CIVIL ENGINEERING, MENG

Introduction
Graduate Education Policies and Procedures apply to this program.

There are many reasons to consider a Master’s of Engineering degree in Civil Engineering:

- Gain advanced training in your chosen civil engineering specialty.
- Become an expert in your chosen thesis (or report) research.
- Position yourself in a competitive employment market.
- Earn more than those with only a bachelor’s degree.

The Master of Engineering (MEng) in Civil Engineering at CU Denver is intended for students who have a non-engineering undergraduate degree. The program is structured to give basic knowledge in engineering in an interdisciplinary manner, allowing students to enhance their engineering education with courses from complimentary areas of study.

Our graduate programs offer ample opportunities for hands-on research. The civil engineering graduate program is designed for both full-time and part-time students who want to advance their academic and professional skills in civil engineering and related areas. Many students are full-time, while many also work full-time jobs and complete evening classes. Depending on a student’s pace, the MEng program typically takes 2-4 years to complete. Most graduate courses are offered in the afternoons or evenings.

Specialty Areas
- Construction Engineering and Management
- Geomatics and Geographic Information Systems (GIS)
- Hydrologic, Environmental, and Sustainability Engineering
- Transportation Engineering

Program Prerequisites
Prerequisite classes are in addition to the 30 semester hours needed to complete a master’s degree, as they are necessary background information that is usually included in an engineering bachelor’s program. Students must receive a grade of C minus (C-) or better for the prerequisite class to apply to the program.

Students may complete prerequisite classes either before or after being admitted to a degree program. However, applicants with 5 or more incomplete prerequisites will not be admitted. Students may complete no more than nine credit hours of graduate work before completing these prerequisites. Note, all courses taken while enrolled in graduate studies at CU Denver count toward your grade point average (GPA).

If prerequisites are taken while admitted to the master’s program, students must maintain a 3.0 overall GPA, per Graduate Education policies and procedures.

Transfer Credit
Master’s students may transfer up to 9 semester hours from another institution toward their master’s degree, if approved by their advisor.

Program Requirements

1. Students must complete a minimum of 30 credit hours at the graduate level
2. Students must complete 3 credit hours of master’s report including a written comprehensive exam and an oral defense to a committee of at least two graduate faculty. The student’s topic must be approved by the faculty advisor.
3. 15 credit hours of course work must be completed with civil or construction engineering classes; this includes the master’s report hours.
4. 15 credit hours may be completed outside of the civil engineering department in related disciplines that supplement the student’s area of study. This requirement gives the Master of Engineering degree the ability to be interdisciplinary and tailored to the student’s exact area of interest.
5. Students must earn a minimum grade of B (3.0) in all major courses taken at CU Denver and must achieve a minimum cumulative major GPA of 3.0. All graded attempts in required and elective courses are calculated in the major GPA. Students cannot complete any course requirements as pass/fail, or satisfactory/unsatisfactory.
6. Every graduate student must also satisfy the degree requirements of Graduate Education on the Denver campus, specified in the Information for Graduate Students section of this catalog.
7. The MEng must be completed within seven years of the date the student begins the degree program.

Construction Engineering and Management
The Master’s program in construction engineering and management provides the necessary decision-making skills to support complex construction projects and subsequent management throughout their useful life. Construction engineering and management concerns the design, planning and management of the construction, maintenance and disposal of structures, infrastructure, transportation systems, site work, and commercial, industrial, residential and environmental projects (for example: highways, bridges, airports, buildings, dams, reservoirs, light and high-speed rail systems, hospitals, laboratories, residential communities, utilities and environmental restoration projects).

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<th>Code</th>
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<tr>
<td>9</td>
<td>Required core courses:</td>
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<tr>
<td>CEMT 5231</td>
<td>Construction Materials and Methods</td>
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<td>CEMT 5232</td>
<td>Construction Planning and Control</td>
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<td>CEMT 5233</td>
<td>Construction Cost Estimating</td>
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<td>12</td>
<td>Construction Electives</td>
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<tr>
<td>CEMT 5234</td>
<td>Sustainable Construction</td>
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<td>CEMT 5235</td>
<td>Advanced Construction Engineering</td>
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<td>CEMT 5236</td>
<td>Project Management Systems</td>
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<tr>
<td>CEMT 5237</td>
<td>Advanced Project Management</td>
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<td>CEMT 5238</td>
<td>Integrated Construction Leadership</td>
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<td>CEMT 5239</td>
<td>Introduction to Temporary Structures and Construction Engineering</td>
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<td>CEMT 5240</td>
<td>Building Information Modeling (BiM)</td>
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<td>CEMT 5242</td>
<td>Construction Safety</td>
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<td>CEMT 5245</td>
<td>Construction Dispute Resolution</td>
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<td>CEMT 5246</td>
<td>Construction, Business and Innovation</td>
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<td>CEMT 5800</td>
<td>Special Topics in Construction</td>
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<td>9</td>
<td>General Electives</td>
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Course selection should be based on planned career path, masters report focus, eligibility and availability of the courses. The following courses are some of the possibilities, but you should discuss course choices with your advisor.

Any 5000+ CVEN or CEMT course
ARCH 5450 Sustainable Design Practices
ARCH 6313 LEED Certification, Greenbuilding Seminar
BIOL 5460 Environmental Toxicology
BUSN 6520 Leading Individuals and Teams
ENGR 5301 Systems Engineering: Principles and Practice
ENTP 6020 Business Model Development & Planning
ENVS 5010 Landscape Biogeochemistry
GEOG 5220 Environmental Impact Assessment
LDAR 5532 Landform Manipulation
MGMT 6808 Leadership Development
PUAD 5644 Environmental and Hazards Law
URPL 5050 Urban Development
URPL 6500 Environmental Planning/Management
Other topics as approved by faculty advisor

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<td>Total Hours</td>
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**General Civil Engineering**

The General Civil Engineering focus is structured to allow students to customize their engineering graduate education with courses from complimentary areas of study.

Students will work with their advisor to develop appropriate graduate course choices across multiple disciplines within civil engineering. Example of disciplines include transportation, sustainability, geomatics, and construction. This does not lead directly to engineering licensure and is not appropriate for a structural engineering focus.

A reflection essay must be written by the student before being approved for graduation.

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<td></td>
<td>Courses approved by faculty advisor</td>
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**Geomatics and Geographic Information Systems (GIS)**

The Geographic Information Systems (GIS) and Geomatics Engineering graduate program at the University of Colorado Denver will provide you with a versatile and coveted skill set that will help you get ahead in the rapidly evolving geospatial field. The program is intended for engineers as well as other geospatial, environmental, or urban infrastructure professionals.

All GIS graduate courses are conveniently offered online, providing flexibility that has been a hallmark of our program for nearly 30 years. Master’s degree students have the option to customize their learning experience by taking select courses on the vibrant CU Denver campus from other programs such as geography, urban planning, or computer science.

Led by industry professionals, you will have the opportunity to dive into a curriculum designed to cover a vast spectrum of geospatial principles. From surveying and mapping science to relational GIS databases and high-definition surveying, our program will help you develop expertise and learn to deploy interactive web applications, setting the stage for a dynamic career in the geospatial realm.

Not only are you investing in your future, but you’re also contributing to the solution. Our program plays a crucial role in addressing the shortage of well-educated geospatial professionals, preparing you for impactful careers in industry and/or science. Upon completion, you’ll possess a comprehensive understanding of geospatial engineering and analysis, empowering you to elevate your career or delve deeper into your own research.

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**Hydrologic, Environmental, and Sustainability Engineering**

The graduate track in hydrologic, environmental, and sustainability engineering (HESE) in the Department of Civil Engineering at the University of Colorado Denver brings together the hydrologic cycle, environmental processes, and sustainability—the powerful notion that everything we engineer should support economic prosperity, environmental health, and social justice.

Graduate coursework in the HESE track requires breadth and depth. Students are required to take at least one graduate course in each of the three areas plus at least two additional courses in one of those three areas. The program also includes graduate-level electives, allowing students to customize their program to match their professional needs and intellectual curiosity.

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Transportation Engineering

By shifting conventional transportation engineering practice towards a more human-centered approach, our Masters’ programs in transportation engineering seek to cultivate forward-thinking transportation professionals. The Master of Science (MS) program is intended for those with an engineering background. The Master of Engineering (MEng) program is intended for students from any discipline.

Students in both programs take the foundational courses, but much of the remaining coursework can be tailored to needs and aspirations of each individual student. Students with more of a transportation engineering background tend to add knowledge from related disciplines such as urban & regional planning or by adding skills such as GIS, statistics, or data science. Students coming from other disciplines tend to take more transportation engineering courses. Whatever the case, we have the flexibility to provide students with the technical knowledge and skills necessary to succeed in their chosen area.

Students can also select one or more of the following core areas: Healthy Active Communities; Equitable Road Safety; and/or Smart Sustainable Mobility.

Our transportation students will develop the advanced problem-solving skills needed to be able to propose innovative and sustainable solutions that prioritize human needs, societal well-being, and environmental considerations. They will foster the ability to empathize with diverse user groups, incorporate qualitative and quantitative data to inform decision-making, and begin to design transportation systems that enhance accessibility, safety, and the overall human experience. They will cultivate the collaboration and communication skills necessary for interdisciplinary work in transportation. The combination of which will put our graduates in a position to embark on a transportation-related career for which they are passionate and can make a positive difference in the world.

Both the MS and MEng degree programs culminate with a thesis or master’s report.

**Code** | **Title** | **Hours**
---|---|---
Research credits (requires advisor approval). | | 3
CVEN 5960 | Master’s Report | 9
Breadth courses | | 9
Depth courses | | 9
Elective courses | | 9
Hydrology and Hydraulics | | 9
CVEN 5333 | Surface Water Hydrology | 9
CVEN 5334 | Groundwater Hydrology | 9
CVEN 5335 | Vadose Zone Hydrology | 9
CVEN 5426 | Pipe Network and Sewer Design | 9
CVEN 5427 | Storm Water System Design | 9
Environmental Engineering | | 9
CVEN 5402 | Contaminant Fate and Transport | 9
CVEN 5404 | Water and Wastewater Treatment | 9
CVEN 5434 | Biological Treatment Processes | 9
Sustainability Engineering | | 9
CVEN 5405 | Environmental Life Cycle Assessment | 9
CVEN 5460 | Introduction to Sustainable Urban Infrastructure | 9
CVEN 5520 | Structural Engineering and the Ocean Environment | 9
Graduate Electives | | 9
Any CVEN course listed above | | 9
ARCH 5330 | Sustainable Systems I | 9
ARCH 5450 | Sustainable Design Practices | 9
CEMT 5234 | Sustainable Construction | 9
CVEN 5381 | Introduction to Geographic Information Systems | 9
CVEN 5633 | Sustainable Transportation Systems | 9
ENVS 5280 | Environmental Hydrology | 9
ENVS 5757 | Urban Climate and Air Quality | 9
Gemm 6000 | 21st Century Global Energy Issues and Realities | 9
Gemm 6200 | Environmental, Regulatory, Legal & Political Environment in the Energy Industry | 9
Gemm 6240 | Environmental, Social, Governance (ESG) Trends in Energy & Commodities | 9
GEOG 5060 | Remote Sensing I: Introduction to Environmental Remote Sensing | 9
GEOG 5335 | Climate Change & Society | 9
GEOG 5757 | Urban Climate and Air Quality | 9
URPL 5040 | Urban Sustainability | 9
URPL 6555 | Transportation, Land Use, and the Environment | 9
Other topics as approved by faculty advisor | | 9

Total Hours 30

**Code** | **Title** | **Hours**
---|---|---
Research credits (requires advisor approval). | | 3
CVEN 5960 | Master’s Report | 3
Transportation Engineering Required Course | | 3
CVEN 5633 | Sustainable Transportation Systems | 3
Transportation Engineering Electives | | 12
CVEN 5602 | Advanced Highway Design | 12
CVEN 5611 | Transportation Engineering Statistics | 12
CVEN 5612 | Traffic Impact Assessment | 12
CVEN 5621 | Highway Capacity Analysis | 12
CVEN 5613 | Traffic Simulation Modeling | 12
CVEN 5622 | Traffic Operations and Control | 12
CVEN 5631 | Transport Modeling and Big Data | 12
CVEN 5632 | Transportation Data Analytics | 12
CVEN 5642 | Transit Operations | 12
CVEN 5641 | Transit System Planning and Design | 12
CVEN 5650 | Urban Street Design | 12
CVEN 5662 | Transportation System Safety | 12
CVEN 5388 | Geographic Information Systems for Transportation Infrastructure (GIS-T) | 12
Graduate Electives | | 12
CVEN 5381 | Introduction to Geographic Information Systems | 12
URPL 5000 | Planning History and Theory | 12
URPL 5010 | Planning Methods | 12
URPL 5050 | Urban Development | 12
URPL 6205 | Plan Making | 12
URPL 6225 | Urban Policy Analytics | 12
URPL 6250 | GIS for Urban Planning | 12
URPL 6350 | City Design Fundamentals | 12
URPL 6555 | Transportation, Land Use, and the Environment | 12
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<tr>
<td>URPL 6600</td>
<td>Regional Growth and Equity</td>
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**Total Hours** 30