

**UNDERGRADUATE
ADVISING GUIDE
FOR
CIVIL ENGINEERING

2009 CURRICULUM**

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Table of Contents

<u>Topic</u>	<u>Page</u>
Introduction	1
Mission Statement	1
Objectives and Outcomes	1
Accreditation and Assessment	2
Employment Opportunities for Graduates	2
CVEN Advising Policy	3
Additional Advising Resources	3
Academic Policies and Requirements	5
• Advanced Placement	5
• Attendance	5
• Computing Course	5
• Course Repetition	5
• Dean’s List	5
• Final Examinations	5
• Free Elective	5
• Full-Time Enrollment	5
• Grading Policy	5
• Graduation Requirements	6
• CVEN Technical Electives	7
• CVEN Senior Design Requirement	7
• Engineering Science (ES) Track	7
• Double degrees in Civil Engineering and Applied Math.....	7
• Engineering for Developing Communities (EDC) Track.....	7
• Honors	7
• Humanities and Social Science Electives	7
• Independent Study and Undergraduate Research	8
• International Baccalaureate (IB) Program	9
• Minimum Academic Preparation Standards (MAPS)	9
• No Credit	9
• Course Forgiveness	10
• One Time Forgiveness	10
• Pass/Fail	10
• Petitions	10
• Prerequisites, Co-requisites, and Passing Grades	11
• ROTC	11
• Time Out Program	12

Table of Contents (cont.)

• Transfer Credit (Course Substitution)	12
• Withdrawal Policy	13
Additional Educational Opportunities	13
• Certificate Programs	13
○ ATLAS: TAM and MAT.....	13
○ International Engineering Certificate in German	13
• Concurrent BS/MS Program.....	13
• Undergraduate Research Experience.....	13
• Discovery Learning Apprenticeships	14
• Double Degrees	14
• Minors	14
• Semester At Sea	14
• Study Abroad	14
Student Societies	15
CVEN Faculty List	16
CVEN Staff List	17
CVEN BS Regular Track Graduation Planner	18
CVEN BS Regular Track Block Diagram	19
CVEN BS Regular Track Concentrations	20
CVEN BS Eng Sc Track Graduation Planner	21
CVEN BS Eng Sc Track Block Diagram	22
CVEN BS Eng Sc Track Concentration-Tech Electives.....	23

Introduction

The purpose of this guide is to assist undergraduate students in the Civil Engineering (CVEN) Department to fulfill the CVEN curriculum requirements for the Bachelor of Science (BS) degree. These requirements are structured to comply with College rules and, to maintain our accreditation, in compliance with the rules of the Accreditation Board for Engineering and Technology (ABET).

To respond to the rapid changes in technology and needs of the profession, our curriculum is dynamic, and consequently undergoes both major and minor revisions annually. As an undergraduate student, you will generally be expected to follow the curriculum in effect when you entered as a freshman. **You should keep a copy of the university catalog and all written information including the version of the *Advising Guide* that was in effect when you entered the Civil Engineering program.** Copies of the curriculum, a course checklist and a graphical flow chart are contained in this document.

The student is responsible for adherence to the CVEN curriculum rules and requirements and should be aware that deviation from the planned sequence of courses may result in delayed graduation.

Because of the diversity of the activities of civil engineers, the basic Civil Engineering Curriculum is intended to provide for a fundamental foundation of engineering science, a proficiency in four of the following five areas: construction, environmental, geotechnical, structural, and water resources engineering; and advanced courses in one of these areas leading to a concentration; culminating in an integrating multidisciplinary civil engineering major design experience. For talented students who seek the next-level preparation for R&D (Research and Development) careers or advanced degrees, they should consider the *Engineering Science (ES) Track* in Civil Engineering. **In a special partnership with the Department of Applied Mathematics (APPM), an efficient dual-degree program in Civil Engineering and Applied Mathematics via the Engineering Science track is now available.** Catering to those who are interested in issues pertinent to the developing world, students can also elect the *Engineering for Developing Communities (EDC) Track* which focuses on sustainability and globally

responsible engineering in developing communities and countries.

Civil Engineering Mission Statement

The mission of the Department of Civil, Environmental and Architectural Engineering is the education of undergraduate students to become leaders in the professional practice of engineering, contributing to technological advances that benefit humankind while enhancing the earth's physical and biological resources

Civil Engineering Department Objectives and Outcomes

Civil Engineering Program Objectives

The overall objectives of the Civil Engineering Bachelor of Science degree program at the University of Colorado at Boulder are:

1. **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 modern society.**
2. **At the same time, allow students sufficient specialization to prepare them for professional careers and graduate study in sub-disciplines of Civil Engineering: Construction, Environmental, Geotechnical, Structural, and Water Resources Engineering.**
3. **Enable students to enhance technical contributions to the public infrastructure with understanding of non-technical concepts, especially those that bear on Civil Engineering projects such as cost, public safety and health.**
4. **Expose students to the unique responsibility of Civil Engineers to uphold ethical relationships with both their clients and with the public at large.**
5. **Teach students how to extend their knowledge and skills in order to meet new technical challenges and continuously innovate in their chosen professional careers.**
6. **Provide a broad education of civil engineering students in humanities and social sciences to encourage students to participate fully in a democratic society.**
7. **Culmination of the course sequences in a major design course in the senior year giving students experience in:**
 - Problem-solving and incorporation of client objectives and constraints to define and evaluate design alternatives.

- Integration of non-technical concerns such as aesthetics, flexibility, public acceptance, cost, etc...
 - Oral and written communication of designs to a diverse audience.
 - Professional responsibility of engineers in defining scope of work, scheduling tasks, and bidding reliable professional services.
8. Enable students to achieve licensing as Professional Engineers.
 9. Enable students with BS degrees in Civil Engineering to start professional careers in construction engineering management, environmental engineering, geotechnical engineering, structural engineering, water resources engineering, and general research and development.
 10. Prepare undergraduate students for graduate studies in construction engineering management, environmental engineering, geotechnical engineering, structural engineering, material mechanics, water resources engineering, and related disciplines.

Accreditation and Assessment

The CVEN curriculum is accredited by the Accreditation Board for Engineering and Technology (ABET). Accreditation is a process of continuous improvement that uses a series of assessment tools that measure how well the program is achieving the objectives listed above. As a student, you can expect to take part in the following evaluations during (and after) your academic career at CU:

- **Faculty Course Questionnaire (FCQ)** – You will evaluate and provide feedback in every course you take at the end of every semester, including your assessment of how well the learning objectives for the course were met.
- **Fundamentals of Engineering (FE) Exam** – This national exam is the first step toward professional registration as an engineer and all CVEN students are required to take the exam

prior to graduation. Most students take it in their last semester at CU.

- **Senior Exit Survey** – In your last semester, you will be asked to fill out a two-part survey that asks how well the outcomes listed above were met, and your overall satisfaction with the program, department, faculty, etc.
- **Alumni Survey** – We will also send you a similar survey three years after graduation.

Employment Opportunities for Civil Engineering Graduates

Civil engineers design and supervise the construction of roads, buildings, airports, tunnels, dams, bridges, and water supply and sewage systems. Civil engineering encompasses many specialties. The major specialties within civil engineering are structural, water resources, environmental, construction, transportation, and geotechnical engineering.

Many civil engineers hold supervisory or administrative positions, from supervisor of a construction site to city engineer. Others may work in design, construction, research, and teaching. More than 4 in 10 were employed by firms providing architectural, engineering, and related services, primarily developing designs for new construction projects. Almost one-third of the jobs were in Federal, State, and local government agencies. The construction industry accounted for most of the remaining employment. About 15,000 civil engineers were self-employed, many as consultants.

Civil engineers usually work near major industrial and commercial centers, often at construction sites. Some projects are situated in remote areas or in foreign countries. In some jobs, civil engineers move from place to place to work on different projects.

With advanced degrees, civil engineers can pursue careers in academics, engineering consulting, research laboratories, and technology development in a wide range of engineering disciplines.

Advising

The faculty and staff are here because they have a true commitment to education and want to see

students succeed. However, you the student are ultimately responsible for ensuring that all graduation requirements have been satisfied, and for seeking out the advice and help you need. To assist in this, each student is assigned a faculty advisor. A listing is posted on the 4th floor of the Civil Engineering Center on the wall next to the department office. You are free to change advisor to better serve your needs, with the approval of the new advisor. After selecting an area of specialty, a new advisor from that area will typically be assigned. The department's undergraduate secretary can also assist you with many questions about the curriculum.

- A. It is the individual student's responsibility to secure the approval of her/his faculty advisor for the course of study for each semester. This activity occurs during the group/individual advising period, of which notification will be sent in advance by email in each semester. After the advising session, the faculty advisor will sign the pink card in your file. That will authorize the CEAE staff to remove the flag that prevents you from registering. **IT IS NOT POSSIBLE TO REGISTER BEFORE THIS FLAG IS REMOVED.**
- B. There are a number of decisions to be made concerning choice of elective courses. These decisions should be made in close consultation with the academic advisor so that the electives contribute to overall educational objectives and become part of a cohesive, rational program. The development of such an academic program is the principal purpose for meeting with the academic advisor. A second, and equally important, purpose is for the student to be able to identify a friendly, experienced, and knowledgeable person with whom s/he can discuss her/his academic progress and solve any difficulties that may possibly arise.
- C. Block diagrams and graduation planners for each program are included in this guide. Each student is responsible for keeping his or her graduation planner up-to-date.
- D. Not all courses are offered every semester. Those that are only offered once per year are marked on the block diagrams.

- E. The minimum course load for full time enrollment is 12 credit hours. The maximum course load is 21 credit hours. Variation must be requested by petition to the college. After 18 credit hours, a tuition surcharge is applied.
- F. If problems arise, the following steps are suggested:
 - 1. See assigned faculty advisor.
 - 2. See the Chair of the Operations Committee (Milan Halek).
 - 3. Contact the Office of the Dean of the College (ECAD 100) for questions concerning College or University rules or policies.

Additional Advising Resources

There are a vast number of advising resources available at CU-Boulder, but students frequently do not know they exist or hesitate to take advantage of them:

College of Engineering Advising Guides are published by the Engineering Dean's Office. These College guides are actually a series of individual sheets which cover a wide range of topics, including everything from academic honesty and ethics to scholarships to descriptions of every degree program offered in the College. They are located in a wall-mounted display in the front hallway of the Engineering Center just southeast of the revolving doors. To view these Guides online, or for additional advising-related information in the College of Engineering and Applied Science, please visit the website:

<http://engineering.colorado.edu/students/advising.htm>

Engineering Peer Advocates Office provides services which include academic advising, assistance with major selection, tutoring, and test files as well as providing general information about study skills, test anxiety, resume writing, study abroad opportunities and much more. The office is staffed by sophomores, juniors and seniors who have been trained to answer questions about anything that may affect you as an engineering student. It is located in ECCR 263 (303-492-0828), and is open and free to all current and prospective engineering students. For additional information please visit the website:

<http://engineering.colorado.edu/academics/support.htm>

Herbst Program of Humanities can assist you in creating a coherent plan for humanities/social science electives that can give you both breadth and depth, and avoid an accumulation of unrelated and/or introductory courses. They can guide you toward selecting H&SS courses that will prepare you for the “real world” by taking courses that could help you get ahead in business or explore issues of special urgency in today’s world. Visit the Herbst website: www.colorado.edu/engineering/herbst, visit the office in the Lesser House (2501 Colorado Ave.), or call 303-492-4774 for additional information.

Multicultural Engineering Program (MEP) is an academic excellence community dedicated to the success of multicultural and first generation students historically underrepresented in engineering and applied science. The MEP Resource Center serves as a central meeting place for forming study groups and networking while providing access to MEP staff, computer stations, and more. The MEP office is located in ECCE 100 (303-492-6606). For additional information please visit the website: <http://www.colorado.edu/engineering/MEP/>

Women in Engineering Program (WIEP) was created to recruit and retain women students in the College of Engineering and Applied Science. WIEP conducts activities and programs that help make the educational experience rewarding for all students. The office is located in ECCE 113A (303-492-0083). For additional information please visit the website: <http://engineering.colorado.edu/WIEP/women.html>

Pre-Professional Advising Center is located in Old Main, room 1B90 (303-735-3000). Professional advisors provide support services to all CU-Boulder students preparing for careers in the medical sciences, health professions, and law.

Career Counseling in Career Services can help students and alumni clarify career interests, values and work-related skills; explore potential careers and employers; and refine job seeking, interviewing, and resume preparation skills. They host Career Fairs and Internship Fairs, sponsor resume writing workshops, and hold mock interview sessions. Career Services is located in Willard Hall, Room 34 (303-492-6541), or you may visit their website: <http://careerservices.colorado.edu>

Counseling and Psychological Services: A Multicultural Center provides a variety of programs and assistance to address general academic or personal issues. They are located in Willard Hall, room 134 (303-492-6766), or visit their website: <http://www.colorado.edu/sacs/counseling>

Important publications include: the *University of Colorado Catalog*, which includes all degree requirements for all academic departments on campus, academic standards, administrative regulations, University and College policies and procedures. *Ralphie’s Guide to Student Life* contains a wealth of well-organized and entertaining information, including an A-Z listing of University resources, facilities, and special programs as well as rules, regulations, and policies of the Campus.

Academic Policies and Requirements

Advanced Placement (AP)

Students may use AP credit to satisfy degree requirements. For a listing of AP examinations, score required for credit, and equivalent courses at CU Boulder, please refer to the current University of Colorado, Boulder Catalog. You may also reference this information at:

www.colorado.edu/prospective/freshmen/requirements/ap.html

Attendance

Successful work in the College of Engineering and Applied Science (EN) is dependent upon regular attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Non-attendance does not constitute withdrawal from a course. If a student stops attending a course in which he or she is formally enrolled, that student will receive a failing grade (F).

Computing Course

Computing is an implicit prerequisite for CVEN course work at the 3000-level and above. CVEN curriculum requires students to take GEEN 1300. CVEN will also accept CSCI 1300 to satisfy the Computing Elective, but students are responsible for the material in GEEN 1300 and will have to learn it on their own.

Dean's List

Degree-seeking students in the College of Engineering and Applied Science who complete at least 12 semester credit hours on the Boulder Campus (excluding Continuing Education) during the fall or spring semester and earn at least a 3.60 semester grade point average are automatically placed on the Dean's List. Notation of the Dean's List is placed on the student's transcript by the Office of the Registrar.

Final Examinations

If a student misses a final exam because of illness or other valid personal emergency, the student must notify the instructor and the Dean's Office no later than the end of the day on which the final examination is given. Failure to properly notify these officials is likely to result in an F grade in the course. Students with three (3) or more final exams on the same day are entitled to arrange an alternative examination time for the last exam scheduled on that day. Such arrangements must be made with the instructor of the exam to be rescheduled no later than the sixth week of the semester. Additional information on the Final Examination Policy can be found in the University of Colorado at Boulder Catalog.

Free Elective (FE)

The CVEN curriculum has no free electives.

Full-time Enrollment

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 could not only delay graduation (and negate the four-year graduation guarantee), but also negatively impact a student's financial aid, scholarships, health insurance, and on-campus housing.

Grading Policy

Faculty within this College have the option of awarding grades with a plus (+) or minus (-) designation, except for A+. Faculty teaching courses have complete authority for calculating and assigning final grades in courses they teach.

Incomplete Grades are given only when students, for documented reasons beyond their control, are unable to complete course requirements.

The College only recognizes the incomplete grade of *I*, which converts to *F* if not completed within one year. An *I Grade Record* form, available in the EN Dean's Office, must be completed by the instructor and student. In all cases, the course with the incomplete grade must be completed on the campus in which the *I* was earned, and the identical course must be completed to remove the *I* grade. Incomplete grades are not calculated into the GPA. Students **cannot** repeat an equivalent course at another campus of the University or at another institution and expect the CU-Boulder grade of *I* to be removed, changed, or excluded from conversion to an *F*. Generally, students are not expected to re-enroll in an Engineering course in which a grade of *I* was awarded, unless the incomplete (*I*) grade has converted to an *F*.

Graduation Requirements

Failure to complete the requirements listed below will postpone graduation. Any exceptions will require authorization from the CVEN Undergraduate Committee and the Dean's Office. Students should meet with the CVEN Undergraduate Advising Coordinator at least one semester prior to their planned graduation to review their records. It is the student's responsibility to be certain that all degree requirements have been met, to fill out the diploma card in the Dean's Office, and to keep the CVEN Undergraduate Advising Coordinator and the Dean's Office informed of any change in graduation plans.

To be eligible for the CVEN BS degree, students must meet the following minimum requirements:

1. The satisfactory completion of the prescribed and elective work in the CVEN BS curriculum. A student must complete a minimum number of **128** semester hours, of which **the last 45 shall be earned after admission to the College of Engineering and Applied Science as a degree student.**
2. A minimum cumulative grade point average of 2.00 for all courses attempted and for all courses that count toward graduation requirements, excluding P grades for courses taken Pass/Fail. (Pass/Fail courses do not count for graduation credit.)
3. A minimum cumulative grade point average of 2.00 for all CVEN course work. This "major" grade point average is computed separately from the

student's cumulative grade point average and includes only course work from CVEN and AREN.

4. Successful completion of all Minimum Academic Preparation Standards (MAPS) requirements of the College.

5. Successful completion of WRTG 3030, *Writing on Science and Society* or an approved alternate writing course. Students participating in the first full year of the Herbst Program of Humanities for Engineers (HUEN 3100) are not required to take WRTG 3030. Any other exceptions to the WRTG 3030 requirement must be approved via petition by the Dean of Engineering.

6. Take the Fundamentals of Engineering (FE) Examination, fall or spring of the student's senior year (including both the morning general and the afternoon general or civil engineering subject section), is required. Graduation is not contingent upon passing. However, it is beneficial for your career to do so because this exam is the first step toward professional registration.

7. Submission of a completed Application for Diploma Form, which is available in the Dean's Office (ECAD 100) at the beginning of the semester graduating.

8. Obtain the recommendation of the CVEN faculty.

9. Obtain the recommendation of the faculty of the College of Engineering and Applied Science.

(Note: Double degree students must obtain approval of both designated departments and colleges. The University normally requires that a minimum of an additional 30 semester credit hours be earned for the second degree. However, BOTH degree requirements must be completed. Minor students must provide EN Dean's Office with a Minor Completion form to verify minor requirements have been completed.)

BECAUSE THE **BURDEN OF PROOF** IS ON THE STUDENT, CONSULT THE ASSOCIATE CHAIR FOR UNDERGRADUATE PROGRAMS, YOUR FACULTY ADVISOR, OR THE UNDERGRADUATE ADVISING

COORDINATOR, AND PETITION FOR APPROVAL OF ANY PROGRAM DEVIATIONS.

CVEN TECHNICAL ELECTIVE REQUIREMENTS

- A. A technical elective is generally a course in engineering or science selected in consultation with a faculty advisor at the upper (3000+) level. Courses listed as Concentrations in this guide are examples of technical electives. Consult the departmental website for a complete list of eligible courses in different areas in the CVEN program. The amount of design content per technical elective is also shown in this guide.
- B. A student must take 6 credit hours of technical electives in the regular Civil Engineering track. These can be used to serve as a second concentration.
- C. Up to 3 credit hours of Independent Study, Undergraduate Research, or the following ROTC courses are acceptable as technical elective credit: AIRR 3010 or NAVR 4010.
- D. A maximum of 6 credit hours of technical electives other than CVEN or AREN courses may be selected with the consent of the student's faculty advisor.

CVEN SENIOR DESIGN REQUIREMENT

All students must take the 4-hour Senior Project Design course.

ENGINEERING SCIENCE TRACK

For those students who have advanced placement credits, seek additional career opportunities in research and development (R&D) in engineering and technology or better preparation for advanced degrees in engineering, they should consider the *Engineering Science Track* which aims to provide a higher-level preparation in analytical and computer modeling essential in modern engineering and technology.

Interested students should contact Prof. Ronald Pak, ES Track Advisor: pak@colorado.edu or visit the department website and go to:
ENGINEERING SCIENCE TRACK

DOUBLE DEGREES IN CIVIL ENGINEERING AND APPLIED MATH

For students who are interested in civil engineering science, applied mathematics and their close relationship, a special dual B.S. degree program is now available by which one can earn a baccalaureate degree in both civil engineering and applied mathematics with a minimum of only 143 credits instead of 158. Contact the dual CE-APPM degree program advisor Professor Ronald Pak (pak@colorado.edu) in civil engineering or Professor Ann Dougherty (anne.dougherty@colorado.edu) in applied math for more details and consultation.

ENGINEERING FOR DEVELOPING COMMUNITIES TRACK

The *Engineering for Developing Communities (EDC) track* educates globally-responsible engineering students and professionals who can offer sustainable and appropriate solutions to the endemic problems faced by developing communities worldwide.

Interested students should contact Robyn Sandekian, EDC Track coordinator, sandekian@colorado.edu or Prof. Bernard Amadei amadei@colorado.edu or visit the department website and go to:
ENGINEERING FOR DEVELOPING COMMUNITIES TRACK

Honors

The designation *With Distinction* is awarded when the student has earned a cumulative University of Colorado grade point average between 3.75 and 3.89. The student will also earn *With High Distinction* when their cumulative University of Colorado grade point average is 3.90 or higher. The cumulative grade point average is calculated at the end of the semester prior to the semester of graduation. In addition to the minimum cumulative

grade point averages, students must complete at least 50 semester credit hours on the Boulder Campus (excluding Continuing Education).

Eligible students are encouraged to participate in the College of Arts and Sciences Honors Program. Criteria for the designations of cum laude, magna cum laude, and summa cum laude are set by the Honors Council and are recorded on the student's diploma and in the commencement program. Interested students should consult with the Director of the Honors Program for detailed information.

Humanities and Social Science Electives (HSS)

The engineering courses prepare a student to analyze the physical or material world, but not all important questions can be well addressed by scientific knowledge or technical skills. It is to help prepare one to overcome life's non-technical challenges and to embrace its opportunities that the Accreditation Board for Engineering and Technology requires engineering students to take courses in the Humanities and Social Sciences. Chosen carefully, such courses can help one learn more about contemporary issues such as globalization and the impact of science on society, the complexity of ethical decision-making, the sources of conflict between different cultures and nation-states, or the power and insight of poetry and drama. With so much at stake, we encourage all students to choose these courses thoughtfully.

- Students need at least 18 credit hours in HSS to graduate. This usually means 6 courses.
- Students must take at least 6 hours of HSS (2 courses) at the 3000 level or higher. In selecting courses, keep in mind that many HSS departments will require one to take a course at the 1000 or 2000 level as the prerequisite for a course numbered 3000 or higher.
- ROTC courses AIRR 4010, MILR 4072, and NAVR 3101 are each acceptable for three (3) semester credit hours of upper-division HSS elective credit. NAVR 2020 can be used toward three (3) semester credit hours of lower-division HSS elective credit.
- Most courses in business are NOT acceptable as HSS.

- Most foreign language courses (including first year courses) are acceptable for meeting HSS elective requirements.
- Student Leadership Institute (President Leadership Class) is accepted for up to twelve (12) semester credit hours of lower-division HSS elective.
- **WRTG 3030, Writing on Science & Society**, fulfills the upper-level undergraduate writing requirement AND counts towards 3 credit hours of 3000 level HSS requirement. There is no lower-level writing requirement; freshmen or sophomore writing or composition courses cannot be used to fulfill this requirement, nor can they be used toward HSS. Students must take WRTG 3030 *unless*:

1. One takes HUEN 3100 from *The Herbst Program of Humanities for Engineers*, OR
2. One has taken a *junior level* writing course at another university or college and that course has either been transferred to CU- Boulder as an equivalent to WRTG 3030 or has been successfully petitioned as a substitution, OR
3. One has taken another junior-level writing course at CU-Boulder and the College of Engineering has certified *in writing* that this course can replace WRTG 3030.

Not every Humanities or Social Science course fulfills the College of Engineering HSS requirement. The College publishes a list of those courses which do fulfill the requirement. It is available on-line at

<http://engineering.colorado.edu/homer/fall2007.htm>
OR <http://engineering.colorado.edu/homer/odyessy/>

Consider courses in the ***Herbst Program of Humanities for Engineers***, which offers seminars that are already designed to fit well with one another in a coherent, interdisciplinary program. The Herbst Program's small classes also allow excellent opportunities for student/faculty interaction and for the development of both written and oral communication skills. Pick up the Herbst Advising Guide in the Dean's Office or visit the Herbst

website: <http://engineering.colorado.edu/herbst> for further information.

Independent Study & Undergraduate Research

Undergraduates can participate in ongoing research through independent study projects, the Undergraduate Research Opportunities Program (UROP), and as research assistants for sponsored projects. These opportunities promote individual contact with faculty and graduate students, and they provide an educational experience that cannot be obtained in the normal classroom setting.

Up to three (3) semester credit hours of Independent Study is acceptable for Technical Electives.

An Independent Study is normally supervised by a CVEN faculty member. An approved Independent Study supervised by a faculty member outside of CVEN may also be applied to curriculum requirements as an out-of-department technical elective.

To pursue an independent study, the following requirements must be observed:

- An *Independent Study Agreement Form* must be completed and signed by both the student and the sponsor of the Independent Study or Undergraduate Research (which includes a written Statement of Work). These forms are available through the CVEN Undergraduate Advising Coordinator. This paperwork must be submitted by the course drop/add deadline.
- Satisfactory completion of a significant portion of the initially defined project.
- A written final report, including a copy for Departmental files, must be submitted before a grade will be sent to the registrar's office for posting.
- A second independent study must be approved by petition PRIOR to the submission of the independent study form. *Note: a copy of the previously approved independent study form should be attached.*
- Under no circumstances will a third independent study be allowed.
- In most cases, students will contact faculty in an area the student is interested in pursuing. Sometimes, a faculty will approach a student who has excelled in a particular course.

Students should use the faculty list section of the Advising Guide for preliminary research areal guidance.

Paid research (no student credit) is also possible at the discretion of the sponsoring faculty, either part-time during the academic year or full-time during the summer. It is also available from UROP in the form of an expense allowance and/or stipend. If interested in UROP, please contact the UROP office in Norlin Library, (see <http://www.colorado.edu/Research/UROP/>) room S430, or call 492-2596 for further information.

College policy is no academic credit is allowed if the student is getting paid.

International Baccalaureate (IB) Program

Students may use IB credit to satisfy degree requirements. For a listing of International Baccalaureate (IB) examinations, level of examination required, examination score and equivalent courses at CU Boulder, please refer to the current University of Colorado, Boulder Catalog. You may also reference this information at the following website:

www.colorado.edu/prospective/freshmen/requirements/ib.html

Minimum Academic Preparation Standards (MAPS)

All students entering CU-Boulder who finished high school in the spring of 1988 or thereafter must meet MAPS specified by each school or college. The College of Engineering and Applied Science has adopted the following standards for admission. These standards are defined in high school units: a unit is one full year of high school course work.

1. English 4 units
2. Mathematics 4 units
3. Natural Science 3 units (including 1 unit in chemistry and 1 in physics or 1 in biology)
4. Social Science 3 units
5. Foreign Language: 3 units in one foreign language, or 2 units each in two different foreign languages

In some cases, students who are otherwise admissible may be admitted even though they have not met all MAPS. In those instances, students are

required to complete the appropriate MAPS courses through courses taken at other institutions of higher education or approved credit-by-examination programs prior to their graduation from college. It is the student's responsibility to be aware of any MAPS deficiencies and complete them in a timely manner. The major department has the responsibility to advise the student on which courses must be taken to satisfy any MAPS deficiencies.

The policies of the Boulder campus with respect to completing MAPS coursework after enrollment are as follows:

Appropriate missing MAPS coursework is included in the hours for graduation (whether taken from within the CU system or taken at other institutions).

All coursework toward fulfillment of the MAPS must be taken for a letter grade.

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, to transfer students, and to students transferring from other academic units on the Boulder campus and from other campuses of the University.

All students who first enroll in one academic unit at CU-Boulder and who 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.

Students in double-degree programs must meet MAPS requirements of both degree granting units.

Students must consult with a CU-Boulder academic advisor or read their college's guide to determine which specific courses may be used to meet a MAPS requirement. Students who graduate from a foreign high school are exempt from MAPS.

No Credit (NC)

A course taken for no credit cannot be used for fulfilling graduation requirements. Once a course has been taken for no credit it cannot be repeated for a grade. Students must petition before enrolling for any course for no credit. Students are still subject to course tuition and fee expenses when registering for a course with the NC option.

One Time Forgiveness Policy

The College of Engineering "One Time Forgiveness

Policy" provides the means for correcting a significant registration error, or withdrawal for death in the family or severe illness, one time in a student's academic career. It is used in conjunction with a detailed College petition which can be obtained from the Undergraduate Advising Coordinator.

This policy does NOT apply to students on academic probation and does not give the student the unlimited right to drop or add any course. The intent is to provide the means for correcting a highly significant student or University registration error. It is used in conjunction with a detailed College petition. Students are allowed to use this policy only once during their undergraduate career and only under the following conditions:

- Throughout the semester, students can late drop a course if they had not previously attended the course, handed in homework, or taken any examinations. Course instructor approval is required.

- From the census date through the tenth week of the semester, students can petition to exercise the one time forgiveness policy to late add a course if they have never late added or dropped a course before. Course instructor approval is required.

- **After the sixth week of class, students can late drop a course only with documentation to verify circumstances beyond their control or a University error. The one time forgiveness policy is not to be used to cover student academic difficulty or neglect. Course instructor approval is required.**

Pass/Fail (P/F)

The primary purpose for offering the opportunity for a student to enroll in a course for a grade of P or F rather than the standard letter grade is to encourage students to broaden their educational experience by electing challenging courses without serious risk to the cumulative grade point average.

P/F credit will be permitted only for course work used as free elective (not applicable to the CVEN curriculum) or for courses above and beyond degree requirements. **Students on academic probation may not elect the P/F grade option.**

Petitions

Any exceptions or waivers of departmental or College rules must have prior approval by petition. This petition must be completed and submitted to CVEN for departmental approval and then forwarded to the College of Engineering and Applied Science (EN) Dean's Office for approval. It is best to petition and "get it in writing" whenever a variance to rules or

procedures is involved. It is the student's responsibility to follow up on the petition's progress and be aware of the final decision.

Please refer to the College's Petition Form for more information on examples of situations that must be petitioned. The Petition can be obtained in the EN Dean's Office (ECAD 100), by download at: <http://engineering.colorado.edu/students/advising.htm> or from the CVEN Undergraduate Advising Coordinator.

The following list provides some examples of situations for which a petition is required.

- Enrolling in a course when the student has not satisfied the course prerequisites.
- Waiving a required course.
- Dropping or adding a course after College or University deadlines.
- Requesting the pass/fail option.
- Ensuring that courses taken elsewhere will be counted toward degree requirements.

Follow these guidelines when completing the petition:

- Review the rules and policies of the College as published in the University of Colorado Catalog during the year of admission to this College and the current edition(s) of the appropriate Advising guide to establish the need to petition and the specific rule or policy one wishes to waive.
- Consult with the Undergraduate Advising Coordinator for clarification of departmental rules and policies.
- The petition must be clearly and neatly written with correct grammar and spelling, concise, and legible to all those who must judge its merits. When referring to specific courses, the appropriate course number and title should be given. Be sure to include pertinent data such as a copy of the course syllabus and/or catalog course description.
- Submit the petition request to the Undergraduate Advising Coordinator for review and processing.

If properly completed, the CVEN petition process will normally take three (3) business days, depending upon the submission date.

Once the petition has been submitted, the student must keep in regular contact with the CVEN Undergraduate Advising Coordinator to be informed of the final decision and to sign the certification that he or she has been notified of the decision. The student should not assume that departmental approval automatically assures College of Engineering approval. Failure by the student to confirm the final petition decision makes the student responsible for any errors or problems which may result.

Petition forms may be obtained from the Undergraduate Advising Coordinator or from the EN Dean's Office in ECAD 100.

Prerequisites, Co-requisites, and Passing Grades

It is the policy of CVEN that students must successfully satisfy all prerequisite course(s) (PRC) and associated corequisite course(s) (CRC) before a subsequent course from the CVEN Required Course List is taken.

- Successful completion of a PRC or CRC course requires a grade of C- or better.
- Grades of D+, D, D-, F, IF, or IW do not satisfy the requirement.

PRC and CRC requirements for all CVEN required courses will be monitored; however it is the student's responsibility to re-take those courses below a grade of C-. Should that be the case, the student is strongly urged to consult with the Undergraduate Advising Coordinator prior to registering for the next required CVEN course.

Courses not taken in CVEN may be used to satisfy PRC and/or CRC requirements if (1) they are included in the Approved Equivalent Course List as described in this document, (2) transfer credit has been awarded, or (3) a petition to the Undergraduate Committee Chair has been approved.

This policy applies only to CVEN *required courses*. If a student has not satisfied all of the PRC and CRC requirements for a particular CVEN *technical elective* course, that course may be taken with the approval of the instructor via a petition.

PRC and CRC requirements for a course taken outside of CVEN will have those requirements set by the department offering the course, and students must abide by the policies in effect for the other departments.

ROTC

Students participating in the ROTC Program may receive up to nine (9) semester hours of credit toward fulfilling CVEN BS degree requirements from approved ROTC coursework: six hours of Humanities/Social Science Elective, three hours of Technical Elective).

Time Out Program (TOP)

TOP is a planned leave program administered through the Office of the Registrar. Students in good academic standing (2.0 GPA or above) may leave for one or two semesters to pursue academic or nonacademic interests and have an assured return to this College. Additional information and an application for TOP may be obtained from the Office of the Registrar in Regent Administrative Center, room 105.

Transfer Credit (Course Substitution)

The initial transfer credit evaluation is performed by the Office of Admissions upon receiving an official transcript mailed directly from the institution in which the credit was earned. Just because the Office of Admissions accepted the credit doesn't mean CVEN will apply that credit toward BS degree requirements. The Office of Admissions will not accept transfer course work in which the student received a grade lower than a "C-." Nor will Pass/Fail credit normally be accepted. Credits from an Engineering Technology program normally will not transfer, and no academic credit is normally given for work or co-op experience.

Once transfer and advanced placement (AP) credit evaluations have been completed by the University, the applicability of these credits towards the undergraduate civil engineering curriculum is determined. Technical engineering credit applicability is then determined by the **CVEN Transfer Credit Evaluator**. In most cases, students will need a catalog description and a course syllabus for a prior technical engineering course. Students can arrange for a transfer credit evaluation by making an appointment with the Undergraduate Advising Coordinator.

All transfer students should see or write the designated CVEN Department Transfer Credit Evaluator about acceptance of transfer credits immediately upon being accepted into the College of Engineering and prior to registering for course work. Acceptance of transfer credits is provisional for one

academic year following matriculation in the CVEN Department and until academic competence in subsequent courses has been established.

The number of credit hours for each course may vary by institution and final grades do not transfer between institutions. Also, the completion of these courses does not assure the student of acceptance into an engineering degree program; each institution has its own admission criteria. Lower division courses cannot transfer as upper division courses between two-year and four-year institutions. In that degree requirements do change, students are urged to check with a faculty advisor in the proposed major at the four-year institution to ensure the maximum acceptance of courses.

As a result of SB 93-136, the Colorado Commission of Higher Education (CCHE) has established a Statewide Transfer Policy for all two-year and four-year State post-secondary institutions. Course equivalencies have been established for students transferring from one campus of the University of Colorado to another campus. Additionally, Transfer Guides have been created for State community colleges which identify the equivalent University of Colorado at Boulder course.

Students pursuing a **double degree** must have transfer credit evaluations performed by each department involved. Additional course substitution is possible for double degree students, and is determined on a case-by-case basis. **Intra-university transfer** students must have a transfer credit evaluation done by their new major department.

Credit hours required for graduation that were earned no more than ten 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 meets current degree program requirements.

Academic rules of the College of Engineering require that the last 45 semester credit hours used to fulfill degree requirements must be taken as a regular degree student in the College of Engineering on the Boulder Campus. Unless approved in advance by the major department and this College, course work taken through the Division of Continuing Education (ACCESS, Boulder Evening, and Correspondence) is not exempt from the residency requirement.

Advanced Placement/College-Level Examination Program

AP and CLEP credit is handled as transfer credit. AP may be approved by the major department on the basis of the College Entrance Examination Board's Advanced Placement tests. For students who have taken an advanced placement course in high school and who make the required score in the CLEP's AP examination, college credit will be granted if the subject would normally satisfy part of the student's curriculum. If a student elects to take the equivalent college course, the credit for that course will replace the AP credit. For a listing of CU course equivalents, see the Advising Guide entitled "Advanced Placement and MAPS" or the *University of Colorado Catalog*.

CLEP credit also may be accepted toward degree requirements. A list of subjects in which CLEP examinations will be accepted is provided in the current *University of Colorado Catalog*. Departments will advise their students on the application of CLEP credit toward degree requirements.

Continuing Education credit is not treated as transfer credit. However, the student must secure approval through his or her major department and the Dean's Office prior to registering for Continuing Education course work.

Withdrawal Policy

If a student is leaving the University during an academic term or after having paid the registration deposit, he or she must withdraw from all courses through the Office of the Registrar. After the sixth week of classes, students are not permitted to withdraw except under documented circumstances clearly beyond their control. Poor academic performance does not justify withdrawal from the University. Students who interrupt their course of study may be required to secure permission of the Dean to re-enroll in the College. A student wishing to return after a withdrawal must reapply for admission and is therefore subject to enrollment limits and academic performance evaluation.

Additional Educational Opportunities

Certificate Programs

Certificate programs are similar to minor programs, and upon completion will be identified on

the student's transcript immediately following the semester in which the certificate was completed. It's possible course work used to satisfy the certificate can also be used for Free Elective, Humanities/Social Science Elective, and/or Technical Elective.

The *College of Arts and Sciences* offers certificate programs in the following areas : 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, and Western American Studies. Completion of specified course work in these programs entitles students to a certificate issued by the Dean of Arts & Sciences. Students interested in these programs should contact the appropriate program.

The Alliance for Technology, Learning, and Society (ATLAS) offers two certificate programs: *Technology, Arts, and Media (TAM)* and *Multidisciplinary Applied Technologies (MAT)*. Both require 18 credit hours. For additional information, call 303-735-6588 or visit the website : www.colorado.edu/ATLAS.

International Engineering Certificate in German is an undergraduate academic program established at CU-Boulder in 2003. It offers students enrolled in an engineering degree program the opportunity to obtain an interdisciplinary certificate in International Engineering and German. The program prepares engineers for a global economy through language, cultural awareness, and international work experience. Students who have had German language instruction in high school, as well as students with other language experience who would like to begin studying German may apply. If interested, contact the Dean's Office at 303-492-5071, or visit the website: ecadw.colorado.edu/engineering/academics/german.htm.

Concurrent B.S./M.S. Program

Civil Engineering students who plan to continue their education to obtain a graduate degree after completing the requirements for their B.S. in Civil Engineering will usually find it advantageous to apply for admission to the concurrent BS/MS degree program. This program allows students who qualify (a 3.25 cumulative GPA is required) to plan a graduate program from the beginning of their junior year rather than from their first year of graduate study. Up to six credit hours of appropriate 5000

level mechanical technical elective courses may be applied to the M.S. degree, subject to GPA restriction. Interested students should discuss this option with the Undergraduate Advising Coordinator and Graduate Coordinator; with their assigned faculty advisor.

The tuition rate for students in this program will be at the undergraduate rate unless the student converts to graduate status after completing the BS requirements.

Undergraduate Research Experience

The Department of Civil, Environmental and Architectural Engineering of the University of Colorado at Boulder is a major research center in the U.S. Most of the CEAE faculty members are active researchers in their field, leading interesting and challenging research projects supported by the government and industry. Students are encouraged to take advantage of such inquisitive setting to enhance their educational experience by exploring early their ability in guided or independent research. Undergraduate research assistantships are available during the academic year and the summer semester from individual faculty, the College of Engineering as well as campus's UROP program. Those who are in the new Engineering Science Track are particularly encouraged to participate in such undergraduate research activities.

Discovery Learning Apprenticeships

As a way to encourage undergraduate students to experience research, the College invites applications annually for a number of a Discovery Learning Apprenticeships. Students can earn an hourly wage while engaging in research with college faculty and graduate students. Positions are announced in April for the following fall term and spring term. Students must apply and selection for positions is competitive. For more information, an application and a list of current discovery learning projects, visit <http://engineering.colorado.edu/activelearning/discovery.htm>.

Double Degrees

It is possible to obtain double degrees in two engineering disciplines or one degree in engineering and a second degree from a department in another

college or school of the University. Students must satisfy curricula for both programs and normally complete a minimum of 30 additional semester credit hours above and beyond the degree with the larger minimum credit hour requirement. If the student can satisfy both degree requirements with fewer than 30 additional hours, the difference can be made up with free electives.

Of the 30 additional semester credit hours, double degree students must complete 24 semester credit hours in courses offered by the secondary academic department or in courses approved in advance by the department as substitutes. Transfer students pursuing double degrees must complete a minimum of 75 semester credit hours as a degree student in the College of Engineering and Applied Science and must satisfy all other stipulations regarding total hours required and approval of all coursework by both departments concerned.

Students may coordinate their double degree schedule by closely interacting with academic advisors in each of the departments involved. It is in the student's best interest to select courses that satisfy degree requirements in both departments as frequently as possible. In some cases, it may be preferable to pursue a Master's degree rather than two undergraduate degrees.

Minors

Numerous minor opportunities exist that would satisfy Humanities/Social Science Elective, Technical Elective, and/or Free Elective. Many require no additional course work beyond the minimum BS requirements. For more information on minor opportunities and requirements, visit:

<http://www.colorado.edu/aac/minor.htm>

Semester At Sea

Administered through the Office of International Education, and managed by the University of Pittsburgh's Institute for Shipboard Education, students explore and learn valuable insights into the various societies visited, allowing students to analyze and discuss their observations in formal classes on the shipboard campus. Set sail aboard the *SS Universe Explorer* each semester and summers.

Contact the Office of International Education for more information, Environmental Design, Room 1B45, 303-492-27741.

Study Abroad

Study abroad, usually taken in the junior year, can be an enriching experience. Information about this unique opportunity can be obtained from the University Study Abroad Office, ENVD 1B01, 303-492-7741. The purpose of these guidelines is to assist the student and his or her faculty advisor in planning the courses to take overseas. In order to guarantee that the courses taken abroad will count toward the CU degree, the student must get the planned program approved by the CVEN Undergraduate Study Abroad Advisor.

Many liberal arts courses taken abroad will satisfy the requirements for electives in the humanities and social sciences. Some courses taken abroad may count as technical electives. Consult with the ME Study Abroad Advisor for approval of specific courses.

Student Societies

Students have excellent opportunities to become involved in discipline-related activities outside of the classroom. The department has active chapters in a number of major student societies including American society of Civil Engineers: Association of General Contractors, Illumination Engineering Society, and Engineers without Borders.

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GRADUATION PLANNER

CIVIL ENGINEERING

Fall 2009

Student _____
Advisor _____

SID _____-____-_____

Transfer credits approved
by _____

Expected date of graduation

Mathematics (16)

APPM 1350-4 _____
APPM 1360-4 _____
APPM 2350-4 _____
APPM 2360-4 _____

Basic Science (17)

CHEM 1221-2 _____
CHEN 1211-3 _____
PHYS 1110- 4 _____
PHYS 1120- 4 _____
PHYS 1140- 1 _____
CVEN 3698-3 _____

Basic Engineering Elective (3)

GEEN 1400-3 Engrg Projects

or _____

The Basic Engineering Elective can be any 3-credit technical course given in the engineering college with a designator ASEN, AREN, APPM, CHEN, CVEN, CSCI, ECEN, EVEN, GEEN, or MCEN.

Engineering Science (27)

CVEN 1317-1 _____
AREN 1027-3 _____
AREN 2110-3 _____
GEEN 1300-3 _____
CVEN 2012-3 _____
CVEN 2121-3 _____
CVEN 3111-3 _____
CVEN 3161-3 _____
CVEN 3313-3 _____
CVEN 3227-3 _____

CE – Fundamentals (18)

CVEN 3246-3 _____
CVEN 3323-3 _____
CVEN 3414-3 _____
CVEN 3525-3 _____
CVEN 3708-3 _____
CVEN 3602-3 _____

Proficiency (12).

Four of the following 5 areas:
CVEN 3718-3 _____
CVEN 4333-3 _____
CVEN 3256-3 _____
CVEN 4545/4555-3 _____
CVEN 3424-3 _____

Concentration (6)

Circle Selection
Const Env Geotech Struct Water
1 _____
2 _____

Technical Electives (6)

Technical Electives can be a second concentration.

1 _____
2 _____

Significant Senior Design Experience (4)

CVEN 4830 -4 _____

Humanities and Social Sciences (18)

WRTG 3030-3 _____

**Must be 3000 level or above*

**Must be 3000 level or above*

TOTAL 128

CVEN BLOCK DIAGRAM

SEMESTER CR

8	16	CVEN XXXX-3 Proficiency IV	CVEN XXXX-3 Concentration II	Technical Elective-3	Technical Elective-3	Technical Elective-3	3 S-H Elective (upper-level)
7	15	CVEN XXXX-3 Proficiency III	CVEN 3602-3 Transportation Systems (Instructor consent) #	CVEN XXXX-3 Concentration I	CVEN 4830-4 Senior Design Project #		3 S-H Elective (upper-level)
6	15	CVEN 3227-3 Probability Statistic & Decision for Civil Engrs. (APPM 2360 JR Standing) #	CVEN XXXX-3 Proficiency I	CVEN 3111-3 Analytical Mechanics II (CVEN 2121 & co-req APPM 2360) #	CVEN XXXX-3 Proficiency II		WRTG 3030-3 Writing on Science & Society (JR standing)
5	15	CVEN 3246-3 Intro. To Construction (JR level or Instructor Consent)	CVEN 3323-3 Hydraulic Engineering (CVEN 3313) #	CVEN 3525-3 Structural Analysis (CVEN 3161)	CVEN 3414-3 Fund. of Env. Engr. (CHEM 1211) (CHEN 1221) (APPM 2350) #	CVEN 3708-3 Geotechnical Engineering I (CVEN 3161)	
4	16	APPM 2360-4 Introduction to Linear Algebra & Differential Equations	CVEN 3313-3 Theoretical Fluid Mechanics (CVEN 2121) #	CVEN 3161-3 Mechanics of Materials I (CVEN 2121 co-req APPM 2360)	CVEN 3698-3 Engineering Geology #	GEEN 1300-3 Intro Engr. Computing (APPM 1350, co-req) #	
3	18	APPM 2350-4 Calculus III for Engineers (APPM 1360 or MATH 2300)	PHYS 1120-4 PHYS 1140-1 Gen.Phys/Lab (PHYS 1110 co-req MATH 2300 or APPM 1360)	CVEN 2121-3 Analytical Mechanics I (PHYS 1110 co-req APPM 2350)		AREN 2110-3 Thermodynamics (APPM 1360 & PHYS 1110) #	3 S-H Elective
2	17	APPM 1360-4 Calculus II for Engineers (APPM 1350 or MATH 1300)	PHYS 1110-4 Gen. Physics I (co-req APPM 1350 or MATH 1300)		CVEN 2012-3** Introduction to Geomatics (APPM 1350)	AREN 1027-3** Engineering Drawing	3 S-H Elective
1	16	APPM 1350-4 Calculus I for Engineers (2yr HS Alg 1yr Geom. 1/2yr Trig or approval by faculty advisor)	CHEN 1211-3 Gen Chem for Engineers \$ (1yr HS CHEM or Satis. In CHEM 1001 or CHEM 1021 & HS Alg coreq CHEN 1221)	CHEM 1221-2 General Chemistry Lab for Engineers \$	Basic Engineering Elective, e.g., GEEN 1400 -3 or other CEAS courses***	CVEN 1317-1 Introduction to Civil & Environmental Engineering same as AREN 1316 #	3 S-H Elective

- Courses marked thus are offered only in SEMESTER shown.

\$ - CHEN 1211 & CHEM 1221 must be taken concurrently.

* - The Senior Design Course incorporates professional material from the prior course, Senior Seminar

** - Both CVEN 2012 and AREN 1027 may be taken earlier or later in the program

*** See curriculum description for acceptable courses

List of Courses for Civil Engineering Concentrations

GEOTECHNICAL ENGINEERING

Fundamental- Proficiency – Concentration-	CVEN 3708 Geotechnical Engineering 1(Spring or Fall), pre-reqs CVEN 3161 CVEN 3718 Geotechnical Engineering 2 (Fall or Spring), pre-reqs CVEN 3708 CVEN 4728 Foundation Engineering (Fall) pre-reqs CVEN 3718 or consent CVEN 5748 Design of Earth Structures (Spring) pre-reqs CVEN 5708 or consent or any CVEN 4000/5000 geotech courses
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WATER RESOURCES ENGINEERING

Fundamentals- Proficiency – Concentration-	CVEN 3323 Hydraulic Engineering (Fall), pre-reqs CVEN 3313 CVEN 4333 Engineering Hydrology (Spring), pre-reqs CVEN 3227 & 3323 CVEN 4353 Ground Water Engineering (Fall) pre-reqs CVEN 3313 CVEN 5363 Modeling of Hydrologic Systems (Spring) co-reqs CVEN 4333
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CONSTRUCTION ENGINEERING AND MANAGEMENT

Fundamentals- Proficiency – Concentration-	CVEN 3246 Introduction to Construction (Spring or Fall) pre-reqs JR or consent CVEN 3256 Const Equipment and Methods (Fall) CVEN 4087 Engineering Contracts (Fall), pre-reqs SR or consent AREN 4466 Construction Planning and Scheduling (Fall) AREN 4420 Cost Engineering (Spring)
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STRUCTURAL ENGINEERING/ STRUCTURAL MECHANICS

Fundamentals- Proficiency – Concentration-	CVEN 3525 Structural Analysis (Spring or Fall), pre-reqs CVEN 3161 CVEN 4545 Steel Design (Spring) or CVEN 4555 Reinforced Concrete (Fall) pre-reqs CVEN 3525 for both CVEN 4161 Mechanics of Materials II, (Spring), pre-reqs CVEN 3161 Either of the following: CVEN 4545 or 4555 (whichever not selected as proficiency) CVEN 4525 Analysis of Framed Structures (Fall), pre-reqs CVEN 3525
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ENVIRONMENTAL ENGINEERING

Fundamentals- Proficiency – Concentration-	CVEN 3414 Fundamentals of Environmental Engineering (Fall), pre-reqs CHEN 1211 & APPM 1360 CVEN 3424 Water and Waste Water (Spring), pre-reqs CVEN 3414 Any two of the following: CVEN 3454 Water Chemistry (Fall), pre-reqs CHEN 1211 & CVEN 3414 CVEN 3434 Introduction to Applied Ecology (Spring), pre-reqs CHEN 1211, CHEM 1221, PHYS 1110 & PHYS 1140 CVEN 4474 Hazardous & Industrial Waste Mgmt (Spring), pre-reqs CVEN 3414 CVEN 4484 Intro to Environmental Microbiology (Spring), pre-reqs CHEN 1211, CHEM 1221, APPM 1350, APPM 1360 & APPM 2350
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GRADUATION PLANNER

CIVIL ENGINEERING – ENGINEERING SCIENCE TRACK

Fall 09

Student _____
Advisor _____

SID ____-____-____

Transfer credits approved
by _____

Expected date of graduation

Mathematics (19)

APPM 1350-4 _____
APPM 1360-4 _____
APPM 2350-4 _____
APPM 2360-4 _____
APPM 4350-3 _____
or equiv

Basic Science (17)

CHEM 1221-2 _____
CHEN 1211-3 _____
PHYS 1110- 4 _____
PHYS 1120- 4 _____
PHYS 1140- 1 _____
CVEN 3698-3 _____

Advanced Engineering Elective (3)

The Adv. Engrg. Elective can be any upper level 3-credit course given in the engineering college with a designator ASEN, AREN, APPM, CHEN, CVEN, CSCI, ECEN, EVEN, GEEN, or MCEN. (GEEN 1400-3 Engrg Projects is acceptable if taken in Yr1)

Engineering Science (30)

CVEN 1317-1 _____
AREN 1027-3 _____
AREN 2110-3 _____
GEEN 1300-3 _____
CVEN 2012-3 _____
CVEN 2121-3 _____
CVEN 3111-3 _____
CVEN 3161-3 _____
CVEN 3313-3 _____
CVEN 3227-3 _____
CVEN 4511-3, CVEN 4537 or APPM 4120 _____

CE – Fundamentals (18)

CVEN 3246-3 _____
CVEN 3323-3 _____
CVEN 3414-3 _____
CVEN 3525-3 _____
CVEN 3708-3 _____
CVEN 3602-3 _____

Proficiency (12).

Four of the following 5 areas:

CVEN 3718-3 _____
CVEN 3333-3 _____
CVEN 3256-3 _____
CVEN 4545/4555-3 _____
CVEN 3424-3 _____

Concentration-Technical Electives (6)

Circle Selection

Const Env Geot Struct Water
1 _____
2 _____

The C-T Elective can be any upper level 3-credit course in CVEN from the approved list.

Significant Senior Design Experience (4)

CVEN 4830 -4 _____

Humanities and Social Sciences (18)

WRTG 3030-3 _____

**Must be 3000 level or above*

**Must be 3000 level or above*

TOTAL 128

SEM	CR	CVEN-ENG SC TRACK- MODIFIED BLOCK DIAGRAM					
8	16	<u>CVEN XXXX-3</u> Proficiency III	<u>CVEN XXXX-3</u> Proficiency IV	<u>CVEN XXXX-3</u> Concentration -Tech Elect II	<u>CVEN XXXX-3</u> Concentration -Tech Elect I		3 S-H Elective (upper-level)
7	15	CVEN 4511/5537 or APPM 4120 -Numer Methods (finite element/ finite difference/ optimiz) #	<u>CVEN 3602-3</u> Transportation Systems (Instructor consent) #	<u>CVEN XXXX-3</u> Proficiency II		<u>CVEN 4830-4</u> Senior Design Project #	3 S-H Elective (upper-level)
6	15	<u>CVEN 3227-3</u> Probability Statistic & Decision for Civil Engrs. (APPM 2360 JR Standing) #	<u>CVEN 3246-3</u> Intro. To Construction (JR level or Instr.uctor Consent	<u>CVEN 3111-3</u> Analytical Mechanics II (CVEN 2121 & co-req APPM 2360) #	<u>CVEN XXXX-3</u> Proficiency I		<u>WR TG</u> 3030-3 Writing on Science & Society (JR standing)
5	15	APPM 4350-3 Methods in Appl. Math or equiv #	<u>CVEN 3323-3</u> Hydraulic Engineering (CVEN 3313) #	<u>CVEN 3525-3</u> Structural Analysis (CVEN 3161)	<u>CVEN 3414-3</u> Fund. of Env. Engr. (CHEM 1211) (CHEM 1221) (APPM 2350) #	<u>CVEN 3708-3</u> Geotechnical Engineering I (CVEN 3161)	
4	16	<u>APPM 2360-4</u> Introduction to Linear Algebra & Differential Equations	<u>CVEN 3313-3</u> Theoretical Fluid Mechanics (CVEN 2121) #	<u>CVEN 3161-3</u> Mechanics of Materials I (CVEN 2121 co-req APPM 2360)	<u>CVEN 3698-3</u> Engineering Geology #	Advanced Engineering Elective-3 ^{***}	
3	18	<u>APPM 2350-4</u> Calculus III for Engineers (APPM 1360 or MATH 2300)	<u>PHYS 1120-4</u> <u>PHYS 1140-1</u> Gen.Phys/Lab (PHYS 1110 co-req MATH 2300 or APPM 1360)	<u>CVEN 2121-3</u> Analytical Mechanics I (PHYS 1110 co-req APPM 2350)		<u>AREN 2110-3</u> Thermodynamic s (APPM 1360 & PHYS 1110) #	3 S-H Elective
2	18	<u>APPM 1360-4</u> Calculus II for Engineers (APPM 1350 or MATH 1300)	<u>PHYS 1110-4</u> Gen. Physics I (co-req APPM 1350 or MATH 1300)		<u>CVEN 2012-3^{**}</u> Introduction to Geomatics (APPM 1350)	<u>GEEN 1300-3</u> Intro Engr. Computing (APPM 1350, co-req) #	3 S-H Elective
1	16	<u>APPM 1350-4</u> Calculus I for Engineers (2yr HS Alg 1yr Geom. 1/2yr Trig or approval by faculty advisor)	<u>CHEN 1211-3</u> Gen Chem for Engineers \$ (1yr HS CHEM or Satis. In CHEM 1001 or CHEM 1021 & HS Alg coreq CHEN 1221)	<u>CHEM 1221-2</u> General Chemistry Lab for Engineers \$	<u>AREN 1027-3^{**}</u> Engineering Drawing	<u>CVEN 1317-1</u> Introduction to Civil & Environmental Engineering same as AREN 1316 #	3 S-H Elective

- Courses marked thus are offered only in SEMESTER shown.

\$ - CHEN 1211 & CHEM 1221 must be taken concurrently.

** - Both CVEN 2012 and AREN 1027 may be taken earlier or later in the program

*** See Engrg Science Track curriculum description for acceptable courses and consult ES Track Advisor

Extended List of Concentration-Technical Electives for CE Eng Sci Track

GEOTECHNICAL ENGINEERING

CVEN 4728 Foundation Engineering	CVEN 5708 Advanced Soil Mechanics
CVEN 5748 Design of Earth Structures	CVEN 5798 Soil Dynamics
or any CVEN 4000/5000 geotech courses	CVEN 5131 Continuum Mech. & Elasticity

WATER RESOURCE ENGINEERING

CVEN 4333 Engineering Hydrology	CVEN 5333 Hydrology
CVEN 4323 Water Resource Sys Engrg	CVEN 5313 Environ Fluid Mechanics
	CVEN 5353 Groundwater Hydrology

STRUCTURAL ENGINEERING/STRUCTURAL MECHANICS

CVEN 4161 Mech. of Mat'l II	CVEN 5111 Intro to Struct Dynamics
CVEN 4555 Reinforced Concrete Design	CVEN 5131 Continuum Mech. & Elasticity
CVEN 4545 Steel Design	CVEN 5161 Advanced Mech. of Mat'l
CVEN 4525 Analy of Frame Structures	

ENVIRONMENTAL ENGINEERING

CVEN 3454 Water Chemistry	CVEN 5313 Environ Fluid Mechanics
CVEN 3434 Intro. Applied Ecology	CVEN 5834 Envir Engrg. Processes
CVEN 4474 Haz. & Indust. Waste Mgmt	CVEN 5833 Reactive Transport Modeling
CVEN 4484 Intro to Envir. Microbiology	

CONSTRUCTION ENGINEERING AND MANAGEMENT

CVEN 4087 Engineering Contracts	CVEN 5276 Engrg. Risk & Decision
AREN 4466 Constr. Planning & Sched.	CVEN 5565 Life-Cycle Engrg. or Civil Infrastructure Systems