Environmental Engineering

UNIVERSITY OF COLORADO **BOULDER**

Environmental Engineering (EVEN) B.S. Degree Guidelines

Academic Year 2023- 2024

College of Engineering and Applied Science

University of Colorado at Boulder

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We Hear You, We Value You, We CU!

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Latest and previous versions at http://www.colorado.edu/even/current-students/guidelines

Contents

1. Overview of Guidelines and Introduction to Environmental Engineering

The Environmental Engineering BS Degree Guidelines provide an outline of the curriculum and policies of the Environmental Engineering (EVEN) BS degree offered by the College of Engineering and Applied Science of the University of Colorado at Boulder. These guidelines are written primarily for students and Faculty Advisors of the EVEN Program. The current version of these Guidelines and versions dating back to the beginning of the Program in 1998 are kept on the Program's website.

General policy information for students is also available from the Office of Student Services in the Dean's Office of the College of Engineering and Applied Science (http://www.colorado.edu/engineering/academics/policies) and in the University of Colorado at Boulder Catalog. Further information on academic support programs, is available online.

Information on courses offered, including course descriptions, is available in the University Catalog. The course schedule for each semester is available to CU students through the Buff Portal. A .pdf file of course listings, alphabetical by college and department, can be found on the Continuing Education Access site (This document is not updated past its "publication date" so check the online schedule for the most recent information.)

1.1. Overview of Environmental Engineering

Environmental engineers play a vital role in maintaining the quality of both human environmental systems and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere, land, water, and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations. These issues include safe drinking water, wastewater processing, solid and hazardous waste disposal, outdoor air pollution, indoor air pollution, transfer of infectious diseases, human health and ecological risk management, renewable and sustainable energy sources and their effects on the environment, and prevention of pollution through product or process design.

The Engineering Center at the University of Colorado at Boulder.

To address these challenges, environmental engineers often encounter challenging problems that must be solved in data-poor situations as members of multidisciplinary teams. Environmental problems require creative solutions with contributions from scientists, lawyers, business professionals, and the public. Good communication skills, as well as technical proficiency, are essential for success in this arena. In addition, technology designed to address environmental problems is marketed globally, which opens up increasing opportunities for international work in the environmental engineering field.

1.2. History of the Environmental Engineering Program

The Environmental Engineering Program at the University of Colorado at Boulder originated with a college-wide faculty committee that met during the 1993-1994 academic year to develop a multi-disciplinary curriculum for a Bachelor of Science degree in Environmental Engineering. The degree program was intended to supplement environmental engineering options that were then offered through the Departments of Civil, Environmental, and Architectural Engineering (CEAE), Mechanical Engineering (ME) and Chemical and Biological Engineering (ChBE).

The initiative to develop the EVEN BS degree and the Environmental Engineering Program to administer the degree was motivated by recognition that (1) Environmental engineering had matured into a full-fledged discipline of its own and (2) Environmental engineering intersected with the traditional disciplines of chemical, civil, and mechanical engineering, but was not adequately covered by any single discipline. The faculty committee decided that students intending to work in environmental engineering would benefit from a curriculum that focused on environmental engineering and related courses regardless of which department offered those courses. At the same time, the existing environmental engineering options could be retained in the departments for students who were interested in environmental engineering but wanted to pursue traditional chemical, civil, or mechanical engineering degrees.

The proposed EVEN BS degree program was approved by the faculty of the College of Engineering and Applied Science in the spring of 1994. The faculty committee then prepared a full proposal for the new degree program for the Colorado Commission on Higher Education (CCHE), and the new EVEN BS degree program was approved in the spring of 1998. Students began entering the program in the fall of 1998. The first EVEN degree was awarded in December 1999 (to a student who transferred into the program as a third-year student), and the first EVEN class graduated in June 2002.

In approving the new degree, CCHE relied on the College's intent to deliver the EVEN BS degree using existing courses and faculty. While the program is administered by the CEAE Department it operates independently through the participation of faculty from Civil, Environmental, and Architectural Engineering, Mechanical Engineering, Aerospace Engineering Sciences, Chemical and Biological Engineering Departments. The College provides support for a faculty director, two instructors, an academic advisor and administrative support, and teaching support for courses to supplement the EVEN curriculum. The departments that participate in the program are committed to regularly offering the courses that comprise the EVEN curriculum, coordinating to avoid scheduling conflicts and sharing academic advising and other faculty service requirements. Professors Jana Milford (ME), Angela Bielefeldt (CEAE), Joseph Ryan (CEAE) and R. Scott Summers (CEAE) have served as Environmental Engineering Program Directors.

During the 2002-2003 academic year, the Environmental Engineering Program applied for accreditation of the EVEN BS degree with the Engineering Accreditation Commission of ABET (Engineering Accreditation Commission of ABET). The ABET examiners were thoroughly satisfied with the EVEN BS degree and the Engineering Accreditation Commission of ABET granted accreditation to the degree in September 2003. The Environmental Engineering Program completed the first major revision of the EVEN curriculum for the 2004-2005 academic year and was re-accredited in 2006 and 2012 by ABET. The PhD and MS EVEN degrees were added in 2015.

EVEN students on a field trip for the CVEN 3434 Introduction to Applied Ecology course with Professor Diane McKnight.

1.3. Mission and Educational Objectives

The EVEN faculty, its Professional Advisory Board (representing prospective employers of our graduates), and EVEN alumni and current students have contributed to the creation of the Program's mission and the educational objectives of the EVEN BS degree.

The **mission** of the Environmental Engineering Program is to provide a multidisciplinary undergraduate environmental engineering education that emphasizes mastery of principles and practices, inspires service for the global public good, endows a desire for life-long learning, and prepares students for broad and dynamic career paths in environmental engineering.

The objective of the Environmental Engineering (EVEN) Bachelor of Science Degree is to produce graduates who are capable of reaching the following career goals three to five years after graduation:

1. Graduates will be employed in engineering, science or other professional careers
2. Graduates will pursue professional registration or other appropriate certifications
3. Graduates will be engaged in continual learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, and/or participation in professional societies.
4. Graduates will be engaged in activities that provide benefits to communities, the environment, and/or public health.

1.4. Program Outcomes

A list of program outcomes for EVEN graduates was developed that satisfies the requirements of ABET in the Criteria for Accrediting Engineering Programs for general engineering programs (ABET Criterion 3) and for environmental engineering programs as developed by the American Academy of Environmental Engineers (AAEE) and cooperating societies. As defined by ABET, outcomes are "statements that describe what students are expected to know and are able to do by the time of graduation" (ABET, 2010).[1]

[1] ABET Engineering Accreditation Commission, Criteria for Accrediting Engineering Programs: Effective for Evaluations During the 2011-2012 Accreditation Cycle, Baltimore, MD, 2010.

The outcomes that students are expected to have attained upon graduation with a Bachelor of Science degree in environmental engineering are:

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

The curriculum that has been developed and the content of those courses help to ensure that the Environmental Engineering Program satisfies these outcome goals. Extracurricular activities, internships, co-ops and participation in research also contribute to satisfying these goals. Evaluation of courses and surveys of graduating seniors and alumni help us to document that the EVEN Program successfully achieves these outcomes. Student performance on the Fundamentals of Engineering (FE) exam also documents our success. Review of course syllabi and student work by faculty and the Advisory Board ensures on-going evaluation and improvement of our curriculum to best serve our students and the Environmental Engineering profession.

2. Environmental Engineering Degree Programs

2.1. Bachelor of Science Degree in Environmental Engineering

2.1.1. Overview of EVEN BS Degree

The Bachelor of Science degree in Environmental Engineering at the University of Colorado provides preparation for professional proficiency or graduate training in environmental engineering in a four-year curriculum.

The curriculum includes courses in engineering fundamentals and applications, advanced mathematics, chemistry, physics, biology, and earth science, as well as the arts, humanities and social sciences. Courses specific to environmental engineering practice include water chemistry, microbiology, and air pollution control. In addition, environmental engineering requires hands-on laboratory experiences, up-to-date skills in the use of computers for modeling and data analysis, and experience in the design of environmental engineering systems. Many of the required engineering courses in the Bachelor of Science curriculum are delivered by the departments of Civil, Environmental, and Architectural Engineering, Mechanical Engineering and Chemical and Biological Engineering. The curriculum includes three technical elective courses and five credits of free electives. The curriculum specifies two courses of environmental engineering design and three environmental engineering technical elective courses. A student can use these three upper-division courses to develop an area of specialization in environmental engineering beginning in the third year. However, a student can also choose to take courses that traverse a breadth of environmental engineering topics as discussed in Section 2.2.

The faculty have developed a list of suggested courses in seven areas of specialization:

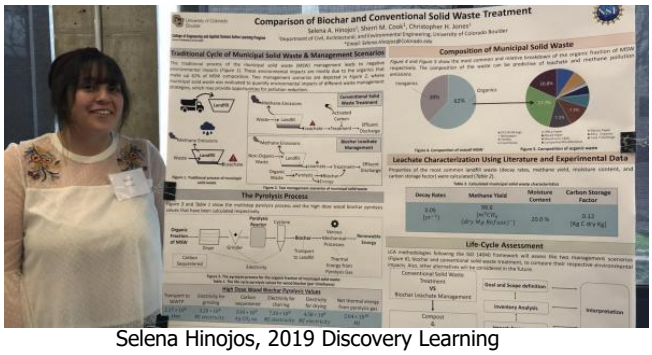
- Air Quality
- Solid & Hazardous Waste Management
- Chemical Processing
- Global Engineering
- Energy Conversion
- Applied Ecology
- Water Resources and Treatment

Students in the program are also encouraged to participate in research through independent study projects, a senior thesis, the Undergraduate Research Opportunities Program (UROP), the Discovery Learning Apprenticeship Program, or as undergraduate research assistants in sponsored research programs.

2.1.2. Curriculum for EVEN BS Degree

The following section contains the curriculum for the EVEN BS degree. The curriculum represents a "contract" of sorts with incoming students – for students entering the program during the current academic year, completion of this curriculum with a satisfactory grade point average is the requirement for graduation. The curriculum also represents a guarantee that the courses listed (or approved substitutes) will be available in the semesters listed.

The curriculum is somewhat dynamic despite its contractual nature. Minor changes may be made by the Program during the academic year, and major changes will be made between academic years. To meet graduation requirements, students are expected to follow the curriculum in effect for the academic year that they matriculated into the program; therefore, students should keep a copy of the Environmental Engineering (EVEN) Degree Guidelines for that year. An archive of the Guidelines is retained on the program's website. Students may elect to follow a later curriculum revision with program approval; however, students may not elect to follow a curriculum in effect before they started the program and may not combine curricula for different years.



Selena Hinojos, 2019 Discovery Learning Research Symposium Awardee

The curriculum below shows the recommended sequence of courses. Courses marked with an asterisk (*) are offered only in the semester shown (fall or spring). Other courses are offered in both semesters, and sometimes in the summer. Students may take courses in terms other than those shown but must be careful to meet prerequisites or co-requisites for each course.

Many of the required courses in the EVEN BS curriculum (statics, engineering economics, fluid mechanics, thermodynamics, heat transfer, probability and statistics) may be satisfied by courses from various engineering departments. Students may choose a course from any of the approved courses for each requirement; however, students should evaluate these choices carefully depending on their major interest in environmental engineering.

For certain courses in the EVEN BS degree curriculum, students may encounter questions about prerequisite and co-requisite course requirements not being met. If students are following the recommended curriculum sequence there is no need for concern; the Environmental Engineering Program has consulted in detail with the departments and faculty offering these courses to ensure that the sequence of courses in the EVEN curriculum is appropriate for engineering students.


EVEN student Val Constien placed 6th on the 2019 NCAA Championships

2.2. EVEN Sequence: Design and Technical Electives (beginning 2016-2017)

Beginning in the spring semester of their third year, EVEN students begin a three course (9 credit hours) sequence in environmental engineering. They will take one 3 credit hour "environmental engineering design" course from list A and two additional (6 credit hours) "environmental engineering upper-division technical elective" courses from list B (or a second from list A, no double counting).

Note that not all of the courses listed are offered every year, denoted by *I

List A – Environmental Engineering Design Electives - at least one course from this list (faculty can petition to add additional courses)

Per ABET Engineering Accreditation Criteria, "*Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.*"

See this website for courses: *https://www.colorado.edu/even/current-students/undergraduate-studies/even-areas-specialization*

List B Environmental Engineering Technical Electives (upper-division)- at least two courses from this list (or a second from list A, no double counting). Faculty can petition to add additional courses:

Students are encouraged to select courses that meet their career goals and interests. This may include courses within a similar theme or crosscut a breadth of environmental engineering topics. As such, this list is organized under various specialization topics within environmental engineering. Environmental engineering design courses from List A also fit under these various specialization topics.

It can be critical that early in the curriculum that students pay careful attention to pre-requisites for these technical electives, as discussed in section 2.1.2. All courses that are numbered 5000 or above are graduate level courses and can only be taken with instructor permission; students should consult carefully with their advisor before selecting a graduate level course. Graduate level courses are good options for double-counting for students admitted to the BAM program.

[1] Also on List A
****I Offered intermittently***

See this website for courses: *https://www.colorado.edu/even/current-students/undergraduate-studies/even-areas-specialization*

2.3. Dual Degrees

Students in the College of Engineering and Applied Science may obtain BS 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 the curricula for both programs and may need to complete additional credit hours beyond the larger minimum credit hour requirement.

Colorado residents should be aware that the College Opportunity Fund (COF) may not cover all tuition costs associated with a double degree program (those beyond 145 semester credit hours).

EVEN Senior Design Class of 2019

2.4. Bachelor's–Accelerated Master's Degree Programs

The Environmental Engineering Program offers a Bachelor's-Accelerated Master's (BAM) Degree Program in Environmental Engineering. The EVEN Program is also cooperating with the Department of Civil, Environmental and Architectural Engineering to offer a BAM Degree Program in Civil Engineering with an Environmental Engineering emphasis, and with the Department of Mechanical Engineering to offer a BAM Degree Program in Mechanical Engineering.
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. 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.

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 3.00 or higher to pursue a Master's degree in environmental engineering or civil engineering. For a Master's degree in mechanical engineering students must have a cumulative GPA of 3.25 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 of those 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.

Applying to the BAM Program

- Eligible students may apply for the BAM program by completing the "BAM Intent Form".
- Please provide a statement of purpose describing your academic/career goals and interests in pursuing a Bachelor's-Accelerated Master's Degree Program.

2.5. Certificate Programs and Minors

The College of Engineering and Applied Science offers certificate and minor programs, which can be obtained along with the EVEN degree:

Certificate in Engineering Science and Society: This program considers the question: "How can the increasingly vast powers of science be guided toward the solution of human problems and kept from aggravating them." Students are guided toward courses that will help them identify and become engaged in the ethical and policy issues, and the risks as well as the benefits of engineering, applied science and technology.

Engineering Management Minor, Engineering Entrepreneurship Certificate and Engineering Management Certificate: Students take courses in engineering management, business plan preparation, finance, economics and marketing.

Global Engineering Minor: Undergraduate minor focusing on how to operate in an international context from an engineering perspective, including international teamwork. Students take courses in global perspective, regional/local perspective, foreign language and acquire a global experience (approved study, research, or internship abroad, or equivalent experience) in coherence with a language/regional course selection.

Energy Engineering Minor: The CU Energy Engineering Minor aims to prepare students with the background and tools to be leaders in energy technology, policy and research. The minor requirements consist of a selection of technical energy courses, an energy policy course and an interdisciplinary projects course, which is comprised of students who are enrolled in the energy engineering minor, and is focused on the design and analysis of energy technologies from a technical, economic and policy perspective.

Water Sampling in Puerto Rico for Prof. Rosario-Ortiz and Hernandez new NSF RAPID Project

Engineering Leadership Program: Students have an opportunity to pursue leadership courses and experiences.

More Minors are available in the College of Engineering and Applied Science in: Computer Science, Computer Engineering, Electrical Engineering, Electrical Renewable Energy Systems, and Signals and Systems as well as in Applied Mathematics. Minors are also available through the College of Arts and Sciences and the Leeds School of Business. Minors typically require 18-33 credits in the discipline, including some specific coursework.

Other certificate and minor programs are available throughout the CU-Boulder campus, in many different disciplines. Some minors are particularly compatible with the EVEN BS degree: Applied Math, Chemistry, Ecology and Evolutionary Biology, Electrical Renewable Energy Systems, Geological Sciences, and Math. The Academic Advisor can provide more details on how these minors fit with the EVEN degree requirements.

Environmental Engineering

Check out our Peer Mentor Program!

On the Currents Students section of the EVEN website.

3. Advising

3.1. Advising Process

In the Environmental Engineering Program, all students meet with the Academic Advisor and junior and senior students are assigned a Faculty Mentor to provide career counseling and promote greater student-faculty interaction. Students are **required** to participate in the advising process during designated advising weeks just prior to course registration for each semester. An **advising hold** to block registration remains on each student's record until advising has occurred. Faculty Mentors are also available for all students during any semester by appointment, for academic and career counseling beyond the required pre-registration meetings.

A few weeks before each advising period, the Academic Advisor will announce to students and Faculty Mentors by email the advising period schedule and advising procedures. Students are required to read these important advising messages and to follow the instructions for making appointments with Faculty Mentors or attending group informational and advising sessions. Faculty mentors will give meetings with advisees high priority during this time; please be courteous and meet with your mentor during the designated advising period.

In preparation for the meeting, students should review and plan their courses for the following two semesters using these Environmental Engineering (EVEN) Degree Guidelines and the course schedule for the following semester, which is available through Buff Portal.

Joanne Uleau, EVEN Academic Advisor

Many academic advising questions pertain to the "logistics" of course scheduling and registration. All of these questions should be directed to the Academic Advisor (see the cover sheet for contact information) instead of the Faculty mentors. The Advisor will provide assistance on procedural questions involving registration, degree plans, graduation requirements, and the petition process. In addition, the Advisor will help students determine whether a particular situation should be discussed with their Faculty Mentors.

3.2. Program Contact with Students (Email)

Official notices to students concerning Environmental Engineering Program advising, curriculum, registration, graduation requirements, and policies will be made by e-mail. By default, official notices will be sent to your university e-mail address as listed on the student directory. If you do not think you are receiving official EVEN e-mail correspondence (you should be receiving messages from the Academic Advisor or program director at least every couple of weeks, probably more often), please contact the Academic Advisor to ensure that you are on the e-mail list. To reiterate, the Program is required to notify you only at your CU email address.

The College of Engineering and Applied Science will also send official notices to your CU e-mail address. The college has developed a series of "code words" for the beginning of the subject line to alert you to the content of the message, and the EVEN program tries to use these codes as well:

ADVISING – covers topics such as curricular options, course registration, academic issues, course information, missing pre-requisites, degree progress, etc.

SCHOLARSHIP – includes information on scholarships, grants, other sources of funding, CEAS Scholarship Coordinator also uses this.

GRADUATION – includes information for graduating seniors such as FE exam, senior checkout, recognition ceremonies, senior survey, etc.

CAREER DEVELOPMENT - includes opportunities that will help advance a student's career, e.g. résumé reviews, mock interviewing, meetings with employers, Career Fair, etc.

JOB - includes job opportunities for students still in school such as internships, co-ops, and on-campus jobs, as well as information on permanent positions.

INTERNSHIP – includes internship/co-op opportunities for students still in school.

EVENT – includes upcoming meetings, programs, events, trips, and opportunities for volunteers to participate in various functions

EXTRACURRICULAR – includes information on student societies, clubs, etc.

SURVEY – for any sort of student survey we are running or sharing on behalf of another party

DEADLINE – includes anything with a looming deadline to which you should pay special attention

ACTION REQUIRED – used when students need to do something post haste.

3.3. Academic Records

An official Environmental Engineering Program academic file will be maintained for each student by the Academic Advisor. This file will contain copies of official documentation related to academic history and progress.

The Environmental Engineering Academic Advisor and Faculty Mentors will strive to provide you with complete, timely, and accurate academic advising; but ultimately, the responsibility of meeting graduation requirements is yours. Consequently, you should ensure that all copies of relevant paperwork are present in your academic file and that you keep your own copies of critical information.

3.4. Additional Advising Resources

The College of Engineering and Applied Science's advising website www.colorado.edu/engineering-advising/ contains other information, including forms for specific situations.

Students may also be referred to various College of Engineering and Applied Science and University of Colorado counselors for certain issues. In particular, several groups within the College offer academic support, including training on study skills and time management, and one-on-one or small group tutoring. These academic programs and other support services are listed on the college web page. At the campus level, students may consult with the following groups:

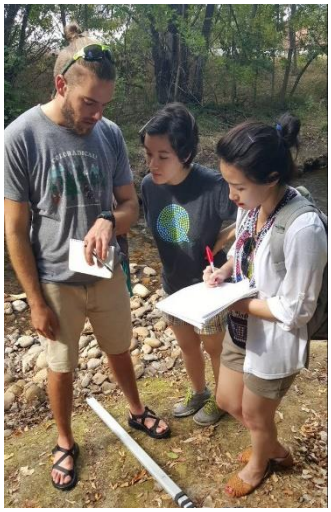
- Academic Coaching – provides free services to all students such as time-management, setting goals, study tips and more!
- Career Services – provides services for resume and interview skills improvement, internship and job postings, and career fairs (N352 Center for Community [C4C], 303 492 6541)
- Counseling and Psychological Services: A Multicultural Center – provides a variety of programs and assistance to address general academic or personal issues. (S440 C4C, 303 492 6766)
- Student Academic Services Center – offers services with academics, academic support, workshops, and more. (141 Fleming, 303 492 1416)

3.5. Faculty Mentor Assignments

All students in the Environmental Engineering Program will be required to meet with a faculty mentor for the first two years and then assigned a faculty mentor for the last two years. Students entering EVEN by change-of-major and transfer students may also need to meet with the Program Director for a transfer credit evaluation. Students may also confer with the Academic Advisor.

4. Academic Policies

Academic policies and guides for the College of Engineering and Applied Science, as well as many forms mentioned in this section, can be found online.


EVEN 4100: Ground Water Sampling, Fort Collins, CO.

4.1. Prerequisite and Co-Requisite Courses

Most of the courses in the Environmental Engineering curriculum have prerequisite and/or co-requisite requirements (see tables on pp. 8-9 and the Appendix). The purpose of these requirements is to ensure that you are adequately prepared for subsequent courses.

Students must successfully complete all prerequisite courses before enrolling for a required course in the Environmental Engineering curriculum. Students must also simultaneously enroll in and complete satisfactorily all co-requisite courses. Successful completion means receiving a grade of C- or better.
Grades of D+, D, D-, F, IF, IW, P or NC do not satisfy this requirement. Successful completion of prerequisite and co-requisite courses will be monitored for all required courses in the Environmental Engineering curriculum. Students who do not successfully complete prerequisite and co-requisite courses must retake those courses before advancing in the curriculum. If a student registers for a course without satisfactorily completing prerequisite courses, he/she will be notified that the course must be dropped and, if necessary, the student will be dropped from the course. Students required to retake courses are strongly urged to consult their advisor for advice on how successful academic performance can be achieved.
The prerequisite and co-requisite policy applies only to required and environmental engineering upper-division technical elective courses in the curriculum. If a student has not satisfied all of the prerequisite and co-requisite requirements for an elective course (technical, humanities & social sciences, or free elective), permission to take that elective course must be obtained from the instructor before enrolling in the course.
Courses not listed in the curriculum may be used to satisfy prerequisite and co-requisite requirements if transfer credit or a petition to the Environmental Engineering Program has been approved. College of Engineering and Applied Science petition forms for this purpose may be obtained from the Academic Advisor or online.

4.2. Transfer Credit

Several types of students transfer into the Environmental Engineering program. For all transfer students, the College of Engineering and Applied Science requires that the last 45 credit hours used to fulfill degree requirements must be CU-Boulder coursework taken after admission to the college. More details about the college's transfer credit policies are available online.

4.2.1. Change of Major: From a College of Engineering Degree to EVEN

If you are thinking about changing your major (or adding a second major) within the College of Engineering and Applied Science, first meet with your current academic advisor to initiate the process. Then you'll meet with an academic advisor for your desired new degree program to discuss your interests and learn more about the major. If you decide to change to that major (or add it as a second major), you'll complete the Change of Major Form.
If you are an engineering student and want to switch (or add) your major to one outside of the Engineering College, you'll need to complete an Intra-University Transfer (IUT) to be admitted to a new major/college. Conversely, if you are not currently an engineering student but would like to switch (or add) your major into the Engineering College, you'll need to complete an IUT to be admitted.

4.2.2. Change of Major: From Another UCB College or School to EVEN

Students transferring into EVEN from another of the University of Colorado at Boulder's Colleges and Schools must complete the Intra-University Transfer (IUT) application process. Once the application is approved, credit hours from the non-engineering degree will be evaluated for EVEN credit at the first advising meeting with the EVEN Program Director.

4.2.3. Transfer from Another Institution

Students transferring from another university or community college can find information online. An initial and official transfer credit evaluation is performed by the CU- Boulder Office of Admissions using the transcript from the previous institution(s). Courses in which the student received a grade lower than a C- will not be accepted by the admissions office.

Once the Office of Admissions has completed its evaluation, the student will meet with the EVEN Advisor for evaluation of transfer credits for the EVEN curriculum. Note that acceptance of transfer credits by the admissions office does not ensure that the transfer credits will count toward the EVEN BS degree; courses taken at another institution must match the course requirements for the EVEN curriculum. In many cases, identification of courses is straightforward; however, for some courses, the EVEN Director may request documentation of course content (catalog descriptions, course syllabi).

Environmental Engineering and Water Resources Networking Event, February 2019

4.2.4. Advanced Placement and International Baccalaureate Credit

Advanced Placement (AP) credit may be approved on the basis of College Entrance Examination Board's Advanced Placement tests. International Baccalaureate (IB) credit may be granted to students who have participated in IB diploma or certificate programs. For students who have taken AP or IB courses in high school and who achieve the required score, AP/IB credit will be granted as part of the admission process. AP and IB credits must also be evaluated for credit toward the EVEN curriculum by the EVEN Academic Advisor. If a student later takes a course for which AP or IB credit was granted, the credit for the course taken at the University of Colorado will replace the AP/IB credit.

For a listing of CU course equivalents for typical AP and IB credit, see the College of Engineering and Applied Science "Advanced Placement, IB and MAPS" Advising Guide online.

College courses taken while in high school (e.g., through the "CU Succeed" Program) will be evaluated as transfer credits according to the applicable section above.

4.2.5. Continuing Education Courses

Courses may be taken for EVEN degree credit through programs offered by the University of Colorado's Division of Continuing Education.


Joe Ryan (third from left) examines waste rock from a mine in St. Kevin Gulch near Leadville with students from the EVEN 4830 Multidisciplinary Approaches to Abandoned Mine Remediation course.

4.3. Humanities and Social Sciences Electives

4.3.1. Importance of Humanities and Social Sciences to Environmental Engineers

The purpose of humanities and social sciences (H&SS) electives is to broaden the engineering education. In environmental engineering, appreciation and knowledge of the social, historical, political, and economic context of environmental problems is critically important. The EVEN faculty recommends that you select a sequence of courses that complement and broaden your education in environmental engineering and that you avoid random selection of unrelated introductory courses.

4.3.2. Humanities and Social Sciences Requirements

The Environmental Engineering Program follows the College of Engineering and Applied Science H&SS requirements. A total of 15 credit hours of H&SS electives is required for graduation. At least six of the required credit hours must be at the upper division level (3000- or 4000-level courses). In addition, a writing course is required to improve writing and oral presentation skills. **Instructor's consent must be obtained on a petition form if prerequisites are not met.** Permission must be obtained from the relevant department if courses have other restrictions.

4.4. Technical Electives

4.4.1. Overview of Technical Electives

Technical electives provide an opportunity for students to explore a range of engineering, mathematical, and natural sciences topics to provide increased breadth or to focus on a specific technical area to develop in-depth understanding. In addition, one technical elective must be used to meet a requirement for a course in earth sciences.

4.4.2. Technical Elective Requirements

The EVEN BS curriculum requires nine credit hours of technical electives. Technical elective credit may be met by courses in the following categories:

- most engineering, physics, biology (both EBIO and MCDB), chemistry, geology, physical geography, atmospheric and oceanic sciences, and mathematics (both APPM and MATH) courses that are substantially different from required EVEN courses;
- many courses taught by Computer Science and Engineering Management;
- quantitatively rigorous courses in social sciences (economics, psychology, human geography);
- EVEN senior thesis; and
- independent study courses with appropriate technical content.

Three credit hours of technical electives may be lower division (1000-, 2000-level course). The remaining technical elective courses must be taken at the 3000-level or above. Both undergraduate and graduate courses (5000 level and above) may be taken as technical electives; enrollment in graduate courses requires the consent of the instructor.

One (3) three credit upper level TE may be satisfied by an upper Social Sciences class that is relevant to environmental engineering.

Requirement: One of the technical elective courses (3 credit hours) must be an earth science course at either the lower or upper division level.

All technical elective course selections should be approved by your advisor. Technical electives counted toward the graduation requirements for the EVEN BS degree **may not** be taken pass/fail.
Exceptions to these rules will be considered by petition to the Environmental Engineering faculty.

4.4.3. Internship for Credit

Internship for credit: Permitted to use up to 3 credits as a free or UD TE credit.
Must be preapproved per policies on website.

4.4.4. Specific Inclusions and Exclusions for Technical Electives

Independent study (see Section 4.7) is accepted as technical elective credit up to a maximum of 6 credit hours.
Co-op/internship credits will not count as technical electives nor toward other degree requirements, except as free elective credits.
A maximum of 3 credit hours of some Reserve Officer Training Corps (ROTC) courses may be used as technical electives upon commissioning.

4.4.5. Earth Science Technical Electives

Courses that meet the earth sciences requirement are typically found in the Departments of Geological Sciences, Geography, Atmospheric and Oceanic Sciences, and some engineering departments.
Please view the available list on the EVEN website, courses with an * next to them satisfy earth science courses, please note the credits needed (3).

4.5. Free Electives

The EVEN curriculum allows for three credits of free elective(s). College-level CU or transfer credits, upper- or lower division, may be used for these credits to broaden the student's academic experience. Students may also use AP or IB credits, courses from Residential Academic Programs (RAP), President's Leadership Class (PRLC), ROTC, courses required to pursue a minor, etc., as long as they are substantially different from required EVEN courses. Or they may be used to take a "fun" class in something you always wanted to study!

EVEN 1000, Introduction to Environmental Engineering with Professor R. Scott Summers, EVEN Program Director

4.6. Independent Study

4.7.1. Introduction to Independent Study

An independent study is a collaboration between a student and a faculty member on a special project that provides the student with a learning experience. An independent study may also fill an academic need of importance to the student that cannot be filled by the regular course offerings. Independent studies are opportunities for students to earn credit for learning outside the normal lecture and laboratory class structure.

In the EVEN BS curriculum, independent studies may be counted as technical electives (up to a maximum of six credit hours) or free elective. Independent studies may be conducted in any increment of credit hours up to a maximum of 3 credit hours per semester, with one credit hour representing 25 hours of actual work on the task or project. The Environmental Engineering Program encourages students to consider independent study to engage in a long-term research project with a faculty member.

4.7.2. Independent Study Requirements

The following rules apply to independent studies:

- A maximum of 6 credit hours of independent study may be applied to EVEN BS degree requirements as technical electives
- Independent studies may not be applied as required courses or Environmental Engineering TE courses
- A maximum of 3 credit hours of independent study may be taken per semester
- Independent studies may be supervised by any appropriate University of Colorado faculty member
- A proposal for an independent study must be made by submitting the Independent Study Agreement Form, complete with student and supervising faculty signatures
- The EVEN Program Director must approve the proposal
- A final product of the independent study must be submitted to the Environmental Engineering Program before credit is awarded toward degree requirements
- Approval of a second independent study is contingent on successful completion of the requirements for the first independent study
- Independent studies may not be arranged retroactively
- Independent study credit is not allowed for internship experiences, co-ops, work-study, or work done for pay, following University rules

SEVEN, Society of EVEN is a resource for engineering students to connect and explore applications of environmental engineering

4.7.3. Independent Study Procedures

To propose an independent study, students must first determine with a collaborating faculty member the topic, goals, number of credit hours, work plan, and required product for the independent study. This information must be recorded on an Independent Study Agreement Form (see the Forms Appendix) and submitted before the drop/add deadline of the semester in which the independent study will be conducted.

The independent study proposal will be reviewed by the EVEN Director and approved, returned for amendment, or disapproved owing to some deficiency in the proposal. The form must then be submitted to the Academic Advisor.

For an EVEN independent study, the Academic Advisor will enroll the student. The student will conduct the independent study under the guidance of the Faculty Advisor. At the end of the independent study, the student must submit to the

Environmental Engineering Program a copy of the final product (a report, a computer code, etc.) in addition to any required products due to the collaborating faculty.

4.8. Senior Thesis

Students in their final year may choose to do a senior thesis, which is conducted over two terms and demonstrates that a student can complete scientific and engineering research independently and can communicate results. A senior thesis must be supervised and graded by a member of the Environmental Engineering faculty and defended before a committee of three faculty members, two of whom must be affiliated with the Environmental Engineering Program. Senior thesis hours (3 credits each term) may be applied toward the technical elective requirement.

The student is required to complete (in collaboration with the thesis supervisor) and sign a Senior Thesis Proposal form for each semester; the form must then be signed by the student and thesis supervisor and approved by the EVEN Program Director before registration in the courses. The final thesis must be submitted to the Environmental Engineering Academic Advisor by the final day of the second term of the thesis. More details on senior thesis policy and procedures may be found on the Senior Thesis Proposal Forms (see Forms Appendix).

4.9. Engineering Co-op Program

A Co-operative Education Program is available to EVEN students, whereby semesters of academic coursework alternate with semesters of paid engineering work at an engineering firm or university. International co-ops are also available. The co-op program provides professional experience in a real-world situation with university oversight and a chance to explore career options during the undergraduate career. Students enroll in co-op credit hours through the Division of Continuing Education; these credits do not apply toward degree requirements except as free electives. More information is available online.

4.10. Petitions

Any exceptions or waivers of the rules and regulations of the Environmental Engineering Program or the College of Engineering and Applied Science must have prior approval by petition. The petition must be completed and submitted to the Environmental Engineering Program for approval; the petition may then be forwarded to the Dean's Office. Exceptions to the humanities/social sciences requirement must also be approved by the Director of the Herbst Program of Humanities for Engineers. It is the student's responsibility to follow up on the petition's progress. Petition forms may be obtained from the Academic Advisor, the dean’s office, or online.

Examples of when petitions are required include (but are not limited to):

- Requests for course substitutions for a major, minor, or certificate
- Approving a non-CU Boulder course to transfer in and apply towards degree requirements in a specific way
- Requesting exceptions to course pre-requisite or co-requisite requirements
- Allowing a lower-than-required grade for a course to stand without having to repeat it
- Allowing courses older than 10 years to apply towards degree requirements
- Taking a class on Pass/Fail grading basis- only can go towards the Free Elective course
- Taking a class on NC grading basis (No Credit, also known as formally auditing a class)
- Enrolling in a course overload (more credit hours than are typically allowed in a given term)
- Enrolling in a course for the degree (or equivalent) more than 3 times
- Requesting an exception to the CEAS 45-hour residency requirement (that last 45 hours earned for the degree is CU Boulder coursework only)
- Requesting to drop a class after the 10-week final drop deadline each semester (or prorated summer session deadline)

If properly completed, the petition process will normally take one to two weeks.

4.11. Academic Honesty

The Environmental Engineering Program adheres to the policies of the University of Colorado at Boulder and the College of Engineering and Applied Science on academic honesty, which state:

"As members of the academic community, students have a responsibility to conduct themselves with the highest standards of honesty and integrity. These qualities are also vital to the profession of engineering. Violations of academic ethics tarnish the reputation of all students and will be treated with the utmost seriousness."

Be forewarned and discourage your fellow students from participating in any unethical activities. The following are examples of some, but certainly not all, acts that violate academic ethics:

- Plagiarizing
- Cheating on assignments and exams (including text messaging during exams, quizzes, etc.)
- Possessing or observing of exams or solutions to examinations prior to the exam
- Altering, forging, or falsifying official records
- Performing work or taking an exam for another student
- Providing material/work of your own or of others to a fellow student

***More information regarding the CU Student Honor Code Policy can be found online.*

5. Graduation Requirements

5.1. Requirements for EVEN BS Degree

5.1.1. General Requirements

To graduate with a Bachelor of Science degree in Environmental Engineering from the College of Engineering and Applied Science at the Boulder campus, students must meet the following minimum requirements:

1. Satisfactory completion of the required and elective courses in the Environmental Engineering Bachelor of Science curriculum. Students must satisfactorily complete a minimum of 128 credit hours, of which the last 45 credit hours shall be CU-Boulder coursework earned after admission to the College of Engineering and Applied Science as a degree student.
2. A minimum CU cumulative grade point average of 2.00 for all courses attempted and for all courses that count toward graduation requirements, excluding "P" grades for courses taken Pass/Fail.
3. A minimum cumulative major grade point average of 2.00. This major grade point average includes only course work coded as an engineering course.
4. Successful completion of the Minimum Academic Preparation Standards (MAPS) requirement of the College of Engineering and Applied Science.
5. Submission of copies of independent study or thesis final product(s), if applicable toward degree requirements.
6. Completion of the Fundamentals of Engineering (FE) examination during the final academic semester, providing proof paperwork.
7. Notification to the EVEN Academic Advisor of intent to graduate.
8. Submission of a request for diploma/graduation.
9. Completion of Senior Survey

EVEN Graduation - May 2019

Graduation will be postponed by failure to complete these requirements. Any exceptions to these requirements will require approval of the Environmental Engineering Program Director and the Dean's office by petition. In addition, students must be recommended for graduation by the faculty of the EVEN Program and the faculty of the college, and should complete the senior survey.
To be sure that all requirements are met, students can consult with the Environmental Engineering Academic Advisor.
Students must be aware that meeting graduation requirements is ultimately their own responsibility.

5.1.2. Grading Policy

Students are evaluated by their performances in the courses that make up the Environmental Engineering curriculum following the standard procedures implemented by the College of Engineering and Applied Science. Student performance is determined by course instructors. Instructors award grades following the University of Colorado standardized grading system (Table 5.1).
Grade point averages of students are determined only for "quality credit hours". Quality credit hours are those earned in courses taken for standard grades at the University of Colorado. "Earned credit hours" include quality credit hours plus credit hours earned in courses taken pass/fail and credit hours transferred from other institutions; thus, grades in pass/fail courses and courses from other institutions do not count in the University of Colorado grade point average.

Other grades appearing on student transcripts include Incomplete (I), No Credit (NC), and Pass (P). A grade of I indicates that course requirements were not completed owing to documented reasons beyond the control of the student.

Grades of I require completion of an "Incomplete Grade Record Form" by the instructor and student stating the work that must be completed to award a final grade. All work required for the final grade must be completed within one year or the I grade is changed to F. A grade of NC indicates that the course taken cannot be used to fulfill graduation requirements and cannot be repeated for a standard grade. A grade of P in a course taken pass/fail indicates that the student achieved the minimum passing grade of D- or better.

5.1.3. Pass/Fail Grading

Starting with academic year 2023-2024, students are allowed up to 6 credit hours of P/P+/F credit to apply towards Free Electives (note that not all degree programs offer 6 credits of Free Electives, so the true limit for a particular student may be fewer than 6 credits).

Continuing students who entered the college prior to AY 2023-2024 may utilize earlier local policy if desired (advisors can make degree audit exceptions to conform to previous policy if needed).

Table 5.1. Standardized grading system of the University of Colorado at Boulder.

letter grade	credit points	quality of performance
A	4.0	superior/excellent
A-	3.7	
B+	3.3	
B	3.0	good/better than average
B-	2.7	
C+	2.3	
C	2.0	competent/average
C-	1.7	(minimum passing grade in prerequisite course)
D+	1.3	
D	1.0	
D-	0.7	(minimum passing grade in non-prerequisite course)
F	0.0	
I		incomplete
NC		no credit
P		pass in a pass/fail course

5.1.4. Grade Replacement Policy

Grade replacement policy undergraduate, graduate and nondegree students (law students are not eligible) may retake a CU Boulder course in which they earned a low grade in an attempt to improve their cumulative GPA**.**

5.2. Fundamentals of Engineering Exam

One of the requirements for graduation with the EVEN BS degree is that students must take the Fundamentals of Engineering (FE) Exam. This test serves two purposes: (1) it provides students the opportunity to complete the first step towards Professional Engineer (PE) status and (2) it provides the Environmental Engineering Program with a useful assessment of engineering proficiency attained by EVEN graduates. Students take the FE Exam during their final semester.

The Fundamentals of Engineering Examination is the first step toward achieving licensure as a Professional Engineer (PE), a particularly important credential for engineers working as consultants. The FE Exam is administered by the National Council of Examiners for Engineering and Surveying (NCEES).

The FE Exam is offered online throughout the year. Students will register online with NCEES. Registration notices will be distributed by the EVEN Academic Advisor. Once the student passes the FE exam and graduates the student will then register with DORA to complete the process to receive their EI enrollment number.

The exam covers engineering, science, and mathematics fundamentals. It is also discipline-specific. The NCEES offers general information, study materials, and sample questions for the FE Exam. Numerous review books for the FE Exam are also readily available at web booksellers.

5.3. Requirements for Dual Degrees

Students may choose to pursue a second Bachelor of Science or Bachelor of Arts degree simultaneously with the EVEN BS degree in a College or School at the University of Colorado at Boulder. To do this, they must satisfy the requirements of both degree curricula and may be required to take credit hours beyond the 128 required for the EVEN BS degree. To complete a dual degree, the student should find an Academic Advisor in the other program to ensure that its course requirements are satisfied.

6. Society of Environmental Engineers (SEVEN)

The Society of Environmental Engineers (SEVEN) is a student society which engages in a combination of educational, service and social activities. It is open to students in all majors who are interested in environmental issues and sustainable solutions. Please visit the EVEN website for more information about meetings and activities, and to contact the current officers.

Summer 2018: EVEN'2020 Student Jasmine Gamboa led a water filtration workshop for a group of High School students

7. Faculty Directory

More than twenty College of Engineering and Applied Science faculty members are affiliated with the Environmental Engineering Program. These faculty members are rostered in the Aerospace Engineering Sciences, Chemical and Biological Engineering, Civil, Environmental, and Architectural Engineering, and Mechanical Engineering departments.

Rajagopalan Balaji, Professor, Department Chair, Civil, Environmental, and Architectural Engineering
Education: B.Tech. in Civil Engineering, National Institute of Technology, Kurukshetra, India (1989), M.Tech. in Operations Research and Reliability, Indian Statistical Institute, Calcutta, India (1991), Ph.D. in Stochastic Hydrology and Water Resources, Utah State University, Logan, UT (1995)
Research: Hydrology, Water Resources and Environmental Fluid Mechanics.
Email: balajir@colorado.edu, phone: 303 492 5968, office: ECOT 444
William Becker, Scholar in Residence, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S. Clarkson University (1979, 1980), Ph.D. Johns Hopkins University (1995)
Research: Physical-chemical processes, Water quality, Water reuse
Email: william.becker@colorado.edu, phone: 917 613 4875, office: SEEC S269
Angela Bielefeldt, Professor, Civil, Environmental, and Architectural Engineering, Director – Engineering Plus Program, Former Director – EVEN Program
Education: B.S. Iowa State University (1992), M.S., Ph.D. University of Washington (1994, 1996)
Teaching: CVEN 4474 Hazardous Waste Management (intermittent), CVEN 1317 Introduction to Civil Engineering, CVEN 4434 Environmental Engineering Design, GEEN 1400 Engineering Projects
Research: Engineering Education, In-situ Bioremediation, Sustainable water and wastewater treatment for developing communities
Email: angela.bielefeldt@colorado.edu, phone: 303 492 8433, office: DLC 173B
Azadeh Bolhari, Instructor, Civil, Environmental, and Architectural Engineering,
Education: B.S.c. Iran University of Science & Technology, M.S.c. University of Colorado Denver, Ph.D. Colorado State University
Research: Contaminant fate and transport, Water sustainability and resilience in low socio-economic settings, Citizen science, Engineering identity and retention
Email: azadeh.bolhari@colorado.edu, Phone: 303 735 1134, Office: SEEC S274
Sherri Cook, Assistant Professor, Civil, Environmental, and Architectural Engineering
Education: B.S. Virginia Tech (2008), M.S.E., Ph.D. University of Michigan (2009, 2014)
Teaching: CVEN 5534 Wastewater Treatment, CVEN 5624 Sustainable Engineering Design, EVEN 3550 Sustainability Principles for Engineers
Research: Sustainable water system design, resource recovery from waste, environmental biotechnology.
Email: sherri.cook@colorado.edu, Phone: 303 735 7288, Office: SEEC S299
John Crimaldi, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S.E. Princeton University, M.S. and Ph.D. Stanford University (1987, 1992, 1998)
Teaching: CVEN 3313 Theoretical Fluid Mechanics, CVEN 5313 Environmental Fluid Mechanics, CVEN 5343 Transport and Dispersion in Surface Water
Research: Interactions between fluid physics and ecology, Turbulent transport of chemicals and odors in complex natural flows
Email: crimaldi@colorado.edu, office: SEEC C252
William Emery, Professor Emeritus, Aerospace Engineering Science
Education: B.S. Brigham Young U. (1971), Ph.D., U. Hawaii (1975)
Teaching: ASEN 4337 Remote Sensing Data Analysis, ASEN 4215 Oceanography, ASEN 5168 Remote Sensing Instrument
Research: Satellite remote sensing of oceans, Vegetation and urban studies
Email: emery@colorado.edu, phone: 720 352 3004, office: ASEN 253
Noah Fierer, Professor, Dept. of Ecology & Evolutionary Biology; Director, Center for Microbial Exploration
Education: B.A., Oberlin College (1995), Ph.D University of California Santa Barbara (2003)
Research: Microbiology, Microbial ecology, Microbes in the built environment, Aerobiology
Email: noah.fierer@colorado.edu, Web: fiererlab.org, phone: 303 492 5615, office: CIRES 215
Michael Gooseff, Professor, Civil, Environmental and Architectural Engineering, INSTAAR
Education: B.C.E. Georgia Tech, M.S., Ph.D, University of Colorado Boulder
Teaching: CVEN 5333 Physical Hydrology
Research: Modeling water quality in surface waters, Contaminant fate and transport, Ecosystem response to climate change, Polar aquatic and general ecosystem research
Email: michael.gooseff@colorado.edu, phone: 303 735 5333, office: SEEC S217
Peter Hamlington, Associate Professor, Mechanical Engineering
Education: B.A. University of Chicago (2004), M.S., Ph.D., University of Michigan Ann Arbor (2005, 2009)
Research: Wildland fire, Oceanography, Wind energy
Email: peh@colorado.edu, phone: 303 492 0555, office: ECME 222
Michael Hannigan, Professor, Mechanical Engineering
Education: B.S. Southern Methodist University (1990), M.S., Ph.D. California Institute of Technology (1991, 1997)
Teaching: MCEN 4228 Sustainable Energy, MCEN 3037 Experimental Design and Data Analysis, MCEN 4131 Air Pollution Control
Research: Characterization and abatement of air pollution, Impact of air quality on health, Energy links to air quality
Email: michael.hannigan@colorado.edu, phone: 303 735 5045, office: ECME120
Daven Henze, Associate Professor, Mechanical Engineering
Education: B.S. University of Washington (2001), M.S., Ph.D. California Institute of Technology (2004, 2007)
Teaching: MCEN 5161 Aerosols
Research: Aerosols and air quality, Climatology and atmospheric chemistry, Adjoint sensitivity analysis, Data assimilation and remote sensing & modeling tools
Email: daven.henze@colorado.edu, phone: 303 492 8716, office: ECME 265
Mark Hernandez, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., Ph.D. Post-Doctoral Fellowship, University of California at Berkeley (1986, 1988, 1994, 1996)
Teaching: EVEN 5/4484 Environmental Microbiology and Toxicology, AREN 2110 Thermodynamics, CVEN 3434 Applied Ecology, GEEN 1400 Freshman Projects
Research: Forensic Environmental Microbiology, Biochemistry and Toxicology of Natural and Engineered Systems: Aerobiology, Disinfection and Corrosion
Email: mark.hernandez@colorado.edu, phone: 303 492 5991, office: SEEC S296D
Jean Hertzberg, Associate Professor, Mechanical Engineering
Education: B.S. U. Michigan (1981), M.S., Ph.D. University of California at Berkeley (1983, 1986)
Teaching:, MCEN 3021 Fluid Mechanics, MCEN 4151/5151 Flow Visualization , MCEN 4228 Aesthics of Design

Research: Flow visualization, Fluids education, Experimental vortex dominated fluid dynamics, Applications in cardiac flow and indoor air quality
Email: jean.hertzberg@colororado.edu, web: jeanhertzberg.com, phone: 303 492 5092; office: ECME 220
Amy Javernick-Will, Associate Professor, Civil, Environmental, And Architectural Engineering
Education: B.S. University of Colorado Boulder (1999), M.S. University of Colorado Boulder (2001), Ph.D. Stanford University (2009)
Teaching: AREN 4506 Pre-construction Estimating and Scheduling; CVEN 5346 Managing Engineering and Construction Organizations
Research: Disaster recovery, Community resiliency, Knowledge mobilization, Socially sustainable infrastructure projects, Engineering education
Email: amy.javernick@colorado.edu, phone: 303 492 6769, office: ECOT 512
Joseph Kasprzyk, Associate Professor, Civil, Environmental, and Architectural Engineering
Education: B.S. Pennsylvania State University (2007), M.S. Pennsylvania State University (2009), Ph.D. Pennsylvania State University (2013)
Teaching: CVEN 4333 Engineering Hydrology, CVEN 5423 Water Resources Engineering, CVEN 5393 Water Resource Systems and Management
Research: water resources planning and management, hydrologic modeling, multi-objective decision support, systems analysis, coupled natural-human systems
Email: joseph.kasprzyk@colorado.edu, phone: 303 492 1818; office: SEEC C244
Rita Klees, Scholar in Residence, Civil, Environmental, and Architectural Engineering
Education: B.A. College of St. Catherine (1972), M.A. University of Chicago (1975), M.S., Ph.D. University of Colorado (1986, 1989)
Teaching: CVEN 5919 Sustainable Community Development I, CVEN 5939 Field Practicum, CVEN 5969 Water, Sanitation and Hygiene (WASH)
Research: Sustainable community development, WASH in international development Sustainable WASH service delivery
Email: rita.klees@colorado.edu
Julie Korak, Assistant Professor, Civil, Environmental, and Architectural Engineering
Education: B.S. (ChemE and EVEN), M.S., Ph.D., Post-Doctoral Fellowship, University of Colorado- Boulder (2009, 2013, 2014)
Teaching: EVEN 4464 Environmental Engineering Processes, CVEN 5834 Analytical Methods, Experimental Design & Applied Data Analysis
Research: Water treatment processes, Environmental chemistry (inorganic and organic), Implementation of real-time sensors for water quality monitoring.
Email: korak@colorado.edu, phone: 303 735 4895, office: SEEC S291B
Karl Linden, Mortenson Professor in Sustainable Development, Civil, Environmental, and Architectural Engineering
Education: B.S. Cornell University (1989), M.S., Ph.D. University of California Davis (1993, 1997)
Teaching: CVEN 3424 Water and Wastewater treatment, EVEN/CVEN 4969 Water and Sanitation in Developing Communities, CVEN 5604 UV Processes
Research: Water treatment, Water reuse, Disinfection, Advanced oxidation, Sustainable systems
Email: karl.linden@colorado.edu, phone: 303 492 4798, office: SEEC S291A
Ben Livneh, Professor, Civil, Environmental, and Architectural Engineering
Education: B.E.Sc., M.E.Sc. University of Western Ontario (2004-2006), Ph.D. University of Washington (2012)
Teaching: CVEN 5363 Modeling Hydrologic Systems, CVEN 4333 Engineering Hydrology
Research: Climate and land cover change impacts on water resources, Computational hydrology, Land surface modeling, Terrestrial water and energy balances
Email: ben.livneh@colorado.edu phone: 303 735 0288, office: SEEC C251
Cresten Mansfeldt, Assistant Professor, Civil, Environmental, and Architectural Engineering
Education: B.C.E. University of Minnesota (2007), Ph.D. Cornell University (2013)
Teaching: CVEN 5484 Applied Microbiology and Toxicology, CVEN 5544 Municipal and Commercial Resource Recovery
Research: Water-energy nexus, Environmental microbiology, Wastewater treatment, Bioremediation, Biorecovery.
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Diane McKnight, Professor, Civil, Environmental, and Architectural Engineering
Education: B.S., M.S., Ph.D. Massachusetts Institute of Technology (1975, 1978, 1979)
Teaching: CVEN 3434 Applied Ecology, CVEN 5323 Applied Stream Ecology
Research: Aquatic ecology, Limnology, Reactive transport of metals and organic material in streams and rivers
Email: diane.mcknight@colorado.edu, phone: 303 492 4687 or 492 7573, office: SEEC S254C
Hope Michelsen, Associate Professor, Mechanical Engineering
Education: A.B. Dartmouth College (1984), PhD, Stanford University (1993)
Research: Combustion emissions, Soot, Black Carbon, Brown Carbon, Atmospheric Chemistry, Atmospheric Instrumentation
Email: hope.michelsen@colorado.edu, web: thesootlab.com, office: ECOT 238, lab: SEEL 250A
Shelly Miller, Professor, Mechanical Engineering
Education: B.S. Harvey Mudd College (1986), M.S., Ph.D. University of California at Berkeley (1991, 1996)
Teaching: MCEN 4131 Air Pollution Control, MCEN 4141 Indoor Air Pollution, GEEN 1400 Engineering Projects
Research: Urban air quality, Indoor air quality, Bioaerosols, Air pollution control technologies including infection control
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Jason Neff, Professor, Environmental Studies Program
Education: B.A. University of Colorado Boulder (1993), Ph.D. Stanford University (1999)
Research: Biogeochemistry, Food security, Environmental modeling
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Roseanna Neupauer, Professor, Civil, Environmental and Architectural Engineering
Education: B.S. Carnegie Mellon University (1989), B.A. University of Colorado (2018), S.M., Massachusetts Institute of Technology (1991), M.S., PhD, New Mexico Tech (1999, 2000)
Teaching: CVEN 4353/5353 Groundwater Engineering, CVEN 3323 Hydraulics, CVEN 4383/5383 Groundwater Modeling
Research: Groundwater flow and transport modeling, Stream-aquifer interaction, Groundwater remediation, Chaotic advection
Email: roseanna.neupauer@colorado.edu, phone: 303 492 6274, office: SEEC C245
John Pellegrino, Research Professor; Mechanical Engineering
Education: B.ChE. City College of New York (1973), M.S., Ph.D. (ChE) University of Colorado at Boulder (1979, 1983)
Teaching: Fluid Mechanics, Membranes, Energy, Separations
Research: Modification, formation, characterization, and performance of membranes; Electrochemical devices and processes; Water treatment and supply; Concentrate minimization
Email: john.pellegrino@colorado.edu, phone 303 735 2631, office: ECES 168
Greg Rieker, Associate Professor, Vogel Family Faculty Fellow, Mechanical Engineering
Education: B.S. Missouri University of Science and Technology (2002), M.S. Stanford University (2004), Ph.D. Stanford University (2009)
Research: Optical and laser-based sensing for environmental and energy systems
Email: greg.rieker@colorado.edu, web: www.colorado.edu/lab/rieker, phone: 303 492 6802, office: ECME 226
Fernando Rosario-Ortiz, Professor, Civil, Environmental, and Architectural Engineering, EVEN Director
Education: B.S. University of Puerto Rico, M.S. California Institute of Technology, D.ENV. UCLA,
Teaching: EVEN 4404 Water Chemistry, CVEN 5424 Environmental Organic Chemistry, EVEN 1000 Introduction to Environmental Engineering, CHEN 1203

General Chemistry II
Research: Environmental photochemistry, Dissolved organic matter, Climate effects on water quality
Email: fernando.rosario@colorado.edu, phone: 303 492 7607, office: SEEC S273
Joseph Ryan, Professor, Civil, Environmental, and Architectural Engineering; former EVEN Director
Education: B.S. Princeton U. (1983), M.S., Ph.D. Massachusetts Institute of Technology (1988, 1992)
Teaching: EVEN 4424 Environmental Organic Chemistry, CVEN 5404 Water Chemistry
Research: Contaminant fate and transport in natural waters, Surface and colloid chemistry, Sources and transport of metals in watersheds affected by acid mine drainage
Email: joseph.ryan@colorado.edu, phone: 303 492 0772, office: SEEC S286B
Carlo Salvinelli, Instructor, Civil, Environmental, and Architectural Engineering
Education: B.S. University of Brescia (2007), M.S. University of Brescia (2012), Ph.D. Missouri University of Science & Technology (2016)
Teaching: CVEN 2837 Introduction to Global Engineering, CVEN 5833 Program & Project Management, CVEN 5833 Solution Identification & Proposal Development, CVEN 5833 Community Appraisal, CVEN 5833 Study Design & Impact Evaluation, CVEN 5833 Data Collection & Analysis Tools
Research: Water service delivery in low income contexts, disaster risk reduction, humanitarian-development nexus and forced displacement related crises
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Anthony Straub, Assistant Professor, Civil, Environmental, and Architectural Engineering
Education: B.S. University of Illinois at Urbana-Champaign (2012), M.S., Ph.D. Yale University (2017)
Teaching: CVEN 3414 Fundamental of Environmental Engineering, CVEN 5464 Environmental Engineering Processes
Research: Water-energy nexus, membrane processes, desalination and advanced water treatment, Sustainable energy production
Email: anthony.straub@colorado.edu, phone: 815 979 7768, office: SEEC S295B
Evan Thomas, Associate Professor, Mortenson Center Director, Mortenson Endowed Chair in Global Engineering
Education: B.S., M.S. University of Colorado Boulder (2006)**,** Ph.D. University of Colorado Boulder (2009), M.P.H. Oregon Health & Science University
Teaching: CVEN 5837 Development Engineering, CVEN 2837 Introduction to Global Engineering
Email: ethomas@colorado.edu, phone: 303 550 4671, office: SEEC N292D
Marina Vance, Assistant Professor, Mechanical Engineering
Education: B.S., M.S. Universidade Federal de Santa Catarina (2004, 2008), Ph.D. Virginia Tech (2012)
Teaching: MCEN 5228 Nanotechnology for Environmental Sustainability, MCEN 4045 and MCEN 4085 Mechanical Engineering Design Project 1 and 2, MCEN 4131 Air Pollution Control, MCEN 3047 Data Analysis and Experimental Methods
Email: marina.vance@colorado.edu, phone: 303 735 4567, office: ECME 132
Jeff Writer, Instructor, Civil, Environmental, and Architectural Engineering, Co-Director, CU Teach Program
Education: B.A. Brown University (1987) M.S. Teacher Certification, Ph.D. University of Colorado (1992, 1997, 2010)
Teaching: EDUC 2020 Step 1, EDUC 2030 Step 2, EDUC 5385 Project Based Instruction, EDUC 4833/5833 Teaching and Learning Earth Systems, CVEN 3414 Fundamentals of Environmental Engineering, CVEN 5323 Applied Stream Ecology, CVEN 3434 Applied Ecology
Research: Contaminant fate and transport in surface waters, ecosystem/infrastructure interactions
Email: jeffrey.writer@colorado.edu, phone: 720 544 1680, Office: EDUC 344
Wendy Young, Senior Instructor, Chemical and Biological Engineering
Education: B.S. University of Notre Dame (1996), M.S., PhD University of Colorado (1998, 2002)
Teaching: CHEN 4520 Design, CHEN 4130 Undergraduate Lab, CHEN 4090 Undergraduate Seminar, CHEN 3220 Separations, CHEN 1300 Intro to Chemical Engineering
Email: wendy.young@colorado.edu, phone: 303 492 8721, office: JSCBB D1B24

Forms and Appendices

These **forms** can be found on the College of Engineering and Applied Science's Advising website:

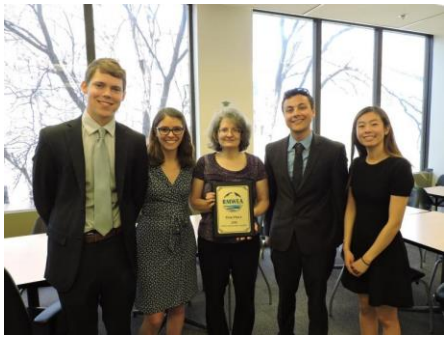
- Change of Major (including adding additional major or minor)
- Concurrent BS/MS Application
- Course Schedule Approval (for students on academic probation)
- Incomplete Grade
- Independent Study
- Minor Completion (for engineering minors)
- Petition

In addition to the forms listed above, the following forms may be obtained from the Academic Advisor:

- Advising Evaluation Form
- Degree Requirements Worksheet (see also following pages)
- Senior Thesis Proposal Forms
- Special Action Form
- Special Option Selection Proposal
- Transfer Credit Appeal

These **appendices** are included here in the following pages:

- Technical Elective Suggestions
- Useful Websites



2019 EVEN Senior Design Team wins 1st place First Place at RMWEA Student Design Competition

Technical Elective Courses

Any of the courses listed in the options are good technical electives. A list of approved Technical Elective Courses for EVEN are available on the EVEN website. If a course is not on this list, you may request approval on a petition form. Honors sections of the courses listed below will also be accepted.

Some graduate-level classes (5000+) can also be taken as technical electives -- check with your advisor. Note, however, that prerequisites are not listed in the catalog for graduate courses; instructor's permission may be required.

Courses marked with an asterisk (*) fulfill the earth sciences technical elective requirement (geology, meteorology or soil science). Courses marked with † will fulfill the air/earth sciences lab/field requirement.

Useful Websites

Environmental Engineering Program: www.colorado.edu/even/
College of Engineering and Applied Science: www.colorado.edu/engineering/
Academic Coaching: https://www.colorado.edu/engineering-advising/academiccoaching
Academic Support Programs: http://www.colorado.edu/engineering/academics/support
Active Learning Program: http://www.colorado.edu/activelearningprogram/
Co-op Program: www.colorado.edu/activelearningprogram/professional-learning/cooperative-education-program
Discovery Learning (includes Discovery Learning Apprenticeship Program, Undergraduate Research Opportunities Program (UROP), Bioscience Undergraduate Research Skills and Training (BURST), Research Experience for Undergraduate (REU)): www.colorado.edu/activelearningprogram/discovery-learning
Service Learning (includes Earn-Learn Apprenticeship Program, Engineering for Developing Communities, Engineers Without Borders, etc.): www.colorado.edu/activelearningprogram/service-learning
Professional Learning (includes internships and co-ops): http://www.colorado.edu/activelearningprogram/professional-learning
Advising Guides (College): www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies
BOLD Center, Academic Support: www.colorado.edu/bold/
Career Services: www.colorado.edu/career/
Catalog, University of Colorado at Boulder: catalog.colorado.edu/
Engineering for Developing Communities (EDC): www.colorado.edu/mcedc/
Engineering Honors Program: www.cuhonorsengineering.com
FE Exam: National Council of Examiners for Engineering and Surveying www.ncees.org/
State of Colorado Board of Licensure: https://www.colorado.gov/pacific/dora/AES

Forms (College): Petition form, Change of Major Form, etc.): http://www.colorado.edu/engineering-advising/forms
Humanities and Social Sciences Requirements: www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-writing-requirements/alphabetic-list
Herbst Program: www.colorado.edu/herbst/
International Engineering Certificates: http://www.colorado.edu/engineering-international/
Minors: www.colorado.edu/engineering/academics/guide-degrees-certificates/minors and www.colorado.edu/leeds/minor-business
Buff Portal: buffportal.colorado.edu
Office of the Registrar: registrar.colorado.edu/
Schedule of Courses: buffportal.colorado.edu
Course listings in .pdf format: conted.colorado.edu/programs/access/
Student Society for Environmental Engineering: www.colorado.edu/even/current-students/undergraduate-studies/seven-society-even
Study Abroad: abroad.colorado.edu/
Transfer students, information for: www.colorado.edu/admissions/transfer
Transfer Credits: www.transferology.com/
GTPathways curriculum: highered.colorado.gov/Academics/Transfers/gtPathways/default.html

Degree Requirements Worksheet – EVEN BS Degree 2023-2024

Student Name:_____ Student#:_____

Faculty Advisor:_____ Catalog year:_____ Major year:_____

Required Courses

course no.	course name	credits	course taken (if different)	grade	term
Engineering (54 hours)					
EVEN 1000	Intro to Environmental Engineering	1			
CHEN 1310	Intro to Engineering Computing	3			
GEEN 1400	Engineering Projects	3			
CVEN 3414	Fundamentals of Environmental Engr	3			
	Free Elective	3			
[1]	Statics/Mechanics	3			
EVEN 4404	Water Chemistry	3			
EVEN 4414	Water Chemistry Lab	1			
[2]	Engineering Economics	3			
[3]	Fluid Mechanics	3			
[4]	Thermodynamics	3			
EVEN 4424	Environmental Organic Chemistry	3			
[5]	Fundamentals of Engineering	3			
EVEN 4484	Intro to Environmental Microbiology	3			
MCEN 4131	Air Pollution Control	3			
EVEN 3550	Sustainability Principles for Engineers	3			
CVEN 4333	Engineering Hydrology	3			
EVEN 4464	Environmental Engineering Processes	3			
EVEN 4434	Environmental Engineering Design	4			
			Engineering Total (**54**)		
Mathematics (16 hours)					
APPM 1350	Calculus 1 for Engineers	4			
APPM 1360	Calculus 2 for Engineers	4			
APPM 2350	Calculus 3 for Engineers	4			
APPM 2360	Intro Diff Eqns w Linear Algebra	4			
			Mathematics Total (**16**)		
Sciences (19 hours)					
CHEN 1201	General Chemistry For Engineers 1	4			
CHEN 1203	General Chemistry For Engineers	2			
CHEM 1221	General Chemistry Laboratory	1			
PHYS 1110	General Physics 1	4			
PHYS 1120	General Physics 2	4			
PHYS 1140	Experimental Physics 1	1			
[6]	Probability and Statistics	3			
			Sciences Total (**19**)		

[1] Statics/Mechanics options: CVEN 2121 Analytical Mechanics, GEEN 2851 Statics for Engrs, MCEN 2023 Statics and Structures.

[2] Engineering Economics options: EMEN 4100 Business Methods and Economics for Engineers, CVEN 3246 Intro to Construction

[3] Fluid Mechanics options: CVEN 3313 Fluid Mechanics, CHEN 3200 Chemical Engineering Fluid Mechanics, , MCEN 3021 Fluid Mechanics.

[4] Thermodynamics options: EVEN 3012/AREN 2110 Thermodynamics, CHEN 3320 Chemical Engineering Thermodynamics, GEEN 3852 Thermodynamics for Engineers, MCEN 3012 Thermodynamics.

[5] Fundamentals of Engineering options: MCEN 3022 Heat Transfer, CVEN 3424 Water and wastewater, CVEN 3323 Hydraulic Engineering.

[6] Probability & Statistics options: CVEN 3227 Probability, Statistics, & Decision, STAT 4000 Statistical Methods, CHEN 3010 Applied Data Analysis,

Degree Requirements Worksheet – EVEN BS Degree 2023-2024

Elective Courses

course no.	course name	credits	course taken	grade	term
Humanities & Social Sciences Electives (18 hours, 6 hours upper division)					
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (lower or upper division)				
	H&SS (upper division)				
	H&SS (upper division)				
[7]	Required Writing Course				
			H&SS Total (**18**)		
Environmental Engineering option courses (9 hours)					
[8]	Enviro Eng Opt A				
	Enviro Eng Opt B				
	Enviro Eng Opt B				
			Enviro Eng TE Total (**9**)		
Technical Electives (9 hours: 6 hours upper division, 3 Earth Science)					
[9]	Tech (lower or upper division)				
	Tech (upper division)				
	Tech (upper division)				
[10]	Fate and Transport EVEN 4494				
			(**12**)		

Credit hour Total:		**(128) Grade Point Average:**	
MAPS Complete:		**Date: Date:**	
FE Exam:		**Date:**	
Final Check:			

[7] Writing courses: ENES 1010 Humanities for Engineers: The Human Quest, ENES 3100 Advanced Humanities for Engineers: The Human Quest Continues, WRTG 3030 Writing on Science and Society, WRTG 3035 Technical Communication and Design, or PHYS 3050 Writing in Physics.
[8] Consult Environmental Engineering (EVEN) Degree Guidelines for lists of Option courses.
[9] Technical Electives: Three technical elective credits may be lower division (1000-, 2000-level). Three technical elective credits must be in the earth sciences, either lower or upper division. Independent studies or senior thesis may be completed as technical electives for up to 6 credits total, 3 credits per semester.

View degree chart here:

2023-2024 EVEN BS Block Diagram

SEM CR						
Spr 16	**Enviro Eng Opt List B -3-**	**Free Elective -3**	**CVEN 4333 -3- Engineering Hydrology** **P: Fluids** **C: Prob & Stat**	**EVEN 4434 - 4- Environmental Engineering Design** P: CVEN 3414 & EVEN 4464 or CVEN 3324	**Technical Elective III -3- or Senior thesis ***	
				*		

Fall 18		Enviro Eng Opt List B -3-	EVEN 4494 Fate & Transport -3 P: EVEN 4404/4414 C: EVEN 4424, EVEN 4464	MCEN 4131 -3- Air Pollution Control P: fluid mechanics & Thermo	EVEN 4464 -3- Env Engrg Processes P: CVEN3414 & fluids	Technical Elective II - 3- or Senior thesis *	H&SS Elective V - 3- upper division
			*	*	*		
Spr 15		Enviro Eng Opt List A -3-	EVEN 4424 -3- Env Organic Chemistry P:CHEN 1211 or 1203 or CHEM 1133 & EVEN 4404	Probability & Statistics - 3- CVEN 3227: JR or SR level only	EVEN 4484 -3- Intro to Environ Microbiology P:CHEN 1201 or CHEN1211 & CHEM 1221 & Calc 1	Engineering Fundamentals-3 MCEN 3022- F/SP, CVEN 3323- F or CVEN 3424- SP	
			*	*	*		
Fall 16		Engineering Economics -3 EMEN 4100 or CVEN 3246	EVEN 4404 -3- Water Chemistry EVEN 4414 -1- Water Chem Lab P: CHEN 1203 or CHEN1211 & CVEN3414	EVEN 3550 -3- Sustainability Principles for Engineers C: CVEN 3414		Thermodynamics -3 EVEN 3012 and AREN: P:PHYS 1110 C: Calc 2 MCEN: P:Calc 2	Writing Course -3- (Jr. standing)
			*	*			
Spr 16		APPM 2360 -4- Introduction to Differential Equations & Linear Algebra P: APPM 1360 or MATH 2300		Fluid Mechanics - 3- CVEN P: Statics MCEN P: Statics & Calc 3	CVEN 3414 -3- Fundamentals of Env. Engineering P: CHEN 1201 or CHEN 1211, CHEM 1221, & APPM 1360	Technical Elective I -3- *	H&SS Elective IV - 3- upper division
Fall 15		APPM 2350 -4- Calculus III for Engineers P: APPM 1360 or MATH 2300 OR MATH 2400	PHYS 1120 -4- PHYS 1140 -1- Gen.Phys/Lab P: PHYS 1110 & C: MATH 2300 or APPM 1360	Statics/Mechanics - 3 CVEN:P: PHYS 1110 & C: Calc III; MCEN: P: calc II, Phys 1110 GEEN: P:PHYS 1110,APPM 2350			H&SS Elective III - 3- lower division
Spr 17		APPM 1360 -4- Calculus II for Engineers P: APPM 1350 or MATH 1300 OR MATH 2300	PHYS 1110 -4- Gen. Physics I P/C: APPM 1350 or MATH 1300	<u>CHEN 1203</u>- 2- GenChem for Engineers 2 & <u>CHEM 1221</u>-1- Eng Gen Chem Lab P: CHEN 1201 $	CHEN 1310 -3- Introduction to Computing P/C: APPM 1350 or MATH 1300		H&SS Elective II - 3- lower division
Fall 15		APPM 1350 -4- Calculus I for Engineers OR MATH 1300	CHEN 1201-4- Gen Chem for Engineers 1		GEEN 1400 -3- Engineering Projects	EVEN 1000 -1- Introduction to Environmental Engineering	H&SS Elective I - 3- lower division
						*	

Statics/ Mechanics: CVEN 2121 Analytic Mechanics I (F,S; PHYS 1110, co-req APPM 2350);
GEEN 2851 Statics for Engr (PHYS 1110, APPM 1360); **MCEN 2023** Statics &
Structures (F; APPM 1360 & PHYS 1110)
Fluid Mechanics: CVEN 3313 Theoretical Fluid Mechanics (S; Solid Mechanics);
MCEN 3021 Fluid Mechanics (F,S; Pre APPM 2350, Solid Mech coreq APPM 2360),
CHEN 3200 Chem Engr Fluid Mechanics (S; APPM2350/2360, CHEN2120/MCEN2023),
GEEN 3853 Fluid Mech for Engrs (sum,APPM 2350/2360, GEEN 1300)
Thermodynamics: **EVEN 3012** Environmental Engineering Thermodynamics (PHYS 1110, APPM 1360, CHEN 1211), **AREN 2110** Thermo (F,S; APPM1360, PHYS1110, CHEN 1211), **GEEN 3852** Thermo for Engrs (SUM, APPM2350); **MCEN 3012** Thermodynamics (F,S; reqd air quality option; APPM 2350); **CHEN 3320** Chem Eng Thermo (F; reqd chem proc option; CHEN2120, CHEM4521);
Eng Fundamental Course: MCEN 3022 Heat Transfer (F,S; P-Thermo,Fluids, APPM 2360); **CVEN 3424** Water & Wastewater (P-CVEN 3414) **CVEN 3323** Hydraulic Engineering (P-Fluids)

***Tech electives:** 3 cr can be lower division, others must be 3000 or 4000 level; one tech elective (3cr) must relate to earth science noted on list by * next to it on the TE List.
Engineering Economics: **EMEN 4100** Business Methods and Economics for Engineers; **CVEN 3246** Introduction to Construction(F,S,Sum)
Probability and Statistics: CVEN 3227 Probability, Statistics, & Decision (S);
STAT 4000 Statistical Methods (F,S; APPM 1360); **CHEN 3010** Appl Data Analysis (F,CHEN1310, APPM 2360)
Writing Course: **ENES 3100** Humanities for Engrs, **WRTG 3030** Writing Sci & Society, **WRTG 3035** Tech Comm & Design; PHYS 3050 Wrtg for Phys; **WRTG 3020** Irish Odysseys:Writing in Ireland; **ENES 1010- Freshmen year only**.
Key: P: Prereq C: Co-req. - Courses marked wtih an * are offered only in SEMESTER shown.