CIVIL ENGINEERING - PROFESSIONAL MASTER OF SCIENCE (MSCVE)

The Department of Civil, Environmental and Architectural Engineering offers a professional master’s degree tailored toward working engineers who desire to develop a new skill set. The programs are coursework based and result in a Master of Science degree.

Areas of Emphasis
Water Engineering and Management Emphasis
CU Boulder’s professional Master of Science degree in civil engineering, with an emphasis in water engineering and management (WE&M), combines technical courses in environmental and civil engineering with highly-valued professional, non-technical skills in communication, leadership, management, utility finance and governance. The water engineering and management program provides students with leadership skills so they can effectively manage teams and initiatives typically faced in the water profession.

The water engineering and management professional master’s program (PMP), designed for working professionals, provides the tools you need to produce results and solve increasingly complex problems in the water profession. Courses are delivered on campus and live streamed/recorded options over the internet, allowing working professionals from around the world to earn a graduate MS degree while continuing to put the learning into practice in their work.

Students are young and mid-career professionals working for utilities, consulting firms, government and regulatory agencies, looking to advance their careers in the water industry. With faculty of senior water professionals from across the country, including those from utilities, consulting firms, and global professional organizations, students gain an opportunity to network and learn through real work case studies.

All of the graduate courses are available to distance and on campus students. All the students can come to class, watch the live classes over Zoom and/or the recorded Zoom classes. The PMP program is a coursework-only degree and requires 30 credits. These credits can be obtained with ten, 3-credit hour courses.

The WE&M courses are available for a WE&M graduate certificate (https://www.colorado.edu/ceae/water-engineering-management-certificate/) or as an Professional MS degree (https://www.colorado.edu/ceae/water-engineering-management-professional-masters-program/).

Global Engineering Emphasis
The master of science degree in civil engineering with an emphasis in global engineering is a unique program offered by the Mortenson Center at CU Boulder. This degree is a professional track of the MS program in civil engineering. It is designed to offer students exposure to a breadth of knowledge in relevant areas such as global health, development economics and impact evaluation, while also building technical skills and providing the opportunity for further study in a specific area of interest within global engineering. In addition to classroom-based learning, students are required to complete a field practicum, embedded for six weeks to six months with a global development organization. These practicum placements have taken place in over 50 countries, partnering with over 80 organizations. Learn more about our practicum partnerships on the Mortenson Center (https://www.colorado.edu/center/mortenson/education/practicumplacements/) website.

Our graduates are able to provide technical expertise to development agencies or other firms by recognizing the many facets of community development that are critical to sustainable solutions. Students gain skills in data analysis, project management and systems thinking so they can help create and implement solutions to address worldwide needs.

For more information, visit the Mortenson Center in Global Engineering (https://www.colorado.edu/center/mortenson/) webpage.

Dual-Track Civil Engineering Emphasis
The dual-track professional master of science degree in civil engineering provides students and practicing professionals graduate-level engineering specialization and technical competence in more than a single area. The intended cross-disciplinary training and perspective is often needed to serve or lead in the diverse field of civil engineering where engineers typically have to work in and interact with others from more than one discipline in large and small projects, private and government sectors, in design and development as well as consulting services. The broader technical preparation expands their career opportunities, professional outlook and provides multiple pathways to leadership and management positions. The high demand nationally for more broadly trained graduates in civil engineering to satisfy our sustainable and resilient infrastructure needs and in turn the national's overall economical development points to the benefit of a cross-disciplinary general civil engineering coursework-only professional master's degree.

For more information, visit the department (https://www.colorado.edu/ceae/civil-engineering-professional-master-science-mscve-dual-track-option/) website.

Requirements
Course Requirements
The following course requirements are subject to change; for the most current information, visit the department’s Water Engineering & Management webpage or the Mortenson Center in Global Engineering (https://www.colorado.edu/center/mortenson/) webpage.

The professional master’s degree requires a total of 30 credit hours, at least 24 of which must be completed at the 5000 level or above. At least 18 credit hours must be from coursework in CVEN.

Time Limit
All degree requirements must be completed within four years of the date of commencing coursework.

Areas of Emphasis
Water Engineering & Management Emphasis
This emphasis requires at least 30 credit hours from the following categories.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CVEN 5464</td>
<td>Environmental Engineering Processes</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5404</td>
<td>Water Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5484</td>
<td>Applied Microbiology and Toxicology</td>
<td>3</td>
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</table>
Choose one:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CVEN 5524</td>
<td>Drinking Water Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5534</td>
<td>Wastewater Treatment</td>
<td></td>
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<tr>
<td>CVEN 5474</td>
<td>Hazardous and Industrial Waste Management</td>
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Water Engineering & Management Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CVEN 5564</td>
<td>Water Profession: Communication and Utility Finance</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5574</td>
<td>Water Utility Management: Current Issues and Future Challenges</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5584</td>
<td>Water Profession: Leadership and Management</td>
<td>3</td>
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</tbody>
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Electives & Master's Report and Seminar Courses

- Civil engineering electives (3-9 credits)
- Public affairs electives at CU Denver (0-3 credits)
- Master's Report and Seminar (2 credits)
- Additional courses to fulfill 30-credit minimum, if necessary.

Total Credit Hours: 30

Global Engineering Emphasis

This emphasis requires at least 30 credit hours distributed as follows.

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CVEN 5919</td>
<td>Global Development for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 5939</td>
<td>Global Development Practicum</td>
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Global Engineering Series

MCGE offers courses as series of 5-week modules, with each module worth one credit-hour. In the Professional Master’s in Global Engineering, students are required to complete 12 credit-hours from the series:

- Principles
- Project Management
- Field Methods
- Water, Sanitation and Hygiene (WASH)
- Humanitarian Aid
- Household Energy

Sub-area 1: Structural Engineering

Group A

- CVEN 5161 Advanced Mechanics of Materials I
- CVEN 5525 Computational Structural Analysis I
- CVEN 5111 Introduction to Finite Element Analysis
- CVEN 5111 Structural Dynamics

Group B

- CVEN 5575 Advanced Topics in Steel Design
- CVEN 5585 Advanced Topics in Reinforced Concrete Design
- CVEN 6595 Earthquake Engineering

Sub-area 2: Construction Engineering

Group A

- CVEN 5006 Construction Engineering and Management Fundamentals
- CVEN 5226 Construction Safety
- CVEN 5346 Managing Construction and Engineering Projects and Organizations
- CVEN 5446 Infrastructure Asset Management

Group B

- CVEN 5246 Legal Aspects of Construction
- CVEN 5276 Engineering Risk and Decision Analysis
- CVEN 5836 Special Topics for Seniors/Grads (BIM for Capital Projects)
- CVEN 5836 Special Topics for Seniors/Grads (AI/ML in the Built Environment)

Sub-area 3: Geotechnical Engineering

Group A

- CVEN 5708 Soil Mechanics
- CVEN 5798 Dynamics of Soils and Structures
- CVEN 5788 Computational Modeling in Geotechnical Engineering
- CVEN 5768 Introduction to Rock Mechanics

Group B

- CVEN 5628 Seepage and Slopes
- CVEN 5728 Foundation Engineering
- CVEN 5818 Geotechnical Earthquake Engineering

Sub-area 4: Water Resources Engineering

Group A

- CVEN 5333 Physical Hydrology
- CVEN 5353 Groundwater Hydrology
- CVEN 5313 Environmental Fluid Mechanics
- CVEN 5454 Statistical Methods for Natural and Engineered Systems
- CVEN 5537 Numerical Methods in Civil Engineering

Group B

Dual-Track Emphasis

For this emphasis, students are required to:

1. Select 9 credit hours from the courses listed in Group A and 15 credit hours from Group B of more than one sub-areas listed below.
2. Select 6 credits of 5000-level free electives from the extensive course offerings from civil or other engineering disciplines in the College or professional management classes, such as EMEN 5010 and EMEN 5020, collectively referred to as Group C.

Global Engineering Series course options can be found on the Mortenson Center (https://www.colorado.edu/center/mortenson/graduate-education/professional-masters-degrees/) website.
<table>
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<tbody>
<tr>
<td>CVEN 5363</td>
<td>Modeling of Hydrologic Systems</td>
</tr>
<tr>
<td>CVEN 5393</td>
<td>Water Resources System and Management</td>
</tr>
<tr>
<td>CVEN 5383</td>
<td>Applied Groundwater Modeling</td>
</tr>
<tr>
<td>CVEN 5343</td>
<td>Transport and Dispersion in Surface Water</td>
</tr>
<tr>
<td>CVEN 5423</td>
<td>Water Resources Engineering Design</td>
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