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/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/degree-requirements#civil_engineering-379).

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREN 2110</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 1200</td>
<td>Introduction to Computational Thinking</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 1027</td>
<td>Civil Engineering Drawing</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 1317</td>
<td>Introduction to Civil and Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CVEN 1316</td>
<td>Introduction to Architectural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 1500</td>
<td>Introduction to Aerospace Engineering Sciences</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3111</td>
<td>Fluid Mechanics and Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3161</td>
<td>Mechanics of Materials 1</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3227</td>
<td>Probability, Statistics and Decision</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3246</td>
<td>Introduction to Construction</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3313</td>
<td>Theoretical Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3323</td>
<td>Hydraulic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3414</td>
<td>Fundamentals of Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3525</td>
<td>Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 3698</td>
<td>Engineering Geology</td>
<td>3</td>
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</table>
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 **CHEM 1211** Accelerated Chemistry for Engineers
- or **CHEM 1113** General Chemistry 1

- **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.

Remaining technical electives may be upper-division AREN or CVEN courses, or any course on the approved Technical Elective List. 2

Free Elective

- **3**

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-advising-curriculum/).

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.
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

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.

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.

Dual Degree Program

BS in Applied Mathematics and Civil Engineering

As an exceptional opportunity for talented students who are interested in analytical and computational methods related to civil engineering and general engineering science, the CEAE and Applied Mathematics departments offer a streamlined track by which a student can earn a baccalaureate degree from both programs with a minimum of 15 extra credit hours. Consult the faculty program advisors in civil engineering and applied mathematics for information and admission.

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
- 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.