



University of Colorado
Boulder

Undergraduate Advising Guide for Architectural Engineering

Civil, Environmental, and Architectural Engineering
428 UCB, ECOT 441
Boulder, CO 80309-0428
t (303) 492-6382
f (303) 492-7317
<http://ceae.colorado.edu>

September 2011

Table of Contents

Introduction	1
Mission Statement	1
Program Educational Objectives	1
Student Outcomes	2
Accreditation and Assessment.....	2
Advising.....	3
Transfer Procedures.....	3
Additional Advising Resources.....	4
College of Engineering Advising Guides.....	4
Career Counseling	5
Counseling and Psychological Services	5
Graduation Requirements	5
Engineering Science Track.....	6
Additional Educational Opportunities	6
Independent Study and Undergraduate Research	6
Concurrent B.S./M.S. Program.....	7
Undergraduate Research Experience	7
Discovery Learning Apprenticeships	7
Double Degrees.....	7
Minors	8
Semester At Sea	8
Study Abroad	8
Student Societies	8
CEAE Faculty.....	9
CEAE Staff.....	10
Architectural Engineering Block Diagram	11

Introduction

The purpose of this guide is to assist undergraduate students majoring in Architectural Engineering (AREN) to fulfill the AREN 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 Engineering Accreditation Commission of ABET (www.abet.org).

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 program.** Copies of the curriculum, a course checklist and a graphical flow chart are contained in this document. Alternatively, you may elect to follow a future revision to the curriculum in its entirety. If you decide to follow new curriculum guidelines, you must inform the Department.

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

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.

Program Educational Objectives

The educational objective of the Architectural Engineering program is to develop graduates who acquire the broad knowledge and skills necessary to successfully begin and sustain a career, and to become leaders who advance the state-of-the-art, in one of four core disciplines of the building industry:

- electrical and lighting systems
- heating, ventilating, and air conditioning (HVAC) systems
- structural systems
- construction engineering and management

The areas of knowledge required to achieve these objectives include both technical and non-technical areas. Technical areas include an elementary understanding of the fundamentals of architectural engineering, proficiency in the engineering sciences of buildings and their systems, proficiency in architectural engineering design and its integration across disciplines, and specialization in one of the four core areas of AREN practice. Non-technical areas include professional management and ethics, processes for communication, and broad exposure to the humanities and social sciences, especially architectural history.

These areas of knowledge must be complemented by skills in design, communication, and professional practice necessary to develop and sustain a career in the building industry. Design skills include problem definition, design workflow and processes, application of codes and standards, and design experience.

Communication skills include oral and written communication in the form of presentations, drawings, and report. Professional skills include resource allocation, planning, and teamwork.

While the educational objectives do not specifically address the development of graduates who pursue further graduate studies, it is recognized that advancing the state-of-the-art in the disciplines of the building industry may require additional education. To that end, the AREN program education objectives include graduate school in engineering and disciplines relevant to the building industry.

Student Outcomes

The outcomes that students are expected to have attained upon graduation with the Bachelor of Science degree in Architectural Engineering are:

1. the ability to apply knowledge of mathematics, science, and engineering
2. the ability to design and conduct experiments
3. the ability to analyze and interpret data
4. the ability to design a system or component to meet desired needs
5. the ability to function on multidisciplinary teams
6. the ability to identify, formulate, and solve engineering problems
7. an understanding of professional and ethical responsibilities
8. the ability to communicate effectively through writing and/or drawing
9. the ability to communicate effectively through oral presentations
10. an understanding of the impact of engineering on society
11. an understanding of the necessity to engage in life-long learning
12. a knowledge of contemporary issues in civil, environmental, and architectural engineering
13. the ability to use modern engineering techniques, skills, and tools

Accreditation and Assessment

The AREN program is accredited by the Engineering Accreditation Commission of ABET. Accreditation involves a process of continuous improvement using a series of assessment tools that measure how well the program is achieving its objectives. 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 AREN 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 survey administered by the College 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 five years after graduation.

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. You are free to change advisor to better serve your needs, with the approval of the new advisor (see CEAE department for advisor form). After selecting an area of specialty, a new advisor from that area will typically be assigned. The CEAE Undergraduate Coordinator 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 registration HOLD that prevents you from registering. **IT IS NOT POSSIBLE TO REGISTER BEFORE THIS HOLD IS REMOVED.**
- B. Graduate requirements are met through one of four distinct tracks within the AREN curriculum – electrical/lighting, mechanical (HVAC), structural, or construction. Each track has a specific set of required upper-division courses and recommended technical electives. During the third year, each student must select one of the specialization tracks. While students are randomly assigned an initial faculty advisor, students are encouraged to change faculty advisors to obtain advice from a faculty member in their area of specialization. With this alignment of interests, the faculty advisor will best be able to help you identify appropriate technical electives, discuss career options, and suggest opportunities for internships, research, and employment.
- 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 19 credit hours. Variation must be requested by petition to the college. After 18 credit hours, a tuition surcharge is applied.
- F. If problems arise with advising, the following steps are suggested:
 - i. See CEAE Undergraduate Coordinator.
 - ii. See the Chair of the Operations Committee (Milan Halek).
 - iii. Contact the Office of the Dean of the College (ECAD 100) for questions concerning College or University rules or policies.

For more information on the civil, environmental and architectural engineering program visit our website at <http://ceae.colorado.edu>.

Transfer Procedures

The University and College have established procedures for admission of transfer students and evaluation of transfer credits. These policies are described on the undergraduate admissions website: <http://admissions.colorado.edu/undergraduate/apply/transfer>. However, once a student is admitted and transfer credits have been evaluated by the University, the CEAE Department is responsible for the final evaluation of the application of transfer credits to degree requirements. A student is required to obtain the approval of the CEAE Transfer Credit Evaluator for all transfer credits. Prof. Ross Corotis

(ross.corotis@colorado.edu) is the current (Fall 2011) CEAE Transfer Credit Evaluator. The following recommendations are offered:

- A. It is the student's responsibility to ensure that transfer credits have been evaluated and approved by the Department.
- B. Newly admitted transfer students should make an appointment with the CEAE Transfer Credit Evaluator as soon as possible to obtain final approval of transfer credits. A transfer credit approval form, signed by the Transfer Credit Evaluator, will be placed in the student's file and will be required for graduation. The form will also be used by advisors to inform academic guidance.
- C. If there are questions or concerns about a transfer course, the Evaluator may request catalog pages or course descriptions, or may seek the advice of other faculty members. In some cases, it may be recommended that the student prepare a petition for transfer credit, with multiple levels of approval, to ensure that there will be no future questions. While the petition process may seem onerous, it is only used to protect the student's interest.
- D. Transfer credit issues can also arise for current students who take one or more courses at other institutions during their academic career, e.g., study abroad programs or summer school at a local college. Current students who are planning to take courses at another institution should seek preliminary approval of the transfer credits **before** taking the courses.

Additional Advising Resources

There are many 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

The College publishes a comprehensive set of advising guides to provide students with timely and accurate information. These guides are not intended as a substitute for personal interaction between student and advisor, but can be a great way to get answers to many common questions and concerns. They are located in a wall-mounted display in the front hallway of the Engineering Center just southeast of the revolving doors. The guides include brief summaries of the curricula and requirements for individual majors in the College as well as the following advising guides and policies.

- Academic Honesty
- Academic Policies
- Academic Probation and Suspension
- Academic Success
- Admission to the College, New Transfer Students
- Advanced Placement, IB, and MAPS
- Advising Resources
- Bioengineering Options
- Engineering Certificates
- Enrollment Limited Majors
- Four Year Guarantee
- Grading Policies
- Graduate Programs
- Herbst Program of Humanities
- Humanities and Social Sciences
- Intercampus Transfer

- Intra-University Transfer (IUT) Students
- Minor Programs
- Open Option
- Transfer Credit Policy
- Undergraduate Scholarships
- Major Departments within engineering
- Change of Major Form
- Course Schedule Approval Form
- Incomplete Grade Form
- Independent Study Policy & Guidelines Form
- Minor Completion Form
- College Petition Form

The College also maintains online advising resources, including all advising guides, common forms, frequently asked questions, and links to additional campus resources. The information is available at <http://engineering.colorado.edu/students/advising.htm>

Career Counseling

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 the Center for Community (C4C) Room N352, (303) 492-6541, or you may visit their website: <http://careerservices.colorado.edu>

Counseling and Psychological Services

This multicultural center provides a variety of programs and assistance to address general academic or personal issues. They are located in C4C (Center for Community), (303-492-6766), or visit their website: <http://counseling.colorado.edu/>

Graduation Requirements

Failure to complete the requirements listed below will postpone graduation. Any exceptions will require authorization from the CEAE Operations Committee and the Dean's Office. Students should meet with the CEAE Undergraduate 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 on-line diploma card, and to keep the CEAE Undergraduate Coordinator and the Dean's Office informed of any change in graduation plans.

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

1. The satisfactory completion of the prescribed and elective work in the AREN 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 2.25 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 2.25 for all CEAE 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 (WRTG 3035, GEEN 3000, or HUEN 3100). 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 civil, environmental, or other disciplines 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, on-line
8. Obtain the recommendation of the CEAE 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 outside of engineering or 15 credits for a second degree within engineering. However, BOTH degree requirements must be completed. Minor students must provide Engineering 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 COORDINATOR, AND PETITION FOR APPROVAL OF **ANY** PROGRAM DEVIATIONS.

Engineering Science Track

For those students who have advanced placement credits, seek additional career opportunities in research and development 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 (pak@colorado.edu) or visit the CEAE website.

Additional Educational Opportunities

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

To pursue an independent study, 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 College of Engineering Advising Guide <http://engineering.colorado.edu/students/advising.htm> or the CEAE Undergraduate Coordinator.

Concurrent B.S./M.S. Program

Engineering students who plan to continue their education to obtain a graduate degree after completing the requirements for their B.S. 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 technical elective courses may be applied to the M.S. degree, subject to GPA restriction. Interested students should discuss this option with their faculty advisor and obtain additional information from the Undergraduate Coordinator or Graduate Coordinator.

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 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 in the 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, regular 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 M.S. degree rather than two undergraduate degrees.

Minors

Numerous minor opportunities exist that would satisfy Humanities/Social Science electives and/or technical electives. 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. 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. To guarantee that the courses taken abroad will count toward the AREN degree, the planned program must be approved by your faculty advisor and the Transfer Credit Evaluator.

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 (ASCE), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Associated General Contractors (AGC), Illumination Engineering Society (IES), and Engineers without Borders (EWB-CU).

CEAE Faculty

Amadei, Bernard
Professor
Geotechnical
ECOT 546, (303) 492-7734
amadei@colorado.edu

Balaji, Rajagopalan
Professor
Fluid Mechanics & Water Resources
ECOT 541, (303) 492-5968
rajagopalan.balaji@colorado.edu

Bielefeldt, Angela
Associate Professor
Environmental
ECOT 516, (303) 492-8433
angela.bielefeldt@colorado.edu

Brandemuehl, Michael
Professor
Building Systems
ECCE 246A, (303) 492-8594
michael.brandemuehl@colorado.edu

Chase, Thomas
Associate Professor
Fluid Mechanics & Water Resources
CIRES, (303) 492-1274
thomas.chase@colorado.edu

Chinowsky, Paul
Professor
Construction
ECOT 647, (303) 735-1063
paul.chinowsky@colorado.edu

Corotis, Ross
Professor
Structures & Mechanics
ECOT 452, (303) 735-0539
ross.corotis@colorado.edu

Crimaldi, John
Associate Professor
Fluid Mechanics & Water Resources
ECOT 511 (303) 735-2162
john.crimaldi@colorado.edu

Dashti, Shideh
Assistant Professor
Geotechnical
ECOT 426 (303) 492-3118
shideh.dashti@colorado.edu

Diekmann, James
Professor Emeritus
Construction
ECOT 640, (303) 492-7642
james.diekmann@colorado.edu

Dow, John
Associate Professor Emeritus
Structures & Mechanics
ECOT 642, (303) 492-8561
john.dow@colorado.edu

Gupta, Vijay
Professor
Fluid Mechanics & Water Resources
LITR 127, (303)492-3696
vijay.gupta@colorado.edu

Halek, Milan
Senior Instructor
Construction
ECOT 648, (303) 492-7007
halek@bechtel.colorado.edu

Hallowell, Matthew
Assistant Professor
Construction
ECOT 641, (303) 492-7994
matthew.hallowell@colorado.edu

Hearn, George
Associate Professor
Structures & Mechanics
ECOT 548, (303) 492-6381
george.hearn@colorado.edu

Henze, Gregor
Professor
Building Systems
ECCE 242, (303) 492-1094
gregor.henze@colorado.edu

Hernandez, Mark
Professor
Environmental
ECOT 515, (303) 492-5991
mark.hernandez@colorado.edu

Javernick-Will, Amy
Assistant Professor
Construction
ECOT 423, (303) 492-6769
amy.javernick@colorado.edu

Krarti, Moncef
Professor
Building Systems
ECCE 246B, (303) 492-3389
moncef.krarti@colorado.edu

Liel, Abbie
Assistant Professor
Structures & Mechanics
ECOT 426, (303) 492-1050
abbie.liel@colorado.edu

Linden, Karl
Professor
Environmental
ECOT 542, (303) 492-4798
karl.linden@colorado.edu

McCartney, John
Assistant Professor
Geotechnical
ECOT 541, (303) 492-0470
john.mccartney@colorado.edu

McKnight, Diane
Professor
Environmental
ECOT 543/RL 1-118, (303) 492-4687
diane.mcknight@colorado.edu

Molenaar, Keith
Professor and Chair
Construction
ECOT 643, (303) 735-4276
keith.molenaar@colorado.edu

Montoya, Lupita
Assistant Professor
Environmental
ECOT 514, (303) 492-7137
lupita.montoya@colorado.edu

Neupauer, Roseanna
Associate Professor
Fluid Mechanics & Water Resources
ECOT 513, (303) 492-6274
roseanna.neupauer@colorado.edu

Pak, Ronald
Professor
Geotechnical
ECOT 423, (303) 492-8613
pak@colorado.edu

Pfeffer, Tad
Professor
Geotechnical
ECOT 412, (303) 735-2062
pfeffer@colorado.edu

Porter, Keith
Associate Research Professor
Structures & Mechanics
ECOT 41, (303) 492-2732
keith.porter@colorado.edu

Rajaram, Harihar
Professor
Fluid Mechanics & Water Resources
ECOT 514, (303) 492-6604
hari@colorado.edu

Regueiro, Richard
Assistant Professor
Geotechnical
ECOT 424, (303) 492-8026
regueiro@colorado.edu

Rosario-Ortiz, Fernando
Assistant Professor
Environmental
ECOT 512, (303) 492-7607
fernando.rosario@colorado.edu

Ryan, Joseph
Professor
Environmental
ECOT 517, (303) 492-0772
joseph.ryan@colorado.edu

Saouma, Victor
Professor
Structures & Mechanics
ECOT 427, (303) 4921622
victor.saouma@colorado.edu

Silverstein, JoAnn
Professor
Environmental
ECOT 444, (303) 492-7211
joann.silverstein@colorado.edu

Sivaselvan, Mettupalayam
Assistant Professor
Structures & Mechanics
ECOT 431, (303) 735-0925
siva@colorado.edu

Strzepek, Kenneth
Professor Emeritus
Fluid Mechanics & Water Resources
ECOT 549, (303) 492-7111
strzepek@spot.colorado.edu

Sture, Stein
Professor & Vice Chancellor-Research
Geotechnical
Regent 333, (303) 492-2890
stein.sture@colorado.edu

Summers, R. Scott
Professor
Environmental
ECOT 540, (303) 492-6644
summersr@colorado.edu

Vásconez, Sandra
Senior Instructor
Building Systems
ECCE 244, (303) 492-7614
sandra.vasconez@colorado.edu

Vernerey, Franck
Assistant Professor
Structures & Mechanics
ECOT 422, (303) 492-7165
franck.vernerey@colorado.edu

Xi, Yunping
Professor
Structures & Mechanics
ECOT 547, (303) 492-8991
yunping.xi@colorado.edu

Zagona, Edith
Research Professor
Fluid Mechanics & Water Resources
CINC 110, (303) 492-2189
zagona@colorado.edu

Zhai, John
Associate Professor
Building Systems
ECOT 247, (303) 492-4699
john.zhai@colorado.edu

Znidarcic, Dobroslav
Professor
Geotechnical
ECOT 649, (303) 492-7577
dobroslav.znidarcic@colorado.edu

CEAE Staff

Araceli Warren
Office Manager
ECOT 440, (303) 492-7427
araceli.warren@colorado.edu

Medford Moorer
Graduate Coordinator
ECOT 449, (303) 492-7316
medford.moorer@colorado.edu

Erin Jerick
Web, Scheduling
ECOT 425, (303) 492-4804
erin.jerick@colorado.edu

Wayne Morrison
Accounting Technician
ECOT 427, (303) 492-8518
wayne.morrison@colorado.edu

LeeAnn Stevens
Administrative Assistant
ECOT 441, (303) 492-6382
leeann.stevens@colorado.edu

Christina Vallejos
Undergraduate Coordinator
ECOT 447, (303) 492-4193
christina.vallejos@colorado.edu

Architectural Engineering Block Diagram

Sem	Credits						
8	17	Technical Elective-3 [Lab]	Technical Elective-3		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	Technical Elective-3	Technical Elective-3		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRTG 3030-3 Writing on Science and Society (Jr. standing)
6	15		Technical Elective-3	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #
5	15		AREN 4550-3 Illumination 2 (AREN 3540) #	AREN 3010-3 Mechanical Systems for Buildings (AREN 2050 AREN 2120) #	ECEN 3030-3 Electrical / Electronic Circuits for Non-majors (APPM 2350) #	CVEN 3525-3 Structural Analysis (CVEN 3161)	CVEN 3246-3 Introduction to Construction (Jr level or Instr Consent)
4	16	APPM 2360-4 Introduction to Differential Equations with Linear Algebra (APPM 1360 or MATH 2300)	AREN 3540-3 Illumination 1 (GEEN 1300) #	AREN 2120-3 Fluid Mech and Heat Transfer (AREN 2110 co-req APPM 2360) #	AREN 2050-3 Engineering Systems for Buildings (AREN 1027 AREN 2406) #	CVEN 3161-3 Mechanics of Materials 1 (CVEN 2121 co-req APPM 2360)	
3	17	APPM 2350-4 Calculus 3 for Engineers (APPM 1360 or MATH 2300)	PHYS 1120-4 General Physics 2 (PHYS 1110 co-req APPM 1360 or MATH 2300)	AREN 2110-3 Thermodynamics (APPM 1360, PHYS 1110) #		CVEN 2121-3 Analytical Mechanics 1 (PHYS 1110 co-req APPM 2350)	AREN 2406-3 Introduction to Building Construction (Soph level or Instr Consent)
2	17	APPM 1360-4 Calculus 2 for Engineers (APPM 1350 or MATH 1300)	PHYS 1110-4 General Physics 1 (co-req APPM 1350 or MATH 1300)		CVEN 2012-3 Introduction to Geomatics (APPM 1350)	GEEN 1300-3 Engineering Computing	Soc-Hum Elective-3
1	16	APPM 1350-4 Calculus 1 for Engineers (2 yr HS Alg., 1 yr Geom., ½ yr Trig. or approved by faculty advisor)	CHEN 1211-3 General Chemistry for Engineers* (1 yr HS chem or CHEM 1001 or CHEM 1021 and HS alg., co-req CHEM 1221)	CHEM 1221-2 Engineering General Chemistry Lab*	AREN 1316-1 Introduction to Architectural Engineering #	AREN 1027-3 Engineering Drawing	Soc-Hum Elective-3

	General science		Social-Humanities		Electrical/Lighting
	General engineering		Structures		Construction
	Arch and drawing		Mechanical		Technical elective

Course is offered only in the semester shown (fall or spring)

() Prerequisite and co-requisite requirements for course listed

* CHEM 1211 and CHEN 1221 must be taken concurrently

** CVEN 4545 offered spring semester only; CVEN 4555 offered fall semester only

++ Other prerequisites: AREN 2406, AREN 3010, AREN 3540, AREN 4570 (co-req), CVEN 3246, CVEN 3525

Structural Systems Track Conventional

Sem	Credits						
8	17	CVEN 3718-3 Geotechnical Engineering 2 (CVEN 3708) <i>or</i> CVEN 4161-3 Mechanics of Materials 2 (CVEN 3161) [Lab]	Technical Elective-3		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	CVEN 4555-3 Reinforced Concrete Design (CVEN 3525) #	Technical Elective-3		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRTG 3030-3 Writing on Science and Society (Jr. standing)
6	15		CVEN 3708-3 Geotechnical Engineering 1 (CVEN 3161)	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 Steel Design (CVEN 3525) #	AREN 4420-3 Cost Engineering (CVEN 3246) #

Note that both CVEN 4545 and CVEN 4555 are required

Suggested electives include: CVEN 3111 Analytical Mechanics 2, CVEN 4525 Frames Structures, CVEN 4315 Design of Masonry Structures, CVEN 4565 Design of Timber Structures, CVEN 4728 Foundation Engineering

Mechanical Systems Track Conventional

Sem	Credits						
8	17	AREN 3130-3 Building Energy Laboratory (AREN 3010) [Lab]	Technical Elective-3		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	Technical Elective-3	Technical Elective-3		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRTG 3030-3 Writing on Science and Society (Jr. standing)
6	15		AREN 4010-3 HVAC System Controls (co-req AREN 4110) ++	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

++ Note that AREN 4010 HVAC System Controls is offered in the spring semester every two years.

Suggested technical electives include: AREN 4580 Daylighting, CVEN 5020 Building Energy Audits, CVEN 5050 Advances Solar Design, CVEN 5080 Computer Simulation of Building Energy Systems, CVEN 5830 SpTpc: Sustainable Building Design, CVEN 4147 Civil Engineering Systems

Electrical/Lighting Systems Track Conventional

Sem	Credits						
8	17	AREN 3130-3 Building Energy Laboratory (AREN 3010) [Lab]	Technical Elective-3		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	AREN 4580-3 Daylighting (AREN 3540) #	Technical Elective-3		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRWG 3030-3 Writing on Science and Society (Jr. standing)
6	15		Technical Elective-3	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

Suggested technical electives include: AREN 4830 SpTpc: Luminaire Design, AREN 4830 SpTpc: Sustainable Lighting Workshop, AREN 4830 SpTpc: Advanced Lighting Design, PSYC 4165 Psychology of Perception, THTR 3055 Stage Lighting Design 1

Construction Engineering and Management Track Conventional

Sem	Credits						
8	17	CVEN 3718-3 or CVEN 4161-3 or AREN 3130-3 [Lab]	Technical Elective-3		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	CVEN 4087-3 Engineering Contracts (Sr standing or Instr Consent) #	AREN 4466-3 Construction Planning & Scheduling (AREN 4420) #		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRWG 3030-3 Writing on Science and Society (Jr. standing)
6	15		CVEN 3708-3 Geotechnical Engineering 1 (CVEN 3161)	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

Lab electives include CVEN 3718 Geotechnical Engineering 2, CVEN 4161 Mechanics of Materials 2, and AREN 3130 Building Energy Laboratory.

Structural Systems Track Engineering Science Option

Sem	Credits						
8	17	CVEN 3718-3 Geotechnical Engineering 2 (CVEN 3708) <i>or</i> CVEN 4161-3 Mechanics of Materials 2 (CVEN 3161) [Lab]	APPM 4120-3 Operations Research <i>or</i> CVEN 4537-3 Numerical Methods		AREN 4317-5 AREN Design (ARCH 4010; others ⁺⁺) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	CVEN 4555-3 Reinforced Concrete Design (CVEN 3525) #	APPM 4350-3 Methods in Applied Math <i>or</i> equiv.		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRTG 3030-3 Writing on Science and Society (Jr. standing)
6	15		CVEN 3708-3 Geotechnical Engineering 1 (CVEN 3161)	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 Steel Design (CVEN 3525) #	AREN 4420-3 Cost Engineering (CVEN 3246) #

Note that both CVEN 4545 and CVEN 4555 are required

Suggested electives include: CVEN 3111 Analytical Mechanics 2, CVEN 4525 Frames Structures, CVEN 4315 Design of Masonry Structures, CVEN 4565 Design of Timber Structures, CVEN 4728 Foundation Engineering

Mechanical Systems Track Engineering Science Option

Sem	Credits						
8	17	AREN 3130-3 Building Energy Laboratory (AREN 3010) [Lab]	APPM 4120-3 Operations Research <i>or</i> CVEN 4537-3 Numerical Methods		AREN 4317-5 AREN Design (ARCH 4010; others ⁺⁺) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	Technical Elective-3	APPM 4350-3 Methods in Applied Math <i>or</i> equiv.		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRTG 3030-3 Writing on Science and Society (Jr. standing)
6	15		AREN 4010-3 HVAC System Controls (co-req AREN 4110) ++	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 <i>or</i> CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

++ Note that AREN 4010 HVAC System Controls is offered in the spring semester every two years.

Suggested technical electives include: AREN 4580 Daylighting, CVEN 5020 Building Energy Audits, CVEN 5050 Advances Solar Design, CVEN 5080 Computer Simulation of Building Energy Systems, CVEN 5830 SpTpc: Sustainable Building Design, CVEN 4147 Civil Engineering Systems

Electrical/Lighting Systems Track Engineering Science Option

Sem	Credits						
8	17	AREN 3130-3 Building Energy Laboratory (AREN 3010) [Lab]	APPM 4120-3 Operations Research or CVEN 4537-3 Numerical Methods		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	AREN 4580-3 Daylighting (AREN 3540) #	APPM 4350-3 Methods in Applied Math or equiv.		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRWG 3030-3 Writing on Science and Society (Jr. standing)
6	15		Technical Elective-3	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

Suggested technical electives include: AREN 4830 SpTpc: Luminaire Design, AREN 4830 SpTpc: Sustainable Lighting Workshop, AREN 4830 SpTpc: Advanced Lighting Design, PSYC 4165 Psychology of Perception, THTR 3055 Stage Lighting Design 1

Construction Engineering and Management Track Engineering Science Option

Sem	Credits						
8	17	CVEN 3718-3 or CVEN 4161-3 or AREN 3130-3 [Lab]	APPM 4120-3 Operations Research or CVEN 4537-3 Numerical Methods		AREN 4317-5 AREN Design (ARCH 4010; others**) #	ARCH 3214-3 History and Theories of Architecture 2	Soc-Hum Elective-3
7	15	CVEN 4087-3 Engineering Contracts (Sr standing or Instr Consent) #	APPM 4350-3 Methods in Applied Math or equiv.		ARCH 4010-3 Architectural Design (Open to AREN Sr's only) #	ARCH 3114-3 History and Theories of Architecture 1	WRWG 3030-3 Writing on Science and Society (Jr. standing)
6	15		CVEN 3708-3 Geotechnical Engineering 1 (CVEN 3161)	AREN 4110-3 HVAC Design 1 (AREN 3010) #	AREN 4570-3 Building Electrical System Design 1 (ECEN 3030) #	CVEN 4545-3 or CVEN 4555-3 Structural Design (CVEN 3525) **	AREN 4420-3 Cost Engineering (CVEN 3246) #

Lab electives include CVEN 3718 Geotechnical Engineering 2, CVEN 4161 Mechanics of Materials 2, and AREN 3130 Building Energy Laboratory.

Architectural Engineering Graduation Planner Conventional

Student: _____
SID: _____

Advisor: _____
Transfer Credit Approval: _____

Expected Date of Graduation: _____

Mathematics (16)

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

Basic Science (13)

CHEN 1211-3 _____
CHEM 1221-2 _____
PHYS 1110-4 _____
PHYS 1120-4 _____

Humanities and Social Science (9)

ARCH 3114-3 _____
ARCH 3214-3 _____
WRTG 3030-3 _____

H&SS Electives (9)

Core Courses (66)

AREN 1316-1 _____
AREN 1027-3 _____
AREN 2110-3 _____
AREN 2120-3 _____
AREN 2050-3 _____
AREN 2406-3 _____
AREN 3010-3 _____
AREN 3540-3 _____
AREN 4110-3 _____
AREN 4420-3 _____
AREN 4317-5 _____
AREN 4550-3 _____
AREN 4570-3 _____
CVEN 2012-3 _____
CVEN 2120-3 _____
CVEN 3161-3 _____
CVEN 3246-3 _____
CVEN 3525-3 _____
CVEN 4545-3 or _____
CVEN 4555-3 _____
ARCH 4010-3 _____
ECEN 3030-3 _____
GEEN 1300-3 _____

Technical Electives (15)

Lab _____

Specialization Track (check one)

- Electrical/Lighting
- Mechanical
- Structural
- Construction

Total Credits: 128

Architectural Engineering Graduation Planner Engineering Science Option

Student: _____
SID: _____

Advisor: _____
Transfer Credit Approval: _____

Expected Date of Graduation: _____

Mathematics (16)

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

Basic Science (13)

CHEN 1211-3 _____
CHEM 1221-2 _____
PHYS 1110-4 _____
PHYS 1120-4 _____

Humanities and Social Science (9)

ARCH 3114-3 _____
ARCH 3214-3 _____
WRTG 3030-3 _____

H&SS Electives (9)

Core Courses (66)

AREN 1316-1 _____
AREN 1027-3 _____
AREN 2110-3 _____
AREN 2120-3 _____
AREN 2050-3 _____
AREN 2406-3 _____
AREN 3010-3 _____
AREN 3540-3 _____
AREN 4110-3 _____
AREN 4420-3 _____
AREN 4317-5 _____
AREN 4550-3 _____
AREN 4570-3 _____
CVEN 2012-3 _____
CVEN 2120-3 _____
CVEN 3161-3 _____
CVEN 3246-3 _____
CVEN 3525-3 _____
CVEN 4545-3 or _____
CVEN 4555-3 _____
ARCH 4010-3 _____
ECEN 3030-3 _____
GEEN 1300-3 _____

Technical Electives (9)

Lab _____

Engineering Science (6)

APPM 4350-3 _____
APPM 4120-3 or _____
CVEN 4537-3 _____

Specialization Track (check one)

- Electrical/Lighting
- Mechanical
- Structural
- Construction

Total Credits: 128