ENVIRONMENTAL ENGINEERING - BACHELOR OF SCIENCE (BSEV)

Environmental engineers play a vital role in maintaining the quality of both public health 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 municipal, 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 and indoor air pollution, human health and ecological risk management, prevention of pollution through alternative product or process design, and renewable and sustainable energy sources.

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 blended with contributions from scientists, lawyers, business people 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, opening up increasing opportunities for international work in the environmental engineering field.

Mission

The mission of the Environmental Engineering Program (http://www.colorado.edu/even/) 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 lifelong learning and prepares students for broad and dynamic career paths in environmental engineering.

Faculty

The faculty of the Environmental Engineering (EVEN) Program (http://www.colorado.edu/even/people/) are drawn from the Departments of Civil, Environmental, and Architectural Engineering; Mechanical Engineering; Chemical and Biological Engineering; and Aerospace Engineering Sciences. The EVEN faculty, its Professional Advisory Board (representing prospective employers of its graduates) and EVEN alumni and current students have contributed to the creation of the program's mission and the educational objectives of the BS in environmental engineering degree.

Requirements

To earn a bachelor's degree in environmental engineering, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit Bachelor of Science in Environmental Engineering (https://www.colorado.edu/even/current-students/undergraduate-studies/) webpage. In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/).

Note: This major cannot be combined with a BS in integrated design engineering with an environmental engineering emphasis.

Some variations may be possible; see undergraduate advisor to work on approval.

Required Courses and Credits

Code	Title	Credit Hours
Required Courses		
CHEN 1310	Introduction to Engineering Computing	3
CVEN 2121	Analytical Mechanics 1	3
or MCEN 2023	Statics and Structures	
or GEEN 2851	Statics for Engineers	
CVEN 3227	Probability, Statistics and Decision	3
or STAT 4000	Statistical Methods and Application I	
CVEN 3246	Introduction to Construction	3
or CVEN 4147	Civil Engineering Systems	
or EMEN 4100	Engineering Economics	
CVEN 3313	Theoretical Fluid Mechanics	3
or MCEN 3021	Fluid Mechanics	
or CHEN 3200	Chemical Engineering Fluid Mechanics	
or GEEN 3853	Data Analysis for Engineers	
CVEN 3414	Fundamentals of Environmental Engineering	3
CVEN 4333	Engineering Hydrology	3
EVEN 1000	Introduction to Environmental Engineering	1
or AREN 1316	Introduction to Architectural Engineering	
or ASEN 1000	Introduction to Aerospace Engineering Sciences	
or BMEN 1000	Exploring Biomedical Engineering	
or CHEN 1300	Introduction to Chemical and Biological Engineering	
or COEN 1500	CEAS First Year Seminar	
or CSCI 1000	Computer Science as a Field of Work and Study	
or CVEN 1317	Introduction to Civil and Environmental Engineering	
or ECEN 1100	Exploring ECE	
EVEN 3012	Thermodynamics for Environmental Science and Engineering	3
or AREN 2110	Thermodynamics	
or GEEN 3852	Thermodynamics for Engineers	
or MCEN 3012	Thermodynamics	
or CHEN 3320	Chemical Engineering Thermodynamics 1	
EVEN 3550	Sustainability Principles for Engineers	3
EVEN 4404	Water Chemistry	3
EVEN 4414	Water Chemistry Laboratory	1
EVEN 4424	Environmental Organic Chemistry	3
EVEN 4434	Environmental Engineering Design	4
EVEN 4464	Environmental Engineering Processes	3
EVEN 4484	Integrative Environmental and Molecular Microbiology	3
EVEN 4494	Contaminant Fate and Transport	3
GEEN 1400	Engineering Projects	3

or ASEN 1400	Gateway to Space	
or ASEN 1403	Introduction to Rocket Engineering	
or ECEN 1400	Introduction to Digital and Analog Electronics	
MCEN 4131	Air Pollution Control Engineering	3
Engineering Fundamentals Course		3
MCEN 3022	Heat Transfer	
CVEN 3424	Water and Wastewater Treatment	
CVEN 3323	Hydraulic Engineering	
Required Science Courses		
CHEM 1221	Engineering General Chemistry Lab	1
or CHEM 1134	Laboratory in General Chemistry 2	
CHEN 1201	General Chemistry for Engineers 1	4
CHEN 1203	General Chemistry for Engineers 2 [1]	2
or CHEN 1211	Accelerated Chemistry for Engineers	
or CHEM 1133	General Chemistry 2	
PHYS 1110	General Physics 1	4
or PHYS 1115	General Physics 1 for Majors	
PHYS 1120	General Physics 2	4
or PHYS 1125	General Physics 2 for Majors	
PHYS 1140	Experimental Physics 1	1
Required Mathematics Courses		
APPM 1350	Calculus 1 for Engineers	4
or MATH 1300	Calculus 1	
or APPM 1345	Calculus 1 with Algebra, Part B	
APPM 1360	Calculus 2 for Engineers	4
or MATH 2300	Calculus 2	
APPM 2350	Calculus 3 for Engineers	4
or MATH 2400	Calculus 3	
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
or MATH 2130 & MATH 3430	Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations	
or MATH 2135 & MATH 3430	Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations	
Humanities, Social Sciences and Writing [2]		**18**
Required Technical Electives		
Choose one lower-division and two upper-division technical electives, one of which must satisfy earth science requirement. [3]		
EVEN Areas of Specialization		
Choose one from the department's areas of specialization List A and two from List B [4]		
Free Electives		
Choose three credit hours of free electives to meet the minimum 128 credit hours required for the BS degree.		3

1. If student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives.
2. Complete the College's Humanities, Social Sciences and Writing (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) requirements (18 credits total) as specified.
3. See department's list of Technical Elective Suggestions for EVEN Students (https://www.colorado.edu/even/sites/default/files/attached-files/technical_elective_offered_in_2019-2020-nov2019_0.pdf).
4. See department's website for more information about EVEN Areas of Specialization (https://www.colorado.edu/even/current-students/undergraduate-studies/even-areas-specialization/).

Sample Four-Year Plan of Study

Year One

Fall Semester		**Credit Hours**
APPM 1350	Calculus 1 for Engineers	4
CHEN 1201	General Chemistry for Engineers 1	4
EVEN 1000	Introduction to Environmental Engineering	1
COEN 1500	CEAS First Year Seminar	1
First-Year Engineering Projects course		3
Humanities and social science elective [1]		2
	Credit Hours	**15**
Spring Semester		
APPM 1360	Calculus 2 for Engineers	4
CHEN 1203	General Chemistry for Engineers 2	2
CHEM 1221	Engineering General Chemistry Lab	1
CHEN 1310	Introduction to Engineering Computing	3
PHYS 1110	General Physics 1	4
Humanities and social science elective [1]		3
	Credit Hours	**17**

Year Two

Fall Semester		
APPM 2350	Calculus 3 for Engineers	4
PHYS 1120	General Physics 2	4
PHYS 1140	Experimental Physics 1	1
Select one of the following in Statics:		3
CVEN 2121	Analytical Mechanics 1	
GEEN 2851	Statics for Engineers	
MCEN 2023	Statics and Structures	
Humanities and social science elective [1]		3
	Credit Hours	**15**
Spring Semester		
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
CVEN 3414	Fundamentals of Environmental Engineering	3
Select one of the following in Fluids Mechanics:		3
CVEN 3313	Theoretical Fluid Mechanics	
GEEN 3853	Data Analysis for Engineers	
MCEN 3021	Fluid Mechanics	
CHEN 3200	Chemical Engineering Fluid Mechanics (Select one of the following in Fluids Mechanics:)	
Technical Elective [2]		3
Humanities and social science elective [1]		3
	Credit Hours	**16**

Year Three		
Fall Semester		
EVEN 4404	Water Chemistry	3
EVEN 4414	Water Chemistry Laboratory	1
EVEN 3550	Sustainability Principles for Engineers	3
Select one of the following in Engineering Economics:		3
CVEN 3246	Introduction to Construction	
EMEN 4100	Engineering Economics	
Select one of the following in Thermodynamics:		3
EVEN 3012	Thermodynamics for Environmental Science and Engineering	
AREN 2110	Thermodynamics	
MCEN 3012	Thermodynamics	
CHEN 3320	Chemical Engineering Thermodynamics 1	
GEEN 3852	Thermodynamics for Engineers	
College-approved writing course [3]		3
	Credit Hours	**16**
Spring Semester		
EVEN 4424	Environmental Organic Chemistry	3
EVEN 4484	Integrative Environmental and Molecular Microbiology	3
Engineering Fundamental Course		3
MCEN 3022	Heat Transfer	
CVEN 3424	Water and Wastewater Treatment	
CVEN 3323	Hydraulic Engineering	
Select one of the following in Probability and Statistics:		3
CVEN 3227	Probability, Statistics and Decision	
STAT 4000	Statistical Methods and Application I	
CHEN 3010	Applied Data Analysis	
Environmental engineering design/technical elective I [4]		3
	Credit Hours	**15**
Year Four		
Fall Semester		
EVEN 4464	Environmental Engineering Processes	3
EVEN 4494	Contaminant Fate and Transport	3
MCEN 4131	Air Pollution Control Engineering	3
Environmental engineering design/technical elective II [4]		3
Select one of the following:		3
Technical elective II [2]		
Senior Thesis [5]		
Environmental engineering design/technical elective III [4]		
Humanities and social science elective [1]		3
	Credit Hours	**18**
Spring Semester		
CVEN 4333	Engineering Hydrology	3
EVEN 4434	Environmental Engineering Design	4
Select one of the following:		3
Environmental engineering design/technical elective III [4]		
Technical Elective II [2]		
Select one of the following:		3
Technical elective III [2]		
Senior Thesis [5]		
Free elective		3
	Credit Hours	**16**
	Total Credit Hours	**128**

1. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).
2. A total of 9 credit hours of technical electives is required. Three technical elective credit hours may be lower-division (1000–2000-level). Three technical elective credit hours must be in the earth sciences, either lower or upper division. Remaining technical elective credit hours must be upper division in engineering, mathematics or sciences. Independent study (EVEN 4840) or senior thesis (EVEN 4980 and EVEN 4990) may be completed as technical electives for up to 6 credits hours.
3. Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/).
4. A nine-credit-hour (three-course) sequence in environmental engineering – one environmental engineering design course and two environmental engineering technical electives.
5. A senior thesis can be completed on a single research topic, with faculty approval and direction, and can apply toward technical elective requirements.

Learning Outcomes

Program Educational Objectives

The educational objective of the Environmental Engineering 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 respond to the needs of society by pursuing professional registration or other appropriate certifications.
3. Graduates will be engaged in continual learning and advancing knowledge by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, and/or participation in professional societies.
4. Graduates will apply critical thinking and creativity as they develop solutions that provide benefits to communities, the environment and/or public health.
5. Graduates will conduct themselves ethically and professionally, while demonstrating that they value diversity and inclusion in work interactions and engagement with the public.

Student Outcomes

Upon graduation, students are expected to be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- 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.
- Communicate effectively with a range of audiences.
- 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.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

Bachelor's–Accelerated Master's Degree Program(s)

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.

BS in Environmental Engineering, MS in Environmental Engineering, Civil Engineering or Mechanical Engineering

Admissions Requirements

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

- Have a cumulative GPA of 3.000 to earn either the EVEN or CVEN MS or a 3.25 GPA to earn the MCEN MS.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Have at least junior status within the bachelor's degree program.

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 six 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.

Please see the BAM degree program (https://www.colorado.edu/even/current-students/undergraduate-studies/5-year-bsms/) web page for more information.