

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

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 civil engineering, electrical & computer engineering, and mechanical engineering, with additional details on the engineering partnership program 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.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/>).

Students are allowed to earn a BS in civil engineering + BS in integrated design engineering with a civil engineering emphasis.

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/partnership-program/>).

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 2402	Thermodynamics	
or ASEN 2702	Introduction to Thermodynamics and Aerodynamics	
or EVEN 3012	Thermodynamics for Environmental Science and Engineering	
or GEEN 3852	Thermodynamics for Engineers	
or MCEN 3012	Thermodynamics	
or CVEN 2545	Construction Materials	
CSCI 1200	Introduction to Computational Thinking	3
or CHEN 1310	Introduction to Engineering Computing	
or CSCI 1300	Computer Science 1: Starting Computing	
or ECEN 1310	Introduction to C Programming	
or MCEN 1030	Introduction to Engineering Computing	
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 and Biological 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 Python R Primer	1
CVEN 2121	Analytical Mechanics 1	3
or GEEN 2851	Statics for Engineers	
or MCEN 2023	Statics and Structures	
or ASEN 2401	Statics	
or ASEN 2701	Introduction to Statics, Structures, and Materials	

CVEN 3111 or MCEN 2043	Analytical Mechanics 2 Dynamics	3
CVEN 3161 or MCEN 2063	Mechanics of Materials 1 Mechanics of Solids	3
CVEN 3227	Probability, Statistics and Decision	3
CVEN 3246	Introduction to Construction	3
CVEN 3313 or AREN 2120 or CHEN 3200 or MCEN 3021	Theoretical Fluid Mechanics Fluid Mechanics and Heat Transfer Chemical Engineering Fluid Mechanics Fluid Mechanics	3
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 or ASEN 1400 or ASEN 1403 or CHEN 1400 or ECEN 1400	Engineering Projects ¹ Gateway to Space Introduction to Rocket Engineering Drugs, Driving and Dynamic Processes Introduction to Digital and Analog Electronics	3
Required Math and Science Courses		
APPM 1350 or MATH 1300 or APPM 1345	Calculus 1 for Engineers Calculus 1 Calculus 1 with Algebra, Part B	4
APPM 1360 or MATH 2300	Calculus 2 for Engineers Calculus 2	4
APPM 2350 or MATH 2400	Calculus 3 for Engineers Calculus 3	4
APPM 2360 or MATH 2130 & MATH 3430 or MATH 2135 & MATH 3430	Introduction to Differential Equations with Linear Algebra Introduction to Linear Algebra for Non- Mathematics Majors and Ordinary Differential Equations Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations	4
CHEM 1114 or CHEM 1221	Laboratory in General Chemistry 1 Engineering General Chemistry Lab	1
CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 or ASEN 1022	General Chemistry for Engineers 1 Accelerated Chemistry for Engineers General Chemistry 1 Chemistry for Energy and Materials Science Materials Science for Aerospace Engineers	4
PHYS 1110 or PHYS 1115	General Physics 1 General Physics 1 for Majors	4
PHYS 1120 or PHYS 1125	General Physics 2 General Physics 2 for Majors	4
PHYS 1140	Experimental Physics 1	1
Required Proficiency Courses		9

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 or CVEN 4555	Steel Design 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		3
Humanities, Social Sciences and Writing		18
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		2
COEN 1500	CEAS First Year Seminar	1
Credit Hours		16
Spring Semester		
APPM 1360	Calculus 2 for Engineers	4
PHYS 1110	General Physics 1	4
CVEN 1027 or AREN 1027	Civil Engineering Drawing or Engineering Drawing	3
First-Year Projects course or Basic Engineering Elective		3
Credit Hours		14

Year Two**Fall Semester**

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 Python 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:

- An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- 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.
- An ability to communicate effectively with a range of audiences.
- 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.
- 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.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- 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 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/ceae/current-students/undergraduate-studies/bsms-program/>) web page for more information.