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 mechanical engineering, civil engineering, and electrical & computer engineering, with additional details on the 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/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>
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<tbody>
<tr>
<td>AREN 2110</td>
<td>Thermodynamics</td>
<td>3</td>
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<tr>
<td>or ASEN 2702</td>
<td>Introduction to Thermodynamics and Aerodynamics</td>
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<tr>
<td>or EVEN 3012</td>
<td>Thermodynamics for Environmental Science and Engineering</td>
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<tr>
<td>or GEEN 3852</td>
<td>Thermodynamics for Engineers</td>
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<tr>
<td>or MCEN 3012</td>
<td>Thermodynamics</td>
<td></td>
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<tr>
<td>or CVEN 2545</td>
<td>Construction Materials</td>
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<tr>
<td>CSCI 1200</td>
<td>Introduction to Computational Thinking</td>
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<tr>
<td>or ASEN 1320</td>
<td>Aerospace Computing and Engineering Applications</td>
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<tr>
<td>or CHEN 1310</td>
<td>Introduction to Engineering Computing</td>
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<tr>
<td>or CSCI 1300</td>
<td>Computer Science 1: Starting Computing</td>
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<tr>
<td>or ECEN 1310</td>
<td>C Programming for ECE</td>
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<tr>
<td>or MCEN 1030</td>
<td>Introduction to Engineering Computing</td>
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<td>CVEN 1027</td>
<td>Civil Engineering Drawing</td>
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</tr>
<tr>
<td>or AREN 1027</td>
<td>Engineering Drawing</td>
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<td>CVEN 1317</td>
<td>Introduction to Civil and Environmental Engineering</td>
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<td>or AREN 1316</td>
<td>Introduction to Architectural Engineering</td>
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<tr>
<td>or ASEN 1000</td>
<td>Introduction to Aerospace Engineering Sciences</td>
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<tr>
<td>or BMEN 1000</td>
<td>Exploring Biomedical Engineering</td>
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<tr>
<td>or CHEN 1300</td>
<td>Introduction to Chemical and Biological Engineering</td>
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<tr>
<td>or CSCI 1000</td>
<td>Computer Science as a Field of Work and Study</td>
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<tr>
<td>or ECEN 1100</td>
<td>Exploring ECE</td>
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<tr>
<td>or EVEN 1000</td>
<td>Introduction to Environmental Engineering</td>
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<tr>
<td>CVEN 2012</td>
<td>Introduction to Geometrics</td>
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<td>CVEN 2017</td>
<td>Excel Matlab R Primer</td>
<td>1</td>
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<tr>
<td>CVEN 2121</td>
<td>Analytical Mechanics 1</td>
<td>3</td>
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<td>or GEEN 2851</td>
<td>Statics for Engineers</td>
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<td>or MCEN 2023</td>
<td>Statics and Structures</td>
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<tr>
<td>or ASEN 2401</td>
<td>Statics</td>
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Required Proficiency Courses

- PHYS 1140
- PHYS 1120
- PHYS 1110

Required Math and Science Courses

- CHEM 1114
- APPM 1360
- APPM 2350
- APPM 2360
- MATH 2130
- MATH 2300
- MATH 2400
- MATH 3430
- CHEM 1113
- CHEM 1111
- CHEM 1201
- CHEM 1211
- CHEM 1113
- CHEM 1024
- CHEM 1022
- PHYS 1110
- PHYS 1115
- PHYS 1120
- PHYS 1125
- PHYS 1140

Choose three:
- CVEN 3256
- CVEN 3424
- CVEN 3718
- CVEN 4333
- CVEN 4545

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.

Free Electives

- Humanities, Social Sciences and Writing 3

Total Credit Hours

- Year One: 128

Sample Four-Year Plan of Study

**Year One**

**Fall Semester**

- APPM 1350: Calculus 1 for Engineers 4
- CHEM 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
- COEN 1830: Special Topics (First-Year Seminar) 1
- Humanities & Social Sciences Elective 1 2

**Spring Semester**

- APPM 1360: Calculus 2 for Engineers 4
- PHYS 1110: General Physics 1 4
- PHYS 1115: General Physics 1 for Majors 4
- PHYS 1120: General Physics 2 4
- PHYS 1125: General Physics 2 for Majors 4
- PHYS 1140: Experimental Physics 1 1
- First-Year Projects course or Basic Engineering Elective 3

**Total 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

**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 | 18 |

**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

**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

**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 |

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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.