Topics may vary from year to year.

**MUSC 5752-3. Women Composers.** Examines the historical contributions of women composers, principally in the western tradition. Investigates the reception of women's work by historians, critics, audiences, performers, and patrons.

**MUSC 5762 (3-4). History of Choral Literature.** Provides a seminar in analysis of musical style, chant to present. Those wishing review of literature and repertory may enroll for 4 hours credit.

**MUSC 5772-3. History of Opera.**

**MUSC 5802-3. Studies in 20th Century Music.** Explores major trends and developments, focusing on specific compositions of important composers. Topics vary from year to year. Prereq., graduate standing.

**MUSC 5812-3. Symphonic Literature.** Studies literature for orchestra, band, and other symphonic ensembles including pre-Classical, Classical, Romantic, and 20th century.

**MUSC 5822-3. Ancient and Medieval Music.** Surveys sources from the ancient Greeks to the early Christian era and music from the 8th to the 15th century.

**MUSC 5832-3. Studies in American Music.** Offers intensified work in folk, popular, and art music of the United States.

**MUSC 5842-3. Music Aesthetics.** Surveys various philosophies of music in writings of philosophers, psychologists, sociologists, composers, critics, and historians.

**MUSC 5852-3. 17th and Early 18th Century Music.** Provides a seminar in analysis of pitch, rhythm, and structure of music, 1570–1750.

**MUSC 5872-3. Late 18th and 19th Century Music.** Same as MUSC 4872.

**MUSC 5882-3. Studies in 18th and 19th Century Music.** Meets as a seminar and examines selected topics in Classical and Romantic music, 1750–1900. Topics vary from year to year.

**MUSC 7822-3. Seminar in Musicology.** Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Periodic reports to musicology colloquium required. See also MUSC 7832.

**MUSC 7832-3. Seminar in Musicology.** Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Periodic reports to musicology colloquium required. See also MUSC 7822.

## Music Education

**MUSC 2103-3. Introduction to Music Education.** Provides an overview of basic principles and practices of the music education profession. Explores public school music teaching through class discussions, directed observations, and a supervised field experience. Offered fall only.

**MUSC 3013-1. String Class.** For music education majors with choral/general emphasis. Develops basic performance skills on two or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.

**MUSC 3023-1. Woodwind Class.** For music education majors with choral/general emphasis. Develops basic performance skills on two or more woodwind instruments. Prepares music education students to teach woodwind instruments to beginning and intermediate level students in heterogeneous classroom. Offered spring only.

**MUSC 3033-1. Brass Class.** For music education majors with choral/general emphasis. Develops basic performance skills on two or more brass instruments. Prepares music education students to teach brass instruments to beginning and intermediate level students in heterogeneous classroom. Offered spring only.

**MUSC 3133-2. Teaching General Music I.** Examines children's musical development (including curriculum design, implementation, and assessment) via model teaching experiences. Students learn appropriate techniques and materials for delivering musical instruction in general music classes. Required for all music education majors as partial fulfillment of course work leading to K–12 music licensure. Offered fall only.

**MUSC 3153-2. Teaching Woodwind Instruments.** For music education majors with instrumental emphasis. Develops basic performance skills on three or more woodwind instruments. Addresses teaching strategies and other specialized topics related to woodwind instruction. Offered spring only.

**MUSC 3163-2. Teaching String Instruments.** For music education majors with instrumental emphasis. Develops basic performance skills on three or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.

**MUSC 3193-2. Vocal Pedagogy and Literature for Young Voices.** Provides an overview of vocal anatomy/function, care of the voice, vocal repertoire, teaching strategies, and other specialized topics related to singing instruction in both private studio and public school choral settings. Fall section for instrumentalists; spring section for vocalists.

**MUSC 3223-2. Teaching Brass Instruments.** For music education majors with instrumental emphasis. Develops basic performance skills on three or more brass instruments. Addresses teaching strategies and other specialized topics related to brass instruction. Offered spring only.

**MUSC 3253-2. Jazz Techniques for the Music Educator.** Prepares the music educator for successful experiences teaching jazz at the secondary level. Students gain insights into performance and rehearsal techniques for the instrumental jazz ensemble. Explores approaches for teaching jazz theory,

improvisation, and selecting literature for young students. Own instrument required for certain classes. Prereqs., MUSC 1111 and 2103. Offered spring only.

**MUSC 3273-2. String Pedagogy and Literature.** Examines instructional methods/materials and pedagogical approaches appropriate for intermediate to advanced string students in private studio, small ensemble, or large ensemble contexts. Topics may include group teaching strategies, as well as contemporary approaches including Havas, Rolland, and Suzuki. Prereqs., MUSC 2103 and 3163, or major applied. Offered spring only.

**MUSC 3363-2. Marching Band Techniques.** Helps develop the skills needed to administer and teach all aspects of a contemporary high school marching band. Includes drill conception and design, instruction, organization, and administration. Prereqs., MUSC 2103 and EMUS 1287. Offered fall only.

**MUSC 4103-1. Introduction to Student Teaching.** Represents the first half of the professional internship year. Familiarizes students with the schools and music programs in which they plan to student teach. Music placements may consist of elementary and high school, elementary and middle school, or middle school and high school. Prereqs., MUSC 4113, 4313, or 4443; and EDUC 3023.

**MUSC 4113-3. Teaching General Music 2.** Studies general music teaching at all levels. Emphasizes appropriate teaching strategies and materials. Prereq., MUSC 2103 and 3133. Offered spring only.

**MUSC 4123-3. Student Teaching Practicum.** Offers practice teaching under the guidance of a master music teacher. Elementary or secondary level. Prereq., MUSC 4103.

**MUSC 4133-3. Student Teaching Practicum.** Offers practice teaching under the guidance of a master music teacher. Elementary or secondary level. Prereq., MUSC 4103.

**MUSC 4143-2. Developing Children's Choirs.** Examines the musical skills, teaching techniques, and administrative procedures necessary for developing a children's choir. Offered spring of odd-numbered years. Prereq., MUSC 2103. See MUSC 5143.

**MUSC 4153-1. Percussion Class and Pedagogy.** Required of all music education majors. Presents knowledge and skills necessary for music educators to teach young students, including a general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Offered fall only.

**MUSC 4163-2. Choral Literature for School Ensembles.** Examination of literature, materials, and methods appropriate for teaching choral music in elementary and secondary schools. Offered spring of even-numbered years. Prereq., MUSC 2103.

**MUSC 4193-1. Student Teaching Seminar.** Required for all music student teachers. Addresses topics of concern to beginning teachers including classroom management, interpersonal skills, legal issues, job search strategies, and teaching portfolio development. Prereq., MUSC 4103.

**MUSC 4203-1. Music Methods Practicum.** Taken concurrently with either MUSC 4113, 4313, or 4443. Provides students with opportunities to observe and practice the use of various teaching techniques and relate them to concepts presented in the methods course. Students consult with the instructor to determine appropriate placements in schools. Prereq., MUSC 2103. Coreq., MUSC 4113, 4313, or 4443.

**MUSC 4313-3. Teaching Choral Music.** Examines choral music curricula, instrumental materials, and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Prereq., MUSC 2103. Same as MUSC 5313. Offered fall only.

**MUSC 4443-3. Teaching Instrumental Music.** Examines instrumental music curricula, instructional materials, and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Prereq., MUSC 2103. Same as MUSC 5442. Offered spring only.

**MUSC 4583-2. Inclusive Music Classroom.** Surveys strategies necessary for teaching music to all students, including those with special needs. Offered fall of even-numbered years. Prereqs., MUSC 2103 and 3133. Recommended prereq., MUSC 4113. Same as MUSC 5583.

**MUSC 5103-3. Teaching General Music.** For graduate music education majors. Studies general music teaching at all levels. Emphasizes appropriate teaching strategies and materials. Prereq., MUSC 2103. Offered spring only.

**MUSC 5143-2. Developing Children's Choirs.** See MUSC 4143.

**MUSC 5183-2. Research in Music Teaching.** Critically analyzes published research in music. Topics include data gathering, planning for survey and experimental studies, sampling, and common statistical analyses (both parametric and nonparametric). Students conduct one original research study. Offered fall only.

**MUSC 5273-2. Comprehensive String Pedagogy.** Comparative study and application of the principles of string teaching. In-depth analysis of individual instrument pedagogy and application to advanced studio and college level techniques and class teaching. Historical survey of major violin, viola, cello, and double bass pedagogues. Includes apprenticeship teaching. Prereq., graduate standing. Offered fall only.

**MUSC 5313-3. Teaching Choral Music.** For graduate music education majors. Same as MUSC 4313. Offered fall only.

**MUSC 5443-3. Teaching Instrumental Music.** For graduate music education majors. Same as MUSC 4443. Offered spring only.

**MUSC 5583-2. The Inclusive Music Classroom.** For graduate music education majors. Same as MUSC 4583.

**MUSC 6113-2. Foundations of Music Education.** Surveys historical, philosophical, psychological, and sociological bases of contemporary music education. Offered fall only.

**MUSC 6133-2. Comprehensive Musicianship through Performance.** Surveys philosophical bases, historical developments, research studies, and curricular models associated with comprehensive musicianship. Provides application to rehearsal, studio, and classroom settings. Offered spring of even-numbered years.

**MUSC 6173-2. Directions of Contemporary Aesthetic Education.** Studies current philosophies in music education. Focuses on aesthetic and praxial views of music, musical behavior, and music learning. Offered fall of odd-numbered years.

**MUSC 6193-1. Selected Studies in Music Education.** May be repeated for additional credit. Prereq., consent of instructor and music education chair.

**MUSC 6203-2. Psychology of Music Learning.** Examines cognitive, behaviorist, and humanist psychology as related to music learning. Offered spring only.

**MUSC 6213-2. Assessment of Music Learning.** Provides an overview of traditional and contemporary approaches to music assessment. Topics include psychometrics, standardized tests, test construction, grade reports, and student portfolios. Offered spring of odd-numbered years.

**MUSC 6223-2. Sociology of Music Education.** Studies sociological perspectives related to music education. Topics include functions and uses of music; taste and preference; motivation theories; teacher and student role development; and cultural perspectives on music learning. Prereq., MUSC 6113. Restricted to graduate students in music education. Offered fall of even-numbered years.

**MUSC 7103-3. Historical Research in Music Education.** Topics include oral history, archival collections, data verification, and critiquing/publishing research. Develops a collaborative research project. Offered spring of odd-numbered years.

**MUSC 7113-3. Quantitative Research in Music Education.** Topics include questionnaire development, sampling, research design, intermediate and advanced statistics, presenting/publishing research, and research ethics. Develops a collaborative research project. Offered spring of even-numbered years.

**MUSC 7143-3. Qualitative Research in Music Education.** Designed to provide an understanding of qualitative inquiry in music education. Students participate in evaluating, designing, and conducting qualitative research studies. Offered fall of odd-numbered years.

**MUSC 7203-3. Doctoral Seminar in Music Education.** Provides an advanced study of topics central to the music education profession. Requires class presentations and a major paper or project. Offered fall of even-numbered years.

## Voice

**MUSC 1544-1. Italian Diction.** Designed for the understanding of lyric Italian diction, the international phonetic alphabet, and its application to classical singing. Includes Latin. Offered fall only.



**MUSC 1554-1. English Diction.** Designed for the understanding of lyric English diction, the international phonetic alphabet, and its application to classical singing as well as various musical styles of English classical voice literature. Prereq., MUSC 1544. Offered spring only.

**MUSC 3444-1. French Diction.** Designed for the understanding of lyric French diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of French classical vocal literature. Prereqs., MUSC 1544 and 1554. Recommended prereq., MUSC 3464.

**MUSC 3464-1. German Diction.** Designed for the understanding of lyric German diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of German classical vocal literature. Prereqs., MUSC 1544 and 1554.

**MUSC 5444-2. Vocal Pedagogy.** In depth study of the physiology, acoustics, and health aspects of the singing voice. Recommended for all graduate students in voice.

**MUSC 5454-2. Repertory for Young Voices.** Survey of the solo repertoire for young voices, the physiological aspects of mutational voices, techniques of vocalizing young voices, and class voice procedure.

**MUSC 5464-2. French Song Literature.** Provides an extensive analytical and historical discussion of French song literature styles, from the Middle Ages through the 20th century.

**MUSC 5484-2. Graduate Seminar in Vocal Pedagogy.** A thorough investigation of the challenges of studio voice pedagogy, including corrective techniques, psychological philosophies, and video analysis of student teaching. Examination and evaluation of comparative methodologies of vocal technique. Prereq., MUSC 5444 or instructor consent.

**MUSC 5564-2. German Song Literature.** Provides an extensive analytical and historical discussion of German song literature styles, from the Middle Ages through the 20th century.

**PMUS 3167-3. Opera Theatre Stagecraft.** Introduction to the processes, materials, and equipment used in theatrical production. Lecture and lab requirements. Lab experiences include introductory work in the opera scenery, property, costume, and electrical shops.

**PMUS 4137-1. Opera Theatre 1.** Addresses issues related to young artist development. Areas of concentration include (but are not limited to) acting technique, resume preparation, audition technique, scene analysis, and role preparation. The acting technique is addressed in this course through textbook reading and exercise.

**PMUS 4147-2. Opera Theatre 2.** Continuation of PMUS 4137. Further scene analysis and movement exercises are addressed in this class. Prereq., PMUS 4137. Same as PMUS 5147.

**PMUS 4167 (1-3). Opera Theatre Lab.** Advanced work in the scenery, property, costume, and electrical shops in opera performance. Additional experiences may include positions with opera run crews, the box office, or other supporting areas.

**PMUS 5137-2. Opera Theatre 1.** Addresses issues related to young artist development at the graduate level. Areas of concentration will include (but are not limited to) acting technique, resume preparation, audition technique, scene analysis, and role preparation. Students will participate in acting and improvisation exercises, mock auditions, and will be assigned monologues. Students will present arias in class from the operatic literature for both audition and scene analysis purposes.

**PMUS 5147-2. Opera Theatre 2.** Continuation of PMUS 5137. Prereq., PMUS 5137. Same as PMUS 4147.

## Organ and Church Music

**MUSC 4255-2. Service Playing Techniques.** Thoroughly studies music of the liturgies of Lutheran and Anglican services. Includes techniques of hymn playing, modulation, transposition, and accompanying and directing from the console. Same as MUSC 5255.

**MUSC 4285-3. Organ Survey.** Historically surveys organ music and organ construction, studying both forms of composition and types of organ for which the music was originally written. Trips to various churches in area gives students an opportunity for firsthand observation. See also MUSC 4295. Same as MUSC 5285.

**MUSC 4295-3. Organ Survey.** Historically surveys organ music and organ construction, studying both forms of composition and types of organ for which the music was originally written. Trips to various churches in area gives students an opportunity for firsthand observation. See also MUSC 4285. Same as MUSC 5295.

**MUSC 5235 (2-8). Church Music Research.**

**MUSC 5255-2. Service Playing Techniques.** Same as MUSC 4255.

**MUSC 5285-3. Organ Survey.** Same as MUSC 4285.

**MUSC 5295-3. Organ Survey.** Same as MUSC 4295.

## Piano

**MUSC 1325-1. Piano Sight Reading.** Studies techniques for improving sight-reading skills at the keyboard, with practical work in solo, ensemble, choral, and theatrical literature. Also covers score reading and transposition. Prereq., piano major or instructor consent. Offered fall only.

**MUSC 2325-2. Applied Harmony for the Keyboard.** Provides an intensive study and application of the harmonic structure of music in a variety of keyboard skills: figured bass realization, chord progressions, transposition, on-sight harmonic analysis, and playing by ear. Prereqs., MUSC 1101, 1111, 1121, 1131, and 1325. Offered spring only.

**MUSC 2365-2. Introduction to Accompanying.** Chamber music for pianists. Requires performance in a variety of accompanying roles to be critiqued and coached by class and instructor. Prereq., piano major or instructor consent. Offered spring only.

**MUSC 3345-2. Piano Pedagogy 1.** Discusses teaching philosophies, objectives, and procedures. Examines and evaluates methods and materials. Studies practical aspects with which the private teacher is concerned. Offered fall of even-numbered years.

**MUSC 3355-2. Piano Pedagogy 2.** Materials and techniques for teaching piano with a focus on the intermediate level student. Offered only in spring of odd-numbered years.

**MUSC 4325-2. Piano Literature 1.** Surveys keyboard music from 1600 to 1830. Offered fall semester of odd-numbered years.

**MUSC 4335-2. Piano Literature 2.** Surveys keyboard music from 1830 to the present. Offered spring semester of even-numbered years.

**MUSC 4365-2. Piano Accompanying.** Discusses and performs selected art songs and sonata literature, emphasizing performance and preparation procedures. Involves special projects. Offered spring only. May be repeated for additional credit.

**MUSC 4405-2. Basso-Continuo Accompaniment.** Studies the brief history, theory, and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect, and creating dynamics. Emphasizes individual cognition and creativity. Also involves periodic practical experience in an ensemble. Prereq., MUSC 2325. Recommended prereq., PMUS 1586. Same as MUSC 5405.

**MUSC 5305-2. Piano Pedagogy Group Techniques.** Discusses materials and techniques for teaching beginning piano students of various ages in studio and class settings. Special attention given to adult classes.

**MUSC 5315-2. Piano Pedagogy: Intermediate Literature.** Surveys repertoire for intermediate level piano students and discusses teaching techniques.

**MUSC 5325-2. Piano Literature 1.** Surveys keyboard music from 1600 to 1830.

**MUSC 5335-2. Piano Literature 2.** Surveys keyboard music from 1830 to the present.

**MUSC 5345-2. Research: Piano Literature and Pedagogy.** Looks at individual or group research related to piano pedagogy or literature for piano. See also MUSC 5355.

**MUSC 5355-2. Research: Piano Literature and Pedagogy 2.** Looks at individual or group research related to piano pedagogy or literature for piano. See also MUSC 5345.

**MUSC 5365-2. Piano Accompanying.** Continuation of MUSC 4365. May be repeated for additional credit.

**MUSC 5375-2. Opera Coaching for Pianists.** Teaches skills for opera coaches and rehearsal pianists.

**MUSC 5405-2. Basso-continuo Accompaniment.** Same as MUSC 4405.

**MUSC 6325-2. Seminar in Piano Literature.** Provides an intensive study of a selected area of repertoire or history. Prereq., doctoral student or instructor consent. Offered fall only.

## Keyboard Musicianship

**PMUS 1105-1. Keyboard Musicianship 1.** Introduces the keyboard, music reading in the treble and bass clefs, basic theory and keyboard harmony, technical patterns, and improvisation. Studies easy classical and pop repertoire. Prereq., music major with no keyboard experience, or instructor consent.

**PMUS 1205-1. Keyboard Musicianship 2.** Continuation of PMUS 1105. Prereq., PMUS 1105 or instructor consent.

**PMUS 1515-2. Jazz Piano Class.** Offers small group instruction in the concepts and skills required to learn jazz piano. Students not only learn basic techniques required to play jazz but also become familiar with the theory, grammar, and lexicon of the jazz language. Prereq., PMUS 1205 or instructor consent. Offered spring only.

**PMUS 2105-1. Keyboard Musicianship 3.** Continuation of PMUS 1205. Prereq., PMUS 1205 or instructor consent.

**PMUS 2205-1. Keyboard Musicianship 4.** Continuation of PMUS 2105. Prereq., PMUS 2105 or instructor consent.

**PMUS 3271-2. Basic Improvisation.** The exploration of basic musical improvisation; performance in various musical styles. Prereq., sophomore theory or instructor consent.

**PMUS 4105-1. Independent Accompanying.** Piano majors accompany instrumental or vocal music majors as assigned in their lessons, performance classes, and juries. Grade is determined by studio teacher coaching the ensemble.

**PMUS 4115-1. Advanced Keyboard Musicianship 1.** Review of keyboard skills necessary for vocal performance. Prereq., instructor consent.

**PMUS 4125-1. Advanced Keyboard Musicianship 2.** Continuation of Advanced Keyboard Musicianship 1. Prereq., PMUS 4115 or instructor consent.

## Choral and Instrumental Music

**MUSC 1326-1. Guitar Sight Reading.** Studies 19th and 20th century approaches to improving sight reading, including practical applications and exercises.

**MUSC 2366-2. Guitar Accompanying.** Survey of accompanying repertoire for guitar with solo instruments (flute, violin, voice, etc.), including introductory work in basso continuo, playing/improvising from chord charts, and arranging accompaniments from musical scores. Prereq., MUSC 1326.

**MUSC 3176-2. Conducting 1.** Introduces conducting and rehearsal techniques. Coreq., performance participation in the appropriate ensemble (band, choir, or orchestra). MUSC 3176 offered in fall only. See also MUSC 3186.

**MUSC 3186-2. Conducting 2.** Introduces conducting and rehearsal techniques. Coreq., performance participation in the appropriate ensemble (band, choir, or orchestra). MUSC 3186 offered in spring only. See also MUSC 3176.

**MUSC 4106-2. Guitar Literature.** Analytically and historically studies guitar literature from the Middle Ages through the 20th century.

**MUSC 5026-2. Percussion Literature.** In-depth investigation of major original solo works for percussion, significant ensemble literature including chamber and large ensembles, and selected transcriptions. Prereqs., graduate standing in music and instructor consent.

**MUSC 5036-2. Brass Literature.** Investigates major original solo works for trumpet, horn, trombone, euphonium, and tuba, and ensemble literature including chamber and large settings. Offered every other spring semester.

**MUSC 5106-2. Guitar Literature.** Analytically and historically studies solo works, chamber music, concertos, and other music for guitar. For graduate students.

**MUSC 5136-2. Advanced Conducting.** Offers advanced work in conducting.

**MUSC 5156-2. Symposium in Choral Music.** Provides an advanced study of choral repertoire by style period. Required of all choral graduate students for a minimum of two semesters.

**MUSC 5246-3. Jazz Improvisation and Analysis.** A study of improvisation through melodic and harmonic analysis of jazz compositions, transcriptions, and the study of historic jazz solos as played by jazz masters. Prereq., MUSC 3071 or instructor consent.

**MUSC 5256-3. Jazz Studies Administration and Pedagogy.** Studies the organization and administration of collegiate jazz programs. Topics include curriculum, program philosophy, teaching techniques, funding, teacher training, and evaluation. Prereq. MUSC 3253 or equivalent. Offered fall only.

**MUSC 5336-2. Brass Pedagogy.** Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring semester.

**MUSC 5346-3. Woodwind Pedagogy.** Provides the knowledge and skills to teach woodwind instruments in both private studio and collegiate class settings. Considers pedagogical techniques addressing all levels of instruction.

**MUSC 5356-3. Jazz Studies Practicum.** Studies strategies for developing and implementing academic programs in jazz studies. Includes demonstration teaching by class members. Prereq., MUSC 5256.

**MUSC 5666-2. Chamber Music Literature: Woodwinds.** Provides a stylistic-historical survey in various genres from Baroque era to present. Offered every other spring.

## Theses and Recitals

**MUSC 3997-1. Junior Recital.**

**MUSC 4957-1. Senior Thesis.**

**MUSC 4997-1. Senior Recital.**

## Interdepartmental Courses

**MUSC 2608-1. Alexander Technique.** Investigates the discoveries and writings of F. M. Alexander regarding kinesthetic perception and coordination. Applies these contexts to specific musical activities.

**MUSC 2988-1. Introduction to Music Research.** Introduces music research and writing skills to provide tools necessary for successful composition of formal research papers. Applies interests and curricular goals to specific topics of student choice.

**MUSC 4288 (2-3). Macintosh-based Web Server Fundamentals for Musicians and Educators.** Designed for music students. Teaches concepts and skills necessary to develop, host, and maintain Macintosh-based web servers and to create and serve multimedia files including video, MP3, midi, and PDF.

**MUSC 5608-1. Graduate Studies in the Alexander Technique.** Study of the relationship of kinesthetic perception and postural reflexes to physical coordination in performance. Analysis and research regarding Alexander's principles.

**MUSC 5708-2. Introduction to Music Bibliography and Research.** Explores basic informational sources about music and musicians; a study of bibliographic forms, research, and writing techniques employed in music research papers, theses, and dissertations. Required in all master's degree programs.

**MUSC 7138-3. Contemporary Issues in College Teaching.** Examines music teaching within colleges and universities, including the evolution of university music programs, undergraduate and graduate music curricula, music professors and their work, and sociopolitical issues. Offered spring of even-numbered years.

## Music Entrepreneurship

**MUSC 4908 (1-3). Internship in Music Business.** Gives upper-division students the opportunity to work in public or private organizations on assignments relating to their career goals, allowing them to explore the relationship between theory and practice in their major. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**MUSC 4918-2. Your Music Career.** Explores career options in music and development of skills to help students in creating opportunities within musical arenas. Restricted to juniors and seniors.

**MUSC 4958-1. Community Performances.** Designed for the aspiring professional performer. Through classroom theory and off-campus application, acquire skills in programming for and communicating with diverse audiences,

self marketing, finding engagements, executing performance contracts, and maintaining an active performing career.

**MUSC 5968-2. Arts Entrepreneurship.** Provides an overview of the music industry and helps prepare students to take leadership roles in existing arts organizations and/or create new music enterprises. Topics for discussion and research include current issues in the music industry, introduction to entrepreneurship, music and the law, preparing for feasibility study, the recording industry, market information for new ventures, and money sources.

## Performance Music

*Courses in composition and vocal or instrumental technique and interpretation may be found under the PMUS section of the Registration Handbook and Schedule of Courses. For individual applied music instruction, the equivalent of one hour of individual recitation (lesson) and one hour of literature class are required. Undergraduate performance majors carry 4 credit hours per semester; music education majors, 3 hours per semester (1 hour recitation); bachelor of arts in music majors, 2 or 4 hours per semester; minors, 2 hours per semester. Graduate performance majors normally carry 3 hours per semester (including ensemble credit if required); minors, 2 hours per semester.*

## Thesis Music

**TMUS 4403 (1-3). Special Studies.** Offers advanced studies in specific areas or special projects in selected areas. For undergraduate majors only. See current *Registration Handbook and Schedule of Courses* for specific course number. Numbered TMUS 4403–4493. May be repeated for additional credit.

**TMUS 4493 (1-3). Special Studies.** Offers advanced studies in specific areas or special projects in selected areas. For undergraduate majors only. See current *Registration Handbook and Schedule of Courses* for specific course number. Numbered TMUS 4403–4493. May be repeated for additional credit.

**TMUS 5504 (1-3). Special Studies.** Offers graduate studies in specific areas or special projects in selected areas. For master's degree students only. See current *Registration Handbook and Schedule of Courses* for specific course number. Numbered TMUS 5504–5594. May be repeated for additional credit.

**TMUS 5594 (1-3). Special Studies.** Offers graduate studies in specific areas or special projects in selected areas. For master's degree students only. See current *Registration Handbook and Schedule of Courses* for specific course number. TMUS 5504–5594. May be repeated for additional credit.

**TMUS 5605 (1-3). Special Studies.** Offers advanced graduate studies in specific areas or special projects in selected areas. For doctoral degree students only. See current *Registration Handbook and Schedule of Courses* for specific course number. Numbered TMUS 5605–5695. May be repeated for additional credit.

**TMUS 5695 (1-3). Special Studies.** Offers advanced graduate studies in specific areas or special projects in selected areas. For doctoral degree students only. See current *Registration Handbook and Schedule of Courses* for specific course number. Numbered TMUS 5605–5695. May be repeated for additional credit.

**TMUS 6947-3. Candidate for Master of Music.**

**TMUS 6956-2. Master's Thesis.**

**TMUS 6957-2. Master's Thesis 2.**

**TMUS 8019-1. Precandidate for Doctor of Musical Arts.**

**TMUS 8029-1. Candidate for Doctor of Musical Arts.**

**TMUS 8219-3. Dissertation Project 1 (Solo Recital, Choral Concert, Composition).**

**TMUS 8229-3. Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy Project).**

**TMUS 8239-3. Dissertation Project 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital).**

**TMUS 8249-3. Dissertation Project 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum).**

**TMUS 8259-3. Dissertation Project 5 (Research Lecture).**

**TMUS 8269-3. Dissertation Project 6 (Research Lecture).**

**TMUS 8279 (1-3). Performance Research Document 1.**

**TMUS 8289-1. Performance Research Document 2.**

**TMUS 8299-1. Performance Research Document 3.**

**TMUS 8309-1. Performance Research Document 4.**

**TMUS 8319-3. Repertoire Project.**

**TMUS 8329 (2-6). Document/Pedagogy Project.**

**TMUS 8339 (3-6). Major Composition.**

**TMUS 8998 (1-10). PhD Thesis.**

## Other Academic Programs

### Alliance for Technology Learning and Society

**ATLS 2000-3. The Meaning of Information Technology.** Surveys the history of information technologies and modern techniques of information production, storage, transmission, and retrieval. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. Restricted to TAM/MAT certificate students.

**ATLS 2010-3. Computer Code as Art.** Instructs non-computer science students in analyzing problems and synthesizing programs for the solution, emphasizing good engineering practices for program construction, documentation, testing, and debugging. Uses Java for programming projects. Recommended prereq., ATLS 2000. Restricted to TAM/MAT certificate students.

**ATLS 3010-3. Introductory Projects in Technology Arts and Media.** Introduces techniques, software, and related concepts of digital design and image-making through individual and group projects. Emphasizes digital animation, film and website coding and composition as a means to formal and expressive ends. Prereq., ATLS 2000. Restricted to TAM/MAT certificate students.

**ATLS 3210-3. Special Topics in Technology, Arts and Media.** Analyzes special interest areas of multidisciplinary technology, arts and media research and practice. May be repeated up to 6 total credit hours for different topics. Prereq., ATLS 2000. Recommended prereq., ATLS 3010. Restricted to TAM or MAT certificate students.

**ATLS 4010-3. Capstone Projects.** Offers advanced practicum for students to design, implement, document, and test multimedia systems for use in local industry, and non-profit organizations. Design of project management parameters and close work with project sponsors lead to acquisition of practical experience. Prereqs., ATLS 2000 and 3010. Restricted to TAM/MAT certificate students.

### Chancellor's Leadership Residential Academic Program

**LDSP 1000-3. The Foundations of 21st Century Leadership.** Introduces students to the critical need for and approaches to the practice of creative and effective leadership. Premised on the idea that the potential for leadership is present in all of us. Approved for arts and sciences core curriculum: ideals and values.

**LDSP 2400-3. Understanding Privilege and Oppression in Contemporary Society: Leadership in a Multicultural World.** Broad-based, multicultural, multidisciplinary course. Covers the interaction of privilege and oppression in the U.S., focusing on race, socioeconomic class, sexual orientation, and physical ability, as well as leadership skills needed to function in a multicultural, global society. Same as FARR 2400. Approved for arts and sciences core curriculum: cultural and gender diversity or contemporary societies.

**LDSP 4010-4. Critical Issues in Leadership: A Capstone Course.** Critical thinking is fundamental to leadership competency. Leaders must have skill at making judgment and collecting information from a variety of sources and on topics in which they have limited expertise. Students read, discuss, and write critical evaluations of contemporary leadership theory from an ethical, military, community building, and business perspective. Prereq., a minimum of 14 credit hours towards the Leadership Certificate completed. Recommended prereq., 20 credit hours of work towards the certificate completed. Approved for arts and sciences core curriculum: critical thinking.

### Norlin Scholars Program

**NRLN 3020-3. Writing Argument, Composing Knowledge.** Focuses on reading, analysis, and writing about major ideas and events. Emphasizes close, careful reading, thoughtful analysis, and student writing. Provides a high-level academic course that enhances reading, writing, and thinking skills. Same as UWWRP/WRTG 3020. Credit not granted for this course and UWWRP/WRTG 3020. Approved for arts and sciences core curriculum: written communication.

### President's Leadership Class

**PRLC 1810-3. Ethical Leadership.** Introduces fundamental principles of leadership and ethics. Emphasizes application of the principles for self-development and organizational effectiveness. Approved for arts and sciences core curriculum: ideals and values.

**PRLC 1820-3. Community Issues in Leadership.** Explores challenges to leadership at the community level such as drug abuse, poverty, decline of infrastructure, care of the aged, etc. Gives particular attention to the development of effective leadership responses to community difficulties at university, city, state, and national levels. Approved for arts and sciences core curriculum: contemporary societies.

**PRLC 2820-3. Multilevel Issues in Leadership.** Studies multilevel issues that originate in organizational settings but carry community and global implications. Encourages students to fully explore the complexity and interrelatedness of issues with a special emphasis on leadership and ethical implications.

**PRLC 2930-3. Leadership Internship.** Students analyze the leadership styles within a host organization, examine how successfully an organization fulfills its mission, and further refine their own theories of what constitutes effective leadership. Students also complete a meaningful project over the course of the internship. Prereqs., PRLC 1810, PRLC 1820, and PRLC 2820.

**PRLC 3810-3. Global Issues in Leadership.** Examines the challenges to leadership posed by major global issues. Problems in the areas of human rights, hunger, disease, large-scale collective violence, and environmental deterioration are explored with a special emphasis on the development of effective, long-term leadership strategies. Prereqs., PRLC 1810, PRLC 1820, and PRLC 2820.

**PRLC 4010-4. 21st Century Leadership.** An advanced course that focuses on critical analysis of leadership principles and techniques. Designed to provide theoretical and hands-on experience for individuals who wish to function in leadership roles at high levels of competence in the workplace and in the civic arena.

### Reserve Officer Training Corps (ROTC)

#### Air Force Aerospace Studies

**AIRR 1010-1. The Air Force Today 1.** One 1-hour lecture and one 2-hour lab per week. Introduces students to the U.S. Air Force and the USAF officer profession. Uses instructor lectures, films and videos, and group activities to examine Air Force issues, officership qualities, and military customs and courtesies. Emphasizes the communication skills necessary for an Air Force officer.

**AIRR 1020-1. The Air Force Today 2.** A continuation of AIRR 1010-1. One 1-hour lecture and one 2-hour lab per week.

**AIRR 2010-1. Development of Air Power 1.** One 1-hour lecture and one 2-hour lab per week. Studies air power from balloons and dirigibles through the jet age and historically reviews air power employment in military and nonmilitary operations in support of national objectives. Looks at the evolution of air power concepts and doctrine and introduces the development of communicative skills.

**AIRR 2020-1. Development of Air Power 2.** A continuation of AIRR 2010. One 1-hour lecture and one two-hour lab per week.

**AIRR 3010-3. Air Force Management and Leadership 1.** Two 1 1/2-hour seminars plus one 2-hour lab per week. Provides an integrated management course emphasizing concepts and skills required by the successful manager and leader. Includes individual motivational and behavioral processes, leadership, communication, and group dynamics while providing foundation for the development of the junior officer's professional skills (officership). Emphasizes decision making and use of analytic aids in planning, organizing, and controlling in a changing environment. Discusses organizational and personal values (ethics), management of change, organizational power, politics, managerial strategy, and tactics within the context of military organization. Uses actual Air Force case studies throughout the course to enhance the learning and communication process.

**AIRR 3020-3. Air Force Management and Leadership 2.** Two 1 1/2-hour seminars and one 2-hour lab per week. Continuation of AIRR 3010. Emphasizes basic managerial processes while employing group discussions, case studies, and role playing as learning devices. Continues to emphasize the development of communicative skills.

**AIRR 4010-3. National Security Forces in Contemporary American Society 1.**

Two 1 1/2-hour seminars and one 2-hour lab per week. Studies U.S. national security policy which examines the formulation, organization, and implementation of national security policy; context of national security; evolution of strategy; management of conflict; and civil-military interaction. Also includes blocks of instruction on the military profession/officership, the military justice system, and communicative skills. Provides future Air Force officers with the background of U.S. national security policy so they can effectively function in today's Air Force.

**AIRR 4020-3. National Security Forces in Contemporary American Society 2.**

Two 1 1/2-hour seminars and one 2-hour lab per week. A continuation of AIRR 4010. Includes defense strategy and conflict management, formulation/implementation of U.S. defense policy, and organizational factors and case studies in policy making, military law, uniform code of military justice, and communication skills.

## Military Science (U.S. Army)

**MILR 1011-2. Adventures in Leadership 1.** Introduces fundamentals of leadership and the United States Army. Examines its organization, customs, and history as well as its current relevance and purpose. Students also investigate basic leadership and management skills necessary to be successful in both military and civilian settings. Includes fundamentals of Army leadership doctrine, team-building concepts, time and stress management, an introduction to cartography and land navigation, marksmanship, briefing techniques, and some basic military tactics. \$175 lab fee.

**MILR 1021-2. Adventures in Leadership 2.** Continues the investigation of leadership in small organizations. Covers selected topics such as basic troop leading procedures, military first aid and casualty evacuation concepts, creating ethical work climates, an introduction to Army organizations and installations, and a further examination of basic military tactics. Introduces students to effective military writing styles. \$175 lab fee.

**MILR 2031-3. Methods of Leadership and Management 1.** Comprehensively reviews advanced leadership and management concepts including motivation, attitudes, communication skills, problem solving, human needs and behavior, and leadership self development. Students continue to refine effective written and oral communications skills and to explore topics such as the basic branches of the Army, and officer and NCO duties. Students conduct classroom and practical exercises in small unit light infantry tactics and are prepared to perform as midlevel leaders in the cadet organization. \$175 lab fee.

**MILR 2041-3. Methods of Leadership and Management 2.** Focuses on leadership and management functions in military and corporate environments. Studies various components of Army leadership doctrine to include the four elements of leadership, leadership principles, risk management and planning theory, the be-know-do framework, and the Army leadership evaluation program. Continue to refine communication skills. \$175 lab fee.

**MILR 3052-3. Military Operations and Training 1.** Further explores the theory of managing and leading small military units with an emphasis on practical applications at the squad and platoon levels. Students examine various leadership styles and techniques as they relate to advanced small unit tactics. Familiarizes students with a variety of topics such as cartography, land navigation, field craft, and weapons systems. Involves multiple, evaluated leadership opportunities in field settings and hands-on experience with actual military equipment. Students are given maximum leadership opportunities in weekly labs. \$175 lab fee.

**MILR 3062-3. Military Operations and Training 2.** Studies theoretical and practical applications of small unit leadership principles. Focuses on managing personnel and resources, the military decision making process, the operations order, and oral communications. Exposes the student to tactical unit leadership in a variety of environments with a focus on preparation for the summer advance camp experience. \$175 lab fee.

**MILR 4072-3. Officer Leadership and Development 1.** Examines management and leadership concepts and techniques associated with planning and executing military training and operations at company and higher echelons. Includes analyses of professional ethics and values, effective training principles and procedures, subordinate counseling, and effective staff officer briefing techniques. Also investigates other subjects such as counter terrorism, modern peacekeeping missions, and the impact of the information revolution on the art of land warfare. Conducted both in and out of classroom setting and with multiple practical leadership opportunities to organize cadet training and activities. \$175 lab fee.

**MILR 4082-3. Officer Leadership and Development 2.** Continues MILR 4072 study of management and leadership concepts and techniques, providing practical leadership experiences in the classroom and during multiple cadet-run activities. Also examines varied topics such as theory and practice of the military justice system, law of war, military-media relations, support mechanisms for soldiers and their families, operational security considerations, and historical case studies in military leadership in the context of 21st century land warfare. \$175 lab fee.

## Naval Science

**NAVR 1010-2. Introduction to Naval Science.** Introduces the structure, missions, and functions of the United States Navy and Marine Corps. Also covers military law, leadership, naval history, and concepts of sea power.

**NAVR 2020-3. Seapower and Maritime Affairs.** Studies the importance of seapower in history including naval, maritime, and other commercial uses of the sea. Emphasizes significant milestones in the history of the U.S. Navy and Marine Corps and their role in the national strategies and policies of the United States.

**NAVR 3020-3. Naval Operations and Maritime Law.** Examines the Inland and International Rules of the Nautical Road, including court interpretations, principles of relative motion and vector analysis with the maneuvering board, ship handling procedures, weather, communications, tactical operations, and maritime law.

**NAVR 3030-3. Naval Ship Systems.** Studies in detail ship propulsion and related auxiliary systems. Emphasizes fossil fuel and nuclear steam and gas turbine systems. Stresses design constraints imposed by unique marine environment.

**NAVR 3040-3. Weapons and Systems Analysis.** Introduces theoretical concepts upon which modern naval weapons systems are designed and constructed. Specific areas of study include physics of underwater sound propagation, pulse radar theory, automatic tracking principles, and fundamentals of missile guidance.

**NAVR 3101-3. Evolution of Warfare.** Traces the development of warfare, focusing on the impact of military theorists and technical developments. Assists students to acquire a sense of strategy, develop an understanding of military alternatives, and see the impact of historical precedent on military actions.

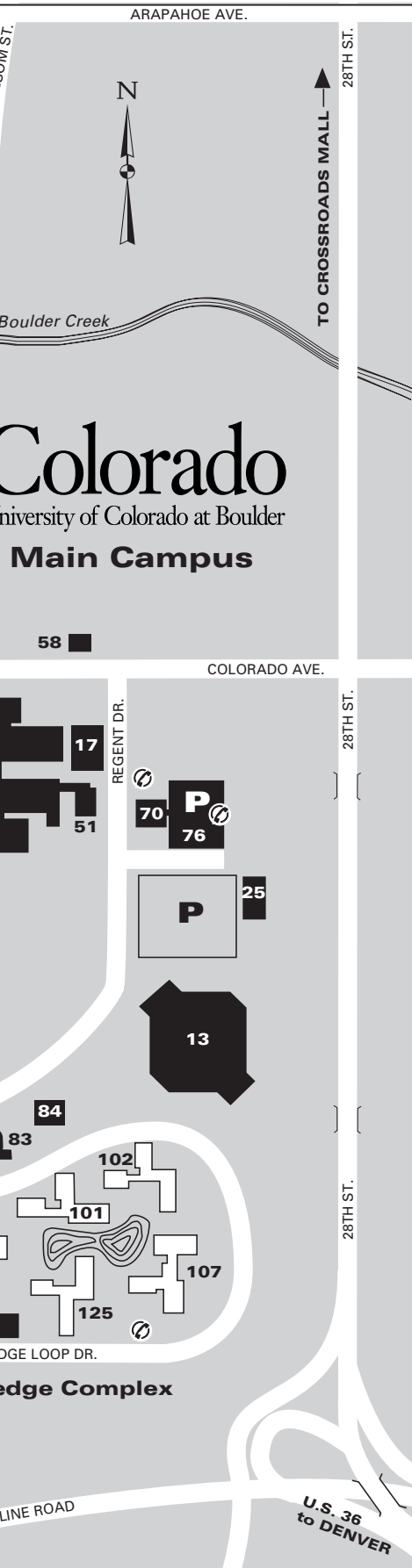
**NAVR 4010-3. Leadership and Management 1.** Comprehensively studies organizational leadership. Emphasizes motivation, communication, empowerment, and needs of subordinates. Studies the role of professional and personal ethics in organizational leadership.

**NAVR 4020-3. Leadership and Management 2.** Studies the ethics and laws of armed conflict, analyzing the leadership responsibilities of officers in conflict. Studies the military justice system and Naval legal administrative procedures, comparing military law with civilian criminal and civil law. Defines the responsibilities of junior officers within the military justice system.

**NAVR 4030-3. Navigation and Naval Operations.** Offers theory and practical application in the art of navigation: charts, publications, piloting, dead reckoning, navigation aids and instruments, time, sextant use, electronic fixing, global positioning system, and voyage planning.

**NAVR 4101-3. Amphibious Warfare.** Surveys the development of amphibious doctrine. Emphasizes the evolution of amphibious warfare in the 20th century. Explores present-day potential and limitations on amphibious operations, including the rapid force deployment concept.





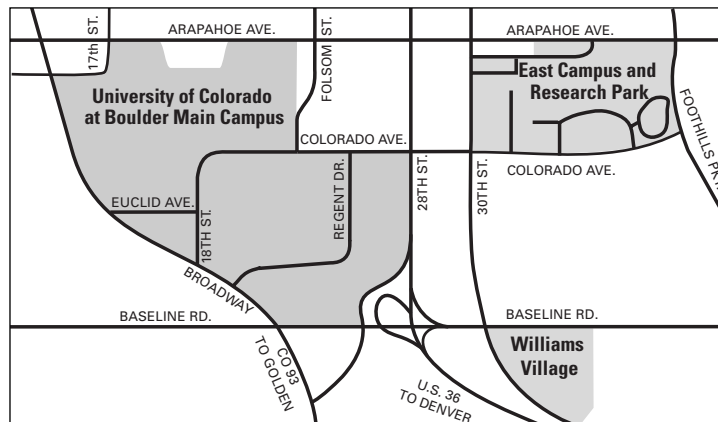
**University Buildings**

1. Administrative and Research Center—East Campus (J-2) (ARCE)
2. Armory (D-4) (ARMR)
3. Balch Fieldhouse (E-7) (FH)
4. Benson Earth Sciences Building (F-9) (BESC)
5. Business (H-10) (BUS)
6. Carlson Gymnasium (E-7) (CARL)
7. Center for Astrophysics and Space Astronomy (L-4) (CASA)
8. Clare Small Arts and Sciences (D-6) (CLRE)
- \* Charlotte York Irely Studios (F-4). *See University Theatre.*
9. College Inn Conference Center (B-5) (CICC)
10. Computing Center (J-3) (COMP)
11. Continuing Education (D-4) (CEDU)
12. Cooperative Institute for Research in Environmental Sciences (F-5) (CIRES)
13. Coors Events/Conference Center (I-12) (EVNT)
14. Cristol Chemistry and Biochemistry (G-5) (CHEM)
15. Dal Ward Athletic Center (D-8) (DALW)
16. Denison Arts and Sciences (G-4) (DEN)
17. Discovery Learning Center (F-11) (DLC) (under construction, 2002)
- \* Duane Physical Laboratories (F-7). *See Duane Physics and Astrophysics, Gamow Tower, Laboratory for Atmospheric and Space Physics, and Joint Institute for Laboratory Astrophysics.*
18. Duane Physics and Astrophysics (F-7) (DUAN)
19. Eaton Humanities Building (E-5) (HUMN)
20. Economics (F-3) (ECON)
21. Education (G-4) (EDUC)
22. Ekeley Sciences (F-5) (EKLC)
23. Engineering Center (F/G-10/11) (EC)
24. Environmental Design (G-7) (ENV D)
25. Environmental Health and Safety Center (H-13)
26. Euclid Avenue AutoPark (G-6) (EPRK)
27. Family Housing Children's Center—Main Offices (A-9) (DACR)
28. Family Housing Children's Center—Colorado Court (L-2)
29. Fiske Planetarium and Science Center (J-10) (FISK)
30. Fleming Law (K-10) (LAW)
31. Folsom Stadium (E-8) (STAD)
32. Gamow Tower (F-7) (DUAN)
33. Gates Woodruff Women's Studies Cottage (F-3) (COTT)
34. Grounds and Service Center (D-9) (GRNS)
35. Guggenheim Geography (F-3) (GUGG)
36. Hale Science (E-3) (HALE)
37. Health Physics Laboratory (D-9) (HPHY)
38. Helms Arts and Sciences/Mary Rippon Theatre (G-4) (HMLS)
- \* Henderson Building (G-4). *See Museum of Natural History.*
39. Housing System Maintenance Center (K-3) (HSMC)
40. Housing System Service Center (J-2) (HS SC)
41. Imig Music (H-7) (MUS)
42. Institute for Behavioral Genetics (K-1) (IBG)
43. Institute of Behavioral Science No. 1 (D-2) (IBS1)
44. IBS No. 2 (C-2) (IBS2)
45. IBS No. 3 (D-2) (IBS3)
46. IBS No. 4 (D-2) (IBS4)
47. IBS No. 5 (D-4) (IBS5)
48. IBS No. 6 (C-2) (IBS6)
49. IBS No. 7 (C-2) (IBS7)
50. IBS No. 8 (C-3) (IBS8)
51. Integrated Teaching and Learning Laboratory (G-11) (ITLL)
52. International English Center (G-2) (IEC)
53. Joint Institute for Laboratory Astrophysics (G-7) (JILA)
54. Ketchum Arts and Sciences (F-6) (KTCH)
55. Koenig Alumni Center (E-2) (ALUM)
56. Laboratory for Atmospheric and Space Physics (F-7) (LASP)
57. LASP Space Technology Research Center (L-3) (LSTR)
58. Lesser House (F-11) (LESS)
- \* Life Sciences Laboratories Complex (E-7). *See Muenzinger Psychology, Porter Biosciences, and Ramaley Biology.*
59. Macky Auditorium (D-4) (MCKY)
60. Mathematics Building (F-10) (MATH)
61. MCD Biology (E-7) (MCD B)
62. McKenna Languages (E-4) (MKNA)
63. Muenzinger Psychology (E-7) (MUEN)
64. Museum Collections (Bruce Curtis Building) (G-3) (MCOL)
65. Museum of Natural History, University of Colorado (G-4) (HEND)
66. Norlin Library (E-6) (LIBR)
67. Nuclear Physics Laboratory (K-2) (NPL)
68. Old Main (E-4) (MAIN)
69. Page Foundation Center (D-3) (PFDC)
70. Police and Parking Services (G-12) (PPDS)
71. Porter Biosciences (E-7) (PORT)
72. Power House (F-6) (POWR)
73. Qwest Research Park (L-4) (USW)
74. Ramaley Biology (E-6) (RAMY)
75. Regent Administrative Center (I-8) (RGNT)
76. Regent Drive AutoPark (G-12) (RPRK)
77. Research Laboratory, Litman RLI (J-1) (LITR)
78. Research Laboratory, WICHE (K-1) (RL2)
79. Research Laboratory, Life Science RL4 (K-1) (LSRL)
80. Research Laboratory (Marine Street Science Center) RL6 (J-2) (MSSC)
81. Research Park Greenhouse (K-1) (GH-3)
82. Sibell Wolle Fine Arts (G-6) (FA)
83. Sommers-Bausch Observatory (I-11) (OBSV)
84. Speech, Language, and Hearing Sciences (I-11) (SLHS)
85. Stadium Offices (E-8) (STAD)
86. Stadium Ticket Building (F-9) (STTB)
87. Student Recreation Center (D-6/7) (REC)

88. Sybase (K-3) (SYBS)
89. Telecommunications Building (G-6) (TCOM)
90. Temporary Building No. 1 (D-6) (TB01)
91. Transportation Center (J-2) (TRAN)
92. University Administrative Center and Annex (I-7) (UCTR)
93. University Club (H-6) (CLUB)
94. University Memorial Center (G-5) (UMC)
95. University Theatre (including Charlotte York Irely Studios) (F-4) (THTR)
96. Wardenburg Health Center (H-7) (WARD)
97. Willard Administrative Center—North Wing (H-8) (WCTR)
98. Woodbury Arts and Sciences (E-5) (WDBY)

**University Housing**

99. Aden Hall—Quadrangle (G-9) (ADEN)
100. Andrews Hall—Kittredge Complex (J-11) (ANDS)
101. Arnett Hall—Kittredge Complex (J-12) (ARNT)
102. Athens Court (B/C-6/7) (ATCT)
103. Athens North Court (B-6) (ATHN)
104. Baker Hall (G-7) (BKER)
105. Brackett Hall—Quadrangle (G-9) (BRKT)
106. Buckingham Hall—Kittredge Complex (K-12) (BUCK)
107. Cheyenne Arapaho Hall (H-7) (CHEY)
108. Cockerell Hall—Quadrangle (G-10) (CKRL)
  9. College Inn (B-5) (CICC)
109. Colorado Court (L-1)
110. Crosman Hall—Quadrangle (G-10) (CROS)
111. Darley Commons—Williams Village (L-6) (DLYC)
112. Darley Towers—Williams Village (K-5) (DLYT)
113. Faculty-Staff Court (C-5/6) (FACT)
114. Farrand Hall (H-9) (FRND)
115. Hallett Hall (H-9) (HLET)
116. Kittredge Commons—Kittredge Complex (J-10) (KITT)
  - \* Kittredge Complex. *See Kittredge Commons, Andrews, Arnett, Buckingham, Kittredge West, and Smith Halls.*
117. Kittredge West Hall—Kittredge Complex (J-10) (KITW)
118. Libby Hall (G-8) (LIBY)
119. Marine Court (B-7) (MRCT)
120. Newton Court (B/C-9/10) (NTCT)
  - \* Quadrangle (Engineering Quarangle). *See Aden, Brackett, Cockerell, and Crosman Halls.*
121. Reed Hall (H-10) (REED)
122. Sewall Hall (D-5) (SWLL)
123. Smiley Court (L-1) (SMCT)
124. Smith Hall—Kittredge Complex (K-11) (SMTH)
125. Stearns Towers—Williams Village (K-6) (STRN)
126. Willard Hall—South Wing (H-8) (WLRD)
  - \* Williams Village. *See Darley Commons, Darley Towers, and Stearns Towers.*



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