



Civil, Environmental and Architectural Engineering

UNIVERSITY OF COLORADO **BOULDER**

Undergraduate Advising Guide for Civil Engineering



Civil, Environmental, and Architectural Engineering

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Contents

| | |
|--|----|
| Introduction | 1 |
| Mission Statement | 1 |
| Program Educational Objectives | 1 |
| Student Outcomes | 2 |
| Accreditation and Assessment | 2 |
| Employment Opportunities for Civil Engineering Graduates | 3 |
| Advising..... | 3 |
| Math Placement | 4 |
| Transfer Procedures..... | 4 |
| Additional Advising Resources | 4 |
| College of Engineering Advising Guides | 4 |
| Resources & Support | 5 |
| Graduation Requirements..... | 5 |
| Grades and Prerequisites/Co-requisites | 6 |
| CVEN Technical Elective Requirements | 6 |
| CVEN Free Elective Requirements | 6 |
| CVEN Basic Engineering Elective Requirements | 6 |
| Engineering Science Track..... | 7 |
| Double Degree in Civil Engineering and Applied Mathematics | 7 |
| Student Enrichment | 7 |
| Internships..... | 8 |
| Learning Through Service..... | 8 |
| Study Abroad | 8 |
| Undergraduate Research and Independent Study | 9 |
| Additional Educational Opportunities | 10 |
| Bachelor's–Accelerated Master's Degree Programs | 10 |
| Engineering For Developing Communities Track | 11 |
| Minors and Certificates | 11 |
| Double Degrees | 11 |
| Semester at Sea | 12 |
| Student Organizations | 12 |
| CEAE Policy on Academic Integrity..... | 13 |
| FALL 2019 CVEN BLOCK DIAGRAM | 14 |
| Fall 2019 Modified CVEN BLOCK DIAGRAM with Pre-Calculus | 16 |
| GRADUATION PLANNER | 21 |
| Appendix: Suggested Course Plans..... | 22 |

Introduction

The purpose of this guide is to assist undergraduate students majoring in Civil Engineering (CVEN) 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 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 Civil Engineering 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 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; and proficiency in three of the following five areas: construction, environmental, geotechnical, structural, and water resources engineering; 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), a streamlined 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.

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 program objectives for the Bachelor of Science degree in Civil Engineering are that within five years:

Graduates will be successfully employed in engineering, science, or technology careers

Graduates will be assuming management or leadership roles

Graduates will engage in continual learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, and/or participation in professional societies

Graduates will pursue professional registration or other appropriate certifications

Graduates will be engaged in activities that provide benefit to communities

Student Outcomes

The outcomes that students are expected to have attained upon graduation with a bachelor of science degree in civil engineering are:

1. identify, formulate, solve complex engineering problems by applying principles of engineering, science, and math
2. apply engineering design to produce solutions that meet specific needs with consideration of public health, safety, and welfare, global, cultural, social, environmental, and economic factors
3. communicate effectively with a range of audiences
4. recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, meet objectives
6. develop and conduct appropriate experimentation, analyze & interpret data, use engineering judgment to draw conclusions
7. acquire and apply new knowledge as needed, using appropriate learning strategies

Accreditation and Assessment

The CVEN curriculum 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 stated outcomes and 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 CU at the end of every semester.

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 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 send you a survey five years after graduation to evaluate if we met the program educational objectives.

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 are 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, students have access to both faculty and staff advisors. The department's Undergraduate Coordinator can also assist you with many questions about the curriculum.

It is the individual student's responsibility to secure the approval of her/his advisor for the course of study for each semester. First- and second-year students meet with the Undergraduate Advisor, while third-year students and above meet with their faculty advisors. This activity occurs during the advising period, of which notification will be sent by email each semester. After the advising session, the 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.

There are a number of decisions to be made concerning choice of technical elective courses. These decisions should be made in close consultation with the academic advisors 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 advisors. 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.

A listing of CEAE faculty and staff with contact information can be found at <http://ceae.colorado.edu/faculty-staff/>. 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.

Not all courses are offered every semester. Those that are offered only once per year are marked on the block diagrams.

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.

If problems arise, the following steps are suggested:

See CEAE Undergraduate Advisor.

See the Associate Chair for Undergraduate Education.

Contact the Assistant Dean for Students (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>.

Math Placement

Incoming freshmen are placed in their first math course based on their math assessment. Students who do not start in Calculus 1 their first semester will not be able to follow the standard CVEN block diagram, as they will not have the prerequisites to take all courses in the semesters shown. These students are encouraged to complete APPM 1360 Calculus 2 for Engineers during the summer session after their freshman year in order to get back on the standard block diagram.

Students who cannot take APPM 1360 during the summer session should see the Undergraduate Coordinator for a CVEN Modified Block Diagram. While students following the modified plan may still be able to graduate in four years, please note that the four-year guarantee does not apply. The department will make every effort to avoid course conflicts for students following the modified block diagram, but cannot guarantee that students will never encounter conflicts.

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://www.colorado.edu/admissions/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. Contact the civil advisor for the name and email address of the CEAE Transfer Faculty Advisor. The following recommendations are required:

It is the student's responsibility to ensure transfer credits have been evaluated and approved by the C E A E Department.

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 listed in the student online degree audit, Transfer Evaluation.

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's used only to protect the student's interest.

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. Use the Tool Transferology at <https://www.transferology.com/school/colorado> to create an account and search for equivalent courses at other institutions.

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. The advising 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. Brief summaries of the curricula and requirements for individual majors in the College can be found at www.colorado.edu/engineering/academics along with the following advising guides:

Guide to Degree Programs, Minors & Certificates
Enriching Your Experience
Online Learning
Summer Session
Graduation Ceremonies

The following College and University policies can also be found on the College website at www.colorado.edu/engineering/advising:

Academic Honesty
Academic Policies
Academic Probation and Suspension
Confirming Your Major
Four-Year Graduation Guarantee and Flexible First Year
Grading Policies
Graduation Requirements
Humanities, Social Sciences and Writing

Resources & Support

Academic Support & Tutoring, Campus Resources, Engineering Ambassadors, Meet with Faculty, Tips for Success

Utilizing resources to support your academic and personal success is an important part of your student experience. You are encouraged to take advantage of college resources such as the Engineering Ambassador peer advisors, Engineering Career Services, Student Success Center tutoring in the BOLD Center, along with campus resources such as workshops on time management, exam preparation, and managing stress offered through the Student Academic Success Center (SASC) and Counseling and Psychiatric Services (CAPS). Reach out and make the most of your student journey!

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 apply for graduation online, and to keep the CEAE Undergraduate 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:

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.

A minimum cumulative grade point average of 2.250 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.)

A minimum cumulative grade point average of 2.250 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.

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

Successful completion of WRTG 3030, Writing on Science and Society or an approved alternate writing course (HUEN 1010, HUEN 3100, WRTG 3035, or PHYS 3050). Any other exceptions to the WRTG 3030 requirement must be approved via petition by the Assistant Dean for Students.

Completion of the Fundamentals of Engineering (FE) Examination during the student's senior year. 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.

Submission of a completed Application for Diploma, online.

Obtain the recommendation of the CEAE faculty.

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 the Undergraduate Coordinator 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.

Grades and Prerequisites/Co-requisites

The minimum passing grade for prerequisite and co-requisite courses is C-. The minimum passing grade for all other courses is D-. Pass/fail courses do not count toward graduation. Students must petition to take a course pass/fail or for no credit.

All prerequisite/co-requisite waivers, including those for required courses taken in other departments, must be petitioned and approved by the course instructor, the CEAE Department, and the Assistant Dean for Students.

CVEN Technical Elective Requirements

A technical elective is generally a course in engineering or science with technical content, selected in consultation with a faculty advisor at the upper (3000+) level.

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.

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.

A list of potential technical electives for CEAE students can be found at www.colorado.edu/ceae/current-students/undergraduate-studies

CVEN Free Elective Requirements

A free elective is generally any college-level course. Free electives cannot be remedial courses needed to fulfill deficiencies (algebra, trigonometry, precalculus, introductory chemistry/physics, etc. may not be used), and cannot be similar to courses used toward graduation requirements (non-calculus-based physics, etc. may not be used).

CVEN Basic Engineering Elective Requirements

Students who could not fit GEEN 1400-Engineering Projects in their First Year, may substitute any 3-credit technical course given in the engineering college with a designator ASEN, AREN, APPM, CHEN, COEN, CVEN, CSCI, ECEN, EVEN, GEEN, or MCEN; or any other course approved by the CEAE Curriculum Committee. Remedial courses or courses approved as HSS electives may not be used.

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.

Double Degree in Civil Engineering and Applied Mathematics

For students who are interested in civil engineering science, applied mathematics, and their close relationship, a special dual BS 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 Anne Dougherty (anne.dougherty@colorado.edu) in Applied Mathematics for more details and consultation.

The minimum passing grade for prerequisite and co-requisite courses is C-. The minimum passing grade for all other courses is D-.

Pass/fail courses do not count toward graduation. Students must petition to take a course pass/fail or for no credit. All prerequisite/co-requisite waivers, including those for required courses taken in other departments, must be petitioned and approved by the course instructor, the CEAE Department, and the Assistant Dean for Students.

A technical elective is generally a course in engineering or science with technical content, selected in consultation with a faculty advisor at the upper (3000+) level. Courses listed as Concentrations in this guide are examples of technical electives. 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. 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.

A free elective is generally any college-level course. Free electives cannot be remedial courses needed to fulfill deficiencies (algebra, trigonometry, precalculus, introductory chemistry/physics, etc.), and cannot be similar to courses used toward graduation requirements (non-calculus-based physics, etc.).

Student Enrichment

The Department of Civil, Environmental and Architectural Engineering strives to develop holistic engineers – it's what sets us apart from our more than 140 peer departments across the U.S. The purpose of the Student Enrichment and Internship Program is to give EVERY student the chance to participate in activities that give them a complete educational experience. By 2018, our goal is to have 95% of our undergraduates take part in at least one enrichment opportunity:

Internship with an owner, engineering firm or contractor.

Research opportunity with one of our more than 35 faculty members across 13 disciplines.

Service-learning experience, such as Bridges to Prosperity or Engineers Without Borders.

Studying abroad through the Office of International Education.

For more information about student enrichment, visit <http://www.colorado.edu/ceae/enrichment>.

Internships

Corporate internships give students the opportunity to practice their professional engineering skills and contribute to their community. Plus, it helps them make connections that will be invaluable as they enter the workforce.

We believe a successful internship allows a student to:

- Perform the job responsibilities of the position
- Develop professional competencies
- Build a meaningful work experience
- Positively contribute to the employer's business objectives

Information about the CEAE Internship Program and CEAE career fairs is available at <http://www.colorado.edu/ceae/internships>.

Learning Through Service

Engineers Without Borders has been an incredible opportunity for me to become integrally involved in something that I hope my future career will resemble. From the development work to the hands-on engineering experience, leadership opportunities to interactions with professionals in the field, I have loved being apart of EWB and everything we do!" - Nikki van den Heever, civil engineering major, minor in leadership

We don't just provide service learning opportunities for students – we pioneer them. Professor Bernard Amadei is the founder of Engineers without Borders - USA, and alumna Avery Bang (MCivEngr'09) is CEO of Bridges to Prosperity.

To get involved with one of our service-learning groups, please visit the following: Engineers without Borders - <http://www.colorado.edu/engineering/ewb>

Bridges to Prosperity Student Chapter - <https://www.facebook.com/CUB2P>

Study Abroad

Study abroad, usually taken in the junior year, can be an enriching experience. The largest engineering firms earn 50 - 75 percent of their income from international projects, and it's not unusual for projects to involve teams from around the globe. Studying abroad gives you a worldview that will open up new career opportunities and make you a true citizen of the world.

Information about this unique opportunity can be obtained from the Office of International Education, Center for Community (C4C) Suite S355, (303) 492-7741, <http://studyabroad.colorado.edu/>.

A Civil Engineering Study Abroad Guide is also available at <http://www.colorado.edu/ceae/enrichment/study-abroad>

Students interested in studying abroad for a semester (or longer) should start the planning process as soon as possible – the study abroad guide is intended to assist in this process. However, students should also consult with their academic advisor and the Study Abroad Office early and often during the planning process. Courses must be pre-approved by the CEAE Study Abroad Advisor to guarantee that they will count toward the AREN degree.

Many summer study abroad opportunities are also available for students not able to spend an entire semester overseas.

Undergraduate Research and Independent Study

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 an inquisitive setting to enhance their educational experience by engaging in guided or independent research. 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. Those in the Engineering Science Track are particularly encouraged to participate in such undergraduate research activities. Visit <http://www.colorado.edu/ceae/enrichment/undergraduate-research>

At CU-Boulder, research opportunities are not limited to graduate students. We encourage undergraduate students to engage with faculty members in their research projects through two programs:

Discovery Learning Apprenticeship Program

Pairs undergrad students with faculty for a paid, year-long research experience.

Student applications (with resume and cover letter for min GPA of 3.0) accepted through end of April for following academic year.

For a list of current projects in CEAE, visit engineering.colorado.edu/surveys/dla/dlafaclisting.aspx.

Independent Study

Earn academic credit outside the normal class structure under the individual direction of a faculty member

Undergraduate Research Opportunities Program

Campus-wide program funds undergraduate research and scholarly work with several types of grants.

Projects are partnerships between faculty and undergraduates.

Additional opportunities available at NIST and through other outside programs.

YOU'RE@CU Research

BOLD Center program links undergraduates with graduate students in their majors for research opportunities.

Work with a graduate mentor for 3-5 hours per week and participate in a weekly seminar class for pass/fail credit.

Additional Educational Opportunities

Bachelor's–Accelerated Master's Degree Programs

The Bachelor's–Accelerated Master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first, but begin taking graduate coursework as undergraduates (typically in their senior year). Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

Our Programs:

- BS in Architectural Engineering, MS in Architectural Engineering or Civil Engineering
- BS in Civil Engineering, MS in Architectural Engineering or Civil Engineering
- BS in Environmental Engineering, MS in Civil Engineering.

Admissions Requirements

In order to gain admission to the BAM programs named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.250 or higher
- Have no MAPS deficiencies
- Have at least junior class standing

Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

NOTE: Students who were admitted prior to July 2019 follow a concurrent Bachelor's/Master's structure (see below), and the two degrees are awarded simultaneously when requirements for both degrees are met.

Applying to the BAM Program

- Eligible students may apply for the BAM program by completing the "[BAM Intent Form](#)"
 - **Required Supporting Documents** (please upload under "Upload supporting documents required by Department" when completing the BAM Intent Form)
1. A [one-page statement of purpose](#) describing your academic/career goals and interests in pursuing a BAM program.
 2. A copy of your unofficial undergraduate transcript (available on MyCUInfo)

Graduation forms for BAM students

- [Master's Continuation Form](#) - submit this form during your last semester of your undergraduate degree.

Questions?

Undergraduate students should contact their [academic advisor](#) (for the BS program) to learn more about BAM programs offered with their particular undergraduate degree program. Students are also welcome to contact the relevant [graduate program advisor](#) (for the MS program) to learn more about the master's program and to determine their eligibility for admission to the BAM program.

More information about BAM programs, policies, and forms may be found on the [Registrar's Office website](#) as well as the Graduate School's website.

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 EDU Faculty, Carlo Salvinelli at carlo.salvinelli@colorado.edu, or Director, Evan Thomas at evan.thomas@colorado.edu or visit the department website.

Minors and Certificates

Numerous minor and certificate opportunities exist that would satisfy humanities/social science electives, technical electives, and/or free electives. Many require little additional course work beyond the minimum BS requirements. For more information on minor opportunities and requirements, visit:

Arts & Sciences minors: <https://www.colorado.edu/artssciences-advising/>

Engineering Degree, Certificates & Minors: <http://www.colorado.edu/engineering/academics/guide-degrees-certificates>

Environmental Design (Architecture) Minor: <https://www.colorado.edu/envd/environmental-design-cu-boulder>

Business Minor: <http://www.colorado.edu/leeds/minor-business#overview>

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. If both bachelor's degrees are in the College of Engineering and Applied Science, a minimum of 143 credits are required (128 + 15). Another exception is the pioneering dual CVEN-APPM degree program described earlier, which is a special opportunity for research- and analytically-inclined students or those who seek a broader career horizon.

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 an MS degree rather than two undergraduate degrees.

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, Center for Community (C4C) Suite S355, (303) 492-6016.

Student Organizations

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), Association of General Contractors (AGC), Illumination Engineering Society (IES), and Engineers without Borders (EWB-CU).

CEAE students can also participate in engineering-related organizations. There is always something to do on campus, so get out there and get involved! View link <http://www.colorado.edu/ceae/student-enrichment/student-organizations>.

CEAE Policy on Academic Integrity

The Department of Civil, Environmental, and Architectural Engineering (CEAE) requires all students to adhere to a strict policy of academic integrity. These expectations are in accordance with the University of Colorado Boulder Honor Code (<http://www.colorado.edu/honorcode/>), but this policy is intended to provide more specific guidelines for all undergraduate and graduate students in CEAE. Ethical behavior in college sets the stage for a lifetime of professional and ethical behavior that is expected of all engineering professionals. This policy describes the academic sanctions that will be imposed by CEAE faculty members. Faculty retain the right to set academic sanctions, and if they choose individual courses can deviate from the expectations stated below; these changes will be noted in the course syllabus. All incidents of academic misconduct will be reported to the Honor Code Council. Non-academic sanctions are the purview of the Honor Code Council.

Any activity that could give you an unfair advantage over other students may be cheating. Specific examples of actions that are considered to be cheating and therefore violations of academic integrity:

Plagiarizing a homework, lab report, or problem set. On assignments that require you to use supplemental materials, you must properly document the sources of information that you used. If you are uncertain about allowable reference materials or how to document your sources, ask your instructor in advance. Specific examples of plagiarism include:

copying from a solution manual copying from Internet sites

copying from previous semester's homework set or lab report copying directly from classmates

copying lab data that you yourself did not participate in collecting

Plagiarizing content in a paper, report, thesis, or dissertation, by copying material from a published sources or the internet, without appropriate citation format and attribution

Using unapproved information during a closed-book test or quiz (such as a reference sheet, information stored in a calculator, iPhone, information written on your skin)

Copying from another student during a quiz, exam, or test Working in groups on web based quizzes, exams, or tests

Working in groups on take-home quizzes, exams, or tests

Asking another student about questions on an exam that you have not yet taken

Changing the answer on your test/homework after it was graded and then telling the instructor that there was a grading mistake

Allowing another student to copy your homework, lab report, or allowing another student to look at your answers during a quiz or exam

The list above is not exhaustive; other violations are possible

Any violation will be reported to the Honor Code Council.

Any first violation of academic integrity on graded course activities (i.e. homework, lab reports, and exams) will result in a minimum sanction of a zero score and an entry in your department file. Instructors can increase these penalties to assigning a failing grade (F) for the entire course. The department will retain a list of all instances of academic integrity violations. Additional sanctions will be imposed for subsequent violations.

| SEM | CR | FALL 2019 CVEN BLOCK DIAGRAM | | | | | |
|----------------------------------|----|---|--|---|---|--|--|
| 8 TH SEM (SPR) | 16 | CVEN 4899-4 Senior Design Project (Senior standing) # | Technical Elective-3 | Technical Elective-3 | Proficiency III CVEN XXXX-3 | | S-H Elective-3 (upper-level) |
| 7 TH SEM (FALL) | 17 | CVEN 4897-2 Professional Issues # | CEAE Technical Elective-3 | CEAE Technical Elective-3 | Proficiency II CVEN XXXX-3 | FREE ELECTIVE-3 | S-H Elective-3 (upper-level) |
| 6 TH SEM (SPR) | 15 | CVEN 3227-3 Probability Statistic & Decision for Civil Engrs. (JR/SRs) # | CVEN 3111-3 Analytical Mechanics II (CVEN 2121, co-req APPM 2360) # | Proficiency I CVEN XXXX-3 | | S-H Elective-3 | WRITG 3030-3 Writing on Science & Society (JR standing) |
| 5 TH SEM (FALL) | 15 | CVEN 3246-3 Intro. To Construction (JR or instructor consent) | CVEN 3323-3 Hydraulic Engineering (CVEN 3313) # | CVEN 3525-3 Structural Analysis (CVEN 3161) | CVEN 3414-3 Fund. of Env. Engr. (CHEN 1211, APPM 1360) | CVEN 3708-3 Geotechnical Engineering I (CVEN 3161) | |
| 4 TH SEM (SPR) | 16 | APPM 2360-4 Introduction to Linear Algebra & Diff. Eq. (APPM 1360) | CVEN 3313-3 Theoretical Fluid Mechanics (CVEN 2121) # | CVEN 3161-3 Mechanics of Materials I (CVEN 2121, co-req APPM 2360) | AREN 2110-3 Thermodynamics (PHYS 1110, co-req APPM 1360) | CVEN 3698-3 Engineering Geology or other Basic Science elective # *** | |
| 3 RD SEM (FALL) | 18 | APPM 2350-4 Calculus III for Engineers (APPM 1360) | PHYS 1120-4 PHYS 1140-1 Gen.Phys/Lab (PHYS 1110, co-req APPM 1360) | CVEN 2121-3 Analytical Mechanics I (PHYS 1110, co-req APPM 2350) % | CVEN 2012-3 Introduction to Geomatics (APPM 1350 or equiv.) # | | S-H Elective-3 |
| 2 ND SEM (SPR) | 15 | APPM 1360-4 Calculus II for Engineers (APPM 1350) | PHYS 1110-4 Gen. Physics I (co-req APPM 1350) | CSCI 1320-4 Intro Engr. Computing or other computing elective (co-req APPM 1350) **** | CVEN 1027-3 OR AREN 1027-3 Engineering Drawing # | | |
| 1 ST SEM (FALL) | 16 | APPM 1350-4 Calculus I for Engineers (2yr HS Alg, 1yr Geom., 1/2yr Trig or approval by faculty advisor) | CHEN 1211-4 Gen Chem for Engineers \$ (1yr HS CHEM or Satis. in CHEM 1001 or CHEM 1021 & HS Alg) | CHEM 1221-1 General Chemistry Lab for Engineers \$ | GEEN 1400-3 Engineering Projects OR Basic Engineering Elective ** | CVEN 1317-1 Introduction to Civil & Environmental Engineering # * | S-H Elective-3 |

Course is offered only in SEMESTER shown (fall or spring)

05/07/2019

\$ CHEN 1211 & CHEM 1221 may be taken concurrently or separately

% APPM 2350 co-req can be replaced with co-req of APPM 1360 AND Engineering Math GEEN 3830

* Any Introduction to Engineering is an equivalent course for CVEN 1317

** GEEN 1400 may be replaced with a Basic Engineering Elective in the engineering college with a designator

***CVEN 3698 may be replaced with one of the following Basic Science Electives (EBIO 1030, EBIO 1210, ATOC 1050, ATOC 1060, OR GEOL 1010)

****CSCI 1320 may be replaced with CHEN 1310-3 or CSCI 1200-3 (fall only) plus one additional credit. CSCI 1200 has no pre- or co-requisites

Civil Engineering

Students select three of five proficiencies [to ensure students can “design in more than one context]

Technical electives: 12 credits must be 3000-level or above; with at least up to 6 credits from CEAE courses.

The list below shows proficiency courses and CEAE electives, and senior design prereqs for the sub-discipline areas in civil engineering. For recommended courses sequence, consult the Suggested Course Plan in the advising guide and your faculty advisor.

GEOTECHNICAL ENGINEERING

Proficiency: CVEN 3718 Geotech Engr II (Fall & Spring), prereq: CVEN 3708

Technical Electives:

CVEN 4728 Foundation Engineering (Fall), prereq: CVEN 3718 or consent

CVEN 5748 Design of Earth Structures (Spring), prereq: CVEN 5708 or consent OR any 4XXX level or above, Geotech Engineering course

Prerequisites for Senior Design: CVEN 3718 Geotechnical Engineering II AND CVEN 4728 Foundation Engineering (Fall)

WATER RESOURCES ENGINEERING

Proficiency: CVEN 4333 Engineering Hydrology (Spring), coreqs CVEN 3227 & 3323

Technical Electives:

CVEN 4353 Ground Water Engineering (Fall), prereq: CVEN 3313

CVEN 5363 Modeling of Hydrologic Systems (Spring), prereq: CVEN 3323 or coreq CVEN 4333

CVEN 4383 Groundwater Modeling (Spring), recommended prereq: CVEN 4353

CVEN 4323 Water Resource Engineering Design (Junior or Senior)

Prerequisites for Senior Design: CVEN 3323 Hydraulic Engineering (Fall) AND CVEN 4333 Engineering Hydrology

CONSTRUCTION ENGINEERING AND MANAGEMENT

Proficiency: CVEN 3256 Construction Engineering (Fall & Spring) prereq: CVEN 3246

Technical Electives:

AREN 4506—Project Management I: Construction Project Planning (Fall & Spring), prereq: CVEN 3246 [starts Spring 2014 & repeats every semester thereafter].

AREN 4606—Project Management II: Construction Project Execution and Control (Spring) prereq: AREN 4506 [Starts Spring 2015 and repeats every Spring].

Prerequisites for Senior Design: CVEN 3256 Construction Equipment and Methods AND AREN 4506 Project Management I

STRUCTURAL ENGINEERING/ STRUCTURAL MECHANICS

Proficiency: CVEN 4545 Steel Design (Spring) or CVEN 4555 Reinforced Concrete (Fall), prereq: CVEN 3525

Technical Electives:

CVEN 4161 Mechanics of Materials II (Fall), prereq CVEN 3161

CVEN 4545 or CVEN 4555 (whichever not selected as proficiency)

CVEN 4525 Analysis of Framed Structures, (Spring), prereq: CVEN 3525

Prerequisites for Senior Design: CVEN 4555 Reinforced Concrete Design (Fall) AND CVEN 4545 Steel Design (Spring)

ENVIRONMENTAL ENGINEERING

Proficiency: CVEN 3424 Water & Wastewater (Spring), prereq: CVEN 3414

Technical Electives:

CVEN 4404 Water Chemistry (Lab CVEN 4414) (Fall), prereqs: CHEN 1211 & CVEN 3414

CVEN 3434 Introduction to Applied Ecology (Spring), prereqs: CHEN 1211 & CHEM 1221

CVEN 4474 Hazardous & Industrial Waste Management (Fall), prereq: CVEN 3414

CVEN 4484 Intro to Environmental Microbiology, (Spring), prereqs: CHEN 1211, CHEM 1221, APPM 1350, 1360, 2360

Prerequisites for Senior Design: Take one of the two-course sequences listed for the other four areas of emphasis.

FREE ELECTIVE: any college-level course; AP or IB credit; cannot be similar to courses used toward graduation requirements or deficiencies; may be an S-H course, technical elective, etc.

Transportation Systems, Timber Design, and Design of Masonry available as a technical elective (spring), every other year.

Potential Technical Electives (outside of CEAE) can be found at <http://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-advising-curriculum>

| SEM | CR | Fall 2019 Modified CVEN BLOCK DIAGRAM with Pre-Calculus | | | | | |
|----------------------------------|----|--|--|---|--|---|---|
| 8 TH SEM (SPR) | 19 | CVEN 4899-4 Senior Design Project (Senior standing) # | CEAE Technical Elective-3 | Technical Elective-3 | Technical Elective-3 | Proficiency III CVEN XXXX-3 | S-H Elective-3 (upper-level) |
| 7 TH SEM (FALL) | 17 | CVEN 4897-2 Professional Issues # | CVEN 3323-3 Hydraulic Engineering (CVEN 3313) # | CEAE Technical Elective-3 | Proficiency II CVEN XXXX-3 | CVEN 3708-3 Geotechnical Engineering I (CVEN 3161) | S-H Elective-3 (upper-level) |
| 6 TH SEM (SPR) | 18 | CVEN 3227-3 Probability Statistic & Decision for Civil Engrs. (JRs/SRs) # | CVEN 3313-3 Theoretical Fluid Mechanics (CVEN 2121, co-req APPM 2360)) # | CVEN 3525-3 Structural Analysis (CVEN 3161) | CVEN 3111-3 Analytical Mechanics II (CVEN 2121, co-req APPM 2360) # | Proficiency I CVEN XXXX-3 | WRTG 3030-3 Writing on Science & Society (JR standing) |
| 5 TH SEM (FALL) | 16 | APPM 2360-4 Introduction to Linear Algebra & Differential Equation | CVEN 3246-3 Intro. To Construction (JR or instructor consent) | CVEN 3161-3 Mechanics of Materials I (CVEN 2121, co-req APPM 2360) | | FREE ELECTIVE-3 | S-H Elective-3 |
| 4 TH SEM (SPR) | 16 | APPM 2350-4 Calculus III for Engineers (APPM 1360) | | CVEN 2121-3 Analytical Mechanics I (PHYS 1110, co-req APPM 2350) % | CVEN 3414-3 Fund. of Env. Engr. (CHEN 1211, APPM 1360) | CVEN 3698-3 Engineering Geology OR Other Basic Science # *** | S-H Elective-3 |
| 3 RD SEM (FALL) | 15 | APPM 1360-4 Calculus II for Engineers (APPM 1350) | PHYS 1120-4 PHYS 1140-1 Gen.Phys/Lab (PHYS 1110, co-req APPM 1360) | | CVEN 2012-3** Introduction to Geomatics (APPM 1350 or equiv.) # | AREN 2110-3 Thermodynamics (PHYS 1110, co-req APPM 1360) | |
| 2 ND SEM (SPR) | 17 | APPM 1350-4 Calculus I for Engineers (2ys HS Alg, 1yr Geom, 1/2yr Trig) (APPM 1235) | PHYS 1110-4 Gen. Physics I (co-req APPM 1350) | CSCI 1320-4 Intro Engr. Computing (co-req APPM 1350) **** | CVEN 1027-3 OR AREN 1027-3 Engineering Drawing | | |
| 1 ST SEM (FALL) | 16 | APPM 1235-4 Pre-Calculus for Engineers (score of 70) | CHEN 1211-4 Gen Chem for Engineers \$ (1yr HS CHEM or Satis. In CHEM 1001 or CHEM 1021 & HS Alg) | CHEM 1221-1 General Chemistry Lab for Engineers \$ | GEEN 1400-3 Engineering Projects OR Basic Engineering Elective** | CVEN 1317-1 Introduction to Civil & Environmental Engineering # * | S-H Elective-3 |

Course is offered only in *SEMESTER* shown (fall or spring)

\$ CHEN 1211 & CHEM 1221 may be taken concurrently or separately

% Co-req of Calc III, **OR** Co-req of Calc II **AND prereq of Engineering Math 3830**

* Any Introduction to Engineering is an equivalent course for CVEN 1317

** GEEN 1400 maybe replaced with a Basic Engineering Elective in the engineering college with a designator

***CVEN 3698 maybe replaced with one of the following Basic Science Electives (**EBIO 1030, EBIO 1210, ATOC 1050, ATOC 1060, OR GEOL 1010**)

****For the Computing Course, these are the two options: CSCI 1310-3.0 or CSCI 1200-3.0 (fall only)

05/07/2019

Civil Engineering

Students select three of five proficiencies [to ensure students can “design in more than one context]

Technical electives: 12 credits must be 3000-level or above; with at least up to 6 credits from CEAE courses.

The list below shows proficiency courses and CEAE electives, and senior design prereqs for the sub-discipline areas in civil engineering. For recommended courses sequence, consult the Suggested Course Plan in the advising guide and your faculty advisor.

GEOTECHNICAL ENGINEERING

Proficiency: CVEN 3718 Geotech Engr II (Fall & Spring), prereq: CVEN 3708

Technical Electives:

CVEN 4728 Foundation Engineering (Fall), prereq: CVEN 3718 or consent

CVEN 5748 Design of Earth Structures (Spring), prereq: CVEN 5708 or consent OR any 4XXX level or above, Geotech Engineering course

Prerequisites for Senior Design:

CVEN 3718 Geotechnical Engineering II **AND** CVEN 4728 Foundation Engineering (Fall)

WATER RESOURCES ENGINEERING

Proficiency: CVEN 4333 Engineering Hydrology (Spring), coreqs CVEN 3227 & 3323

Technical Electives:

CVEN 4353 Ground Water Engineering (Fall), prereq: CVEN 3313

CVEN 5363 Modeling of Hydrologic Systems (Spring), prereq: CVEN 3323 or coreq CVEN 4333

CVEN 4383 Groundwater Modeling (Spring), recommended prereq: CVEN 4353

CVEN 4323 Water Resource Engineering Design (Junior or Senior)

Prerequisites for Senior Design:

CVEN 3323 Hydraulic Engineering (Fall) **AND** CVEN 4333 Engineering Hydrology

CONSTRUCTION ENGINEERING AND MANAGEMENT

Proficiency: CVEN 3256 Construction Engineering (Fall & Spring) prereq: CVEN 3246

Technical Electives:

AREN 4506—Project Management I: Construction Project Planning (Fall & Spring), prereq: CVEN 3246 [starts Spring 2014 & repeats every semester thereafter].

AREN 4606—Project Management II: Construction Project Execution and Control (Spring) prereq: AREN 4506 [Starts Spring 2015 and repeats every Spring].

Prerequisites for Senior Design:

CVEN 3256 Construction Equipment and Methods **AND** AREN 4506 Project Management I

STRUCTURAL ENGINEERING/ STRUCTURAL MECHANICS

Proficiency: CVEN 4545 Steel Design (Spring) or CVEN 4555 Reinforced Concrete (Fall), prereq: CVEN 3525

Technical Electives:

CVEN 4161 Mechanics of Materials II (Fall), prereq CVEN 3161

CVEN 4545 or CVEN 4555 (whichever not selected as proficiency)

CVEN 4525 Analysis of Framed Structures, (Spring), prereq: CVEN 3525

Prerequisites for Senior Design:

CVEN 4555 Reinforced Concrete Design (Fall) **AND** CVEN 4545 Steel Design (Spring)

ENVIRONMENTAL ENGINEERING

Proficiency: CVEN 3424 Water & Wastewater (Spring), prereq: CVEN 3414

Technical Electives:

CVEN 4404 Water Chemistry (Lab CVEN 4414) (Fall), prereqs: CHEN 1211 & CVEN 3414

CVEN 3434 Introduction to Applied Ecology (Spring), prereqs: CHEN 1211 & CHEM 1221

CVEN 4474 Hazardous & Industrial Waste Management (Fall), prereq: CVEN 3414

CVEN 4484 Intro to Environmental Microbiology, (Spring), prereqs: CHEN 1211, CHEM 1221, APPM 1350, 1360, 2360

Prerequisites for Senior Design: Take one of the two-course sequences listed in the other four areas of emphasis.

FREE ELECTIVE: any college-level course; AP or IB credit; cannot be similar to courses used toward graduation requirements or deficiencies; may be an S-H course, technical elective, etc.

Transportation Systems, Design of Wood Structures and Design of Masonry available as a technical elective (spring), every other year.

Potential Technical Electives (outside of CEAE) can be found at <http://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-advising-curriculum>

GRADUATION PLANNER

GRADUATION PLANNER

CIVIL ENGINEERING – NEW

FALL 2019

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

Or other Basic Science: EBIO 1030, EBIO 1210,
ATOC 1050, ATOC 1060, or GEOL 1010

Basic Engineering Elective (3)

GEEN 1400-3 Eng Projects
or _____

*The Basic Engineering Elective can be
any 3 credit course 1XXX level given in
the engineering college with a designator
ASEN, AREN, APPM, CHEN, CVEN,
COEN, CSCI, ECEN, EVEN, GEEN, or
MCEN.*

Engineering Science (29)

CVEN 1317-1 _____
CVEN 1027-3 _____
CVEN 2012-3 _____
CSCI 1320-4 (or CHEN 1310-3, CSCI 1200-3)

CVEN 2121-3 _____
AREN 2110-3 _____
CVEN 3161-3 _____
CVEN 3313-3 _____
CVEN 3111-3 _____
CVEN 3227-3 _____

CE – Fundamentals (15)

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

Proficiency (9)

Take 3 of the following 5 areas:

CVEN 3718-3 _____
CVEN 4333-3 _____
CVEN 3256-3 _____
CVEN 4545 or 4555-3 _____
CVEN 3424-3 _____

CEAE Technical Electives (6)

Optional Selection

Const Env Geotech Struct Water

1 _____
2 _____

Technical Electives (6) *may be outside CEAE*

1 _____
2 _____

FREE Elective (3) *may be S-H courses,*
technical elective, etc.

Significant Senior Design Experience (4)

CVEN 4899 -4 _____

Professional Issues (2)

CVEN 4897-2 _____

Humanities and Social Sciences (18)

WRTG 3030-3 _____

*
**Must be 3000 level or above*

**Must be 3000 level or above*

Total Required Credits: 128 5/7/2019

Appendix: Suggested Course Plans

CVEN Construction Engineering Management Emphasis- Suggested Course Plan

Prerequisites for SENIOR DESIGN:

CVEN 3256 Construction Equipment & Methods and AREN 4506 Project Management

Proficiencies (3 total)

CVEN 3256 Construction Engineering (Equipment & Methods)

CVEN 4555 Reinforced Concrete

CVEN 3718 Geotech Engineering II

CEAE Technical Electives (2 total)

AREN 4506 Pre-construction Estimating and Scheduling

AREN 4606 Project Execution and Control

Highly Recommended Tech/Free Elective (2 Tech Electives & 2 Free Elective)

CVEN 3602 Transportation Systems

CVEN 4545 Steel Design

CVEN 4728 Foundation Engineering

CVEN 4147 Civil Engineering Systems

CVEN 4333 Engineering Hydrology

CVEN 4565 Design of Wood Structures

AREN 4315 Masonry Design

CEM Graduate courses with instructor consent

Other Good Options – Tech/Free Elective

CVEN 3227 Probability, Statistics, and Decision Making for Civil Engineers

CVEN 4147 Civil Engineering Systems

CVEN 5565 Life-cycle Engineering of Civil Infrastructure Systems

AREN 3540 Illumination I

AREN 3010 Mechanical Systems for Buildings

AREN 4110 HVAC Design

AREN 4830 Computer Simulations of Building Systems

EMEN 4100 Business Methods and Engineering Economics

AREN 1027 Engineering Drawing (Free Elective only as it is lower division)

AREN 2050 Building Systems and Materials (Free Elective only as it is lower division)

CVEN 1837 Civil Engineering Drawing (Free Elective only as it is lower division)

CVEN Water Resources Emphasis – Suggested Course Plan

Prerequisites for SRNIOR DESIGN:

CVEN 3323 Hydraulic Engineering (FALL) and CVEN 4333 Engineering Hydrology

Proficiencies (3 total)

CVEN 4333 Engineering Hydrology

CVEN 3424 Water and Wastewater

Choose one additional course from the following list:

CVEN 3718 Geotechnical Engineering II

CVEN 4555 Reinforced Concrete

CVEN 4545 Steel Design

CEAE Technical Electives (2 total)

CVEN 4353 Groundwater Engineering

CVEN 4323 Water Resource Engineering Design

CVEN 4838 Groundwater Modeling

CVEN 5363 Modeling of Hydrologic Systems

Highly Recommended Tech/Free Elective (2 Tech Electives & 2 Free Elective)

Courses listed under CEAE Technical Electives and Proficiencies that are not used to fulfill either the CEAE Technical Elective or Proficiencies requirement

GEOG 4321 Snow Hydrology

GEOG 4501 Water Resources and Water Management of the Western United States

ATOC 3600 Principles of Climate (requires ATOC 1050 Weather and the Atmosphere)

Other Good Options – Tech/Free Electives

CVEN 3434 Introduction to Applied Ecology

CVEN 4404 Water Chemistry

APPM 4350 Methods of Applied Mathematics: Fourier Series and Boundary Value Problems

CVEN Structural Engineering and Structural Mechanics Emphasis – Suggested Course Plan

Prerequisites for SENIOR DESIGN:

CVEN 4555 Reinforced Concrete Design (Fall) and CVEN 4545 Steel Design (Spring)

Proficiencies (3 total)

CVEN 4545 Steel Design (spring) or CVEN 4555 Reinforced Concrete (fall)

CVEN 3718 Geotech Engineering II

CVEN 3256 Construction Engineering (Equipment & Methods)

CEAE Technical Electives (2 total)

CVEN 4161 Mechanics of Materials II (spring)

CVEN 4545 Steel Design (spring) or CVEN 4555 Reinforced Concrete (fall)

Recommended Tech Electives (2 total) and Free Elective (2 total)

Primarily Design Oriented Careers

CVEN 4525 Analysis of Framed Structures

CVEN 4535 Construction Materials

CVEN 4565 Design of Wood Structures (every other spring)

AREN 4315 Design of Masonry Structures (every other spring)

CVEN 4728 Foundation Engineering

Primarily Theoretical Oriented Careers and Graduate School Preparation

CVEN 4525 Analysis of Framed Structures

CVEN 4511 Finite Element Analysis

CVEN 5111 Introduction to Structural Dynamics

CVEN 5131 Continuum Mechanics and Elasticity

CVEN Environmental Engineering Emphasis – Suggested Course Plan

Prerequisites for SENIOR DESIGN:

Take one of the two-course sequenced listed for the other four areas of emphasis

Proficiencies (3 total)

CVEN 3424 Water & Wastewater

CVEN 4333 Engineering Hydrology

CVEN 3718 Geotechnical Engineering II

CEAE Technical Electives (2 total)

CVEN 4404 Water Chemistry

CVEN 4484 Environmental Microbiology

Highly Recommended Tech/Free Electives (2 Tech Electives & 2 Free Electives)

CVEN 4464 Environmental Engineering Processes

CVEN 3434 Intro to Applied Ecology

CVEN 4554 Fundamentals of Air Quality Management

CVEN 4594 Water Reuse and Reclamation

EVEN 41000 Environmental Sampling and Analysis

CVEN 4474 Hazardous Waste Management

CVEN 4434/EVEN 4434 Environmental Engineering Design

CVEN 4969 Water Air Sanitation Hygiene

CVEN Geotechnical Engineering Emphasis – Suggested Course Plan

Prerequisites for SENIOR DESIGN:

CVEN 3718 Geotechnical Engineering II and CVEN 4728 Foundation Engineering (Fall)

Proficiencies (3 total)

CVEN 3718 Geotechnical Engineering II

CVEN 4555 Reinforced Concrete

CVEN 4333 Engineering Hydrology

CEAE Geotech Technical Electives (2 total)

CVEN 4728 Foundation Engineering

CVEN 5708 Soil Mechanics

Any CVEN 5**8 introductory graduate level geotechnical engineering course

Other Highly Recommended Tech/Free Electives (2 Tech Electives & 2 Free Electives)

Courses listed under CEAE/Geotech Technical Electives and Proficiencies that are not used to fulfill either the CEAE /Geotech Technical Elective or Proficiencies requirement

CVEN 4161 Mechanics of Material II

CVEN 4511 Introduction to Finite Element Analysis

CVEN 5131 Continuum Mechanics & Elasticity

Other Good Options – Tech/Free Electives

APPM 3050 Scientific Computing in Matlab

APPM 4350 Methods of Applied Mathematics: Fourier Series and Boundary Value Problems

CVEN 3424 Water & Wastewater

CVEN 5454 Statistical Methods for Natural/Engineered Systems

GEOL 5714 Field Geophysics

Note – Free Elective

****CVEN 3698 Engineering Geology (if not already taken)**