

CIVIL ENGINEERING - BACHELOR OF SCIENCE (BSCV)

The curriculum in civil engineering within the Department of Civil, Environmental and Architectural Engineering has been designed to prepare students for entry-level positions in professional practice or for graduate study in the following subdisciplines of civil engineering:

- construction engineering and management
- environmental engineering
- geotechnical engineering and geomechanics
- structural engineering and structural mechanics
- water resource engineering and management

For undergraduates who want additional preparation for graduate study and careers in research and development within civil engineering, a theoretically-based engineering science track is also available.

Colorado Mesa University/University of Colorado Boulder Partnership Program (Civil Engineering)

Colorado Mesa University (CMU) (<http://www.coloradomesa.edu/engineering/>) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs in their entirety in Grand Junction, Colorado. The first two years of coursework are taught by CMU faculty and the second two years of coursework are taught by CU Boulder faculty located in Grand Junction. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in mechanical engineering, civil engineering, and electrical & computer engineering, with additional details on the partnership website (<https://www.coloradomesa.edu/engineering/partnership-program/>).

Coursework requirements and plans of study specific to this partnership can be found on the Colorado Mesa University civil engineering partnership website (<https://www.coloradomesa.edu/engineering/degrees/civil-engineering-partnership.html>). Learn more about this program on the CU Boulder partnership website (<https://www.colorado.edu/academics/cmu-cu-bs-civil-engineering/>).

Program Requirements

To earn a bachelor's degree in civil engineering, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit the Bachelor of Science in Civil Engineering (<https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/>) webpage. *Note:* Some variations may be possible; see a civil engineering academic advisor.

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/>) and all graduation requirements specified on the CEAE Department website (<https://www.colorado.edu/ceae/current-students/undergraduate-studies/graduation-requirements-advising-guide/>).

Civil engineering is also offered in partnership with Colorado Mesa University (<https://www.coloradomesa.edu/engineering/partnership-program/>) in Grand Junction, Colorado. Specific coursework requirements and plans of study can be found on the partnership website (<https://www.coloradomesa.edu/engineering/degrees/civil-engineering-partnership.html>).

Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet a prerequisite requirement.

Required Courses and Credits

Code	Title	Credit Hours
Required Courses		
AREN 2110	Thermodynamics	3
or ASEN 2702	Introduction to Thermodynamics and Aerodynamics	
or GEEN 3852	Thermodynamics for Engineers	
or MCEN 3012	Thermodynamics	
or CVEN 2545	Construction Materials	
CSCI 1200	Introduction to Computational Thinking	3
or ASEN 1320	Aerospace Computing and Engineering Applications	
or CHEN 1310	Introduction to Engineering Computing	
or CSCI 1300	Computer Science 1: Starting Computing	
or ECEN 1310	C Programming for ECE	
CVEN 1027	Civil Engineering Drawing	3
or AREN 1027	Engineering Drawing	
CVEN 1317	Introduction to Civil and 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 Engineering	
or CSCI 1000	Computer Science as a Field of Work and Study	
or ECEN 1100	Exploring ECE	
or EVEN 1000	Introduction to Environmental Engineering	
CVEN 2012	Introduction to Geomatics	3
CVEN 2017	Excel Matlab R Primer	1
CVEN 2121	Analytical Mechanics 1	3
or GEEN 2851	Statics for Engineers	
or MCEN 2023	Statics and Structures	
or ASEN 2701	Introduction to Statics, Structures, and Materials	
CVEN 3111	Analytical Mechanics 2	3
or MCEN 2043	Dynamics	
CVEN 3161	Mechanics of Materials 1	3
or MCEN 2063	Mechanics of Solids	
CVEN 3227	Probability, Statistics and Decision	3
CVEN 3246	Introduction to Construction	3

CVEN 3313	Theoretical Fluid Mechanics	3
or AREN 2120	Fluid Mechanics and Heat Transfer	
or CHEN 3200	Chemical Engineering Fluid Mechanics	
or MCEN 3021	Fluid Mechanics	
CVEN 3323	Hydraulic Engineering	3
CVEN 3414	Fundamentals of Environmental Engineering	3
CVEN 3525	Structural Analysis	3
CVEN 3698	Engineering Geology	3
CVEN 3708	Geotechnical Engineering 1	3
CVEN 4897	Professional Issues in Civil Engineering	2
CVEN 4899	Civil Engineering Senior Project Design	4
GEEN 1400	Engineering Projects ¹	3
or ASEN 1400	Gateway to Space	
or ASEN 1403	Introduction to Rocket Engineering	
or CHEN 1400	Drugs, Driving and Dynamic Processes	
or ECEN 1400	Introduction to Digital and Analog Electronics	

Required Math and Science 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	
CHEM 1114	Laboratory in General Chemistry 1	1
or CHEM 1221	Engineering General Chemistry Lab	
CHEN 1201	General Chemistry for Engineers 1	4
or CHEN 1211	Accelerated Chemistry for Engineers	
or CHEM 1113	General Chemistry 1	
or MCEN 1024	Chemistry for Energy and Materials Science	
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 Proficiency Courses

Choose three:

CVEN 3256	Construction Equipment and Methods
CVEN 3424	Water and Wastewater Treatment
CVEN 3718	Geotechnical Engineering 2
CVEN 4333	Engineering Hydrology
CVEN 4545	Steel Design
or CVEN 4555	Reinforced Concrete Design

Required Technical Electives

At least 6 credits of technical electives must be upper-division AREN or CVEN courses.	6
Remaining technical electives may be upper-division AREN or CVEN courses, or any course on the approved Technical Elective List. ²	6

Free Electives**Humanities, Social Sciences and Writing**Complete the College's Humanities, Social Sciences, and Writing requirements ³**Total Credit Hours****128**

¹ Students who do not take a first-year projects course may substitute a basic engineering elective: any 3-credit technical course offered in ASEN, AREN, APPM, CHEN, COEN, CVEN, CSCI, ECEN, EMEN, EVEN, GEEN, MCEN, or other course approved by the CEAE Curriculum Committee. Remedial courses (such as precalculus) or courses approved as Humanities & Social Sciences electives may not be used.

² The approved Technical Elective List can be found on the CEAE Department website (<https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/>).

³ For more information, see the Humanities, Social Sciences and Writing Requirements (<https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/>) webpage.

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
CHEM 1114	Laboratory in General Chemistry 1	1
CVEN 1317	Introduction to Civil and Environmental Engineering	1
CSCI 1200	Introduction to Computational Thinking	3
Humanities & Social Sciences Elective ¹		3
Credit Hours		16

Spring Semester

APPM 1360	Calculus 2 for Engineers	4
PHYS 1110	General Physics 1	4
CVEN 1027	Civil Engineering Drawing	3
or AREN 1027	or Engineering Drawing	
First-Year Projects course or Basic Engineering Elective		3
Credit Hours		14

Year Two

Fall Semester		Credit Hours
APPM 2350	Calculus 3 for Engineers	4
PHYS 1120	General Physics 2	4
PHYS 1140	Experimental Physics 1	1
CVEN 2012	Introduction to Geomatics	3
CVEN 2121	Analytical Mechanics 1	3
Humanities & Social Sciences elective ¹		3
Credit Hours		18

Spring Semester

APPM 2360	Introduction to Differential Equations with Linear Algebra	4
AREN 2110 or CVEN 2545	Thermodynamics or Construction Materials	3
CVEN 2017	Excel Matlab R Primer	1
CVEN 3161	Mechanics of Materials 1	3
CVEN 3313	Theoretical Fluid Mechanics	3
CVEN 3698	Engineering Geology	3
Credit Hours		17

Year Three**Fall Semester**

CVEN 3246	Introduction to Construction	3
CVEN 3323	Hydraulic Engineering	3
CVEN 3414	Fundamentals of Environmental Engineering	3
CVEN 3525	Structural Analysis	3
CVEN 3708	Geotechnical Engineering 1	3
Credit Hours		15

Spring Semester

CVEN 3111	Analytical Mechanics 2	3
CVEN 3227	Probability, Statistics and Decision	3
CVEN Proficiency I		3
College-approved writing course ²		3
Humanities & Social Sciences elective ¹		3
Credit Hours		15

Year Four**Fall Semester**

CVEN 4897	Professional Issues in Civil Engineering	2
Technical Electives ³		6
CVEN Proficiency II		3
Free Elective		3
Humanities & Social Sciences elective ¹		3
Credit Hours		17

Spring Semester

CVEN 4899	Civil Engineering Senior Project Design	4
CVEN Proficiency III		3
Humanities & Social Sciences elective ¹		3
Technical Electives ³		6
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 Students may choose a course from the list of college-approved writing courses (<http://www.colorado.edu/engineering/academics/policies/hss/>).

³ See approved Technical Electives list on the CEAE website (<https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/>).

Learning Outcomes

Program Educational Objectives

The program objectives for the bachelor of science degree in Civil Engineering are that within five years:

- Graduates will be successfully employed in engineering, science, or technology careers.
- Graduates will be assuming management or leadership roles.
- Graduates will engage in continual learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, and/or participation in professional societies.
- Graduates will pursue professional registration or other appropriate certifications.
- Graduates will be engaged in activities that provide benefit to communities.

Student Outcomes

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

1. 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.

Before their graduation, students in civil and environmental engineering will take a capstone design course in addition to training in structural and foundation design, civil engineering systems, construction, engineering geology, engineering materials, geotechnical engineering, soil mechanics, water quality, environmental engineering, fluid mechanics, computer-aided and manual engineering drawing, mechanics and dynamics, computer modeling, professional practice and ethics seminars, structural analysis and design, surveying and transportation systems via required and elective courses.

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 Civil Engineering, MS in Civil Engineering or Architectural Engineering

Admissions Requirements

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

- Have a cumulative GPA of 3.000 or higher.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Fall 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/ceae/current-students/undergraduate-studies/bsms-program/>) web page for more information.