CIVIL ENGINEERING, MS

Introduction

Graduate Education Policies and Procedures apply to these programs. There are many reasons to consider a master’s 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 Science (MS) in Civil Engineering at CU Denver is intended for students who have previously earned an undergraduate degree in engineering or a similar field. Students of other backgrounds are welcome but usually have more prerequisites to complete before they can be admitted to the MS program.

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. Our graduate programs are designed for working professionals and offer ample opportunities for hands-on research.

Many students are full-time, while many also work full-time jobs and complete evening classes. Depending on a student’s pace, the master’s 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)
- Geotechnical Engineering
- Hydrologic, Environmental, and Sustainability Engineering
- Structural 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. You may complete no more than nine credit hours of graduate work before completing these prerequisites. Note, all courses taken at CU Denver while enrolled graduate studies count toward your grade point average (GPA).

If prerequisites are taken after admission to the master’s program, students must maintain a 3.0 overall GPA, per Graduate Education policies and procedures. The student’s faculty advisor may also specify undergraduate courses that must be completed before starting graduate course work, but these will not count toward the semester hour requirements for the degree.

Transfer Credits

Master’s students may transfer up to 9 semester hours from another institution toward their master’s degree, if approved by their advisor. Students who completed their undergraduate degree at CU Denver many have additional options available.

Program Requirements

1. Students must complete a minimum of 30 credit hours at the graduate level, including a master’s report or thesis.
2. Students must complete 6 credit hours of master’s thesis or 3 credits of master’s report. Both require a written comprehensive exam and an oral defense to a committee of at least two graduate faculty for a report and three graduate faculty for a thesis. The student’s topic must be approved by the faculty advisor.
3. Students must complete a minimum of 15 credit hours in your chosen host department or within Civil Engineering, not including master’s report or thesis. Any courses taken outside your host department must be approved by advisor.
4. Students must earn a minimum grade of B- (2.7) 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.
5. The MS 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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<tr>
<th>Code</th>
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<tr>
<td>CVEN 5950</td>
<td>Master’s Thesis</td>
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<tr>
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<td>Master’s Report</td>
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<tr>
<td>CEMT 5231</td>
<td>Construction Materials and Methods</td>
<td>9</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>CEMT 5234</td>
<td>Sustainable Construction</td>
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<tr>
<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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<tr>
<td>CEMT 5239</td>
<td>Introduction to Temporary Structures and</td>
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<td></td>
<td>Construction Engineering</td>
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<tr>
<td>CEMT 5240</td>
<td>Building Information Modeling (BIM)</td>
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Our Geomatics and GIS curriculum covers a wide range of geospatial principles. Students learn from industry professionals in areas of surveying, geodesy, mapping science and cartography, photogrammetry, remote sensing, high-definition surveying, and relational GIS databases.

Our program prepares graduates for careers in industry and/or science. Students who complete the program have a comprehensive understanding in these disciplines, empowering them to advance their careers in geospatial engineering and analysis or to continue their research.

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Geomatics and Geographic Information Systems (GIS)

The Geomatics Engineering and Geographic Information Systems (GIS) graduate program at the University of Colorado Denver provides broad-based expertise and cutting-edge skills that span the growing geospatial field and helps alleviate the shortage of well-educated geospatial professionals. The program is intended for engineers and other geospatial, environmental and urban infrastructure professionals seeking skills in using and managing rapidly developing geospatial data technologies.

All GIS graduate courses are entirely online, as they have been for more than 20 years. However, master’s degree students have the option of taking some courses on the CU Denver campus from other programs such as geography or computer science.

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Research credits (requires advisor approval). Choose 1 of the following

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Breadth courses 9

Depth courses 6

Elective courses 6-9

Hydrology and Hydraulics

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<tr>
<td>CVEN 5333</td>
<td>Surface Water Hydrology</td>
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<td>CVEN 5334</td>
<td>Groundwater Hydrology</td>
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<tr>
<td>CVEN 5335</td>
<td>Vadose Zone Hydrology</td>
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<tr>
<td>CVEN 5426</td>
<td>Pipe Network and Sewer Design</td>
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<tr>
<td>CVEN 5427</td>
<td>Storm Water System Design</td>
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Environmental Engineering
Structural Engineering

Structural engineering is the analysis and design of structures that support or resist loads. At CU Denver the area of structural engineering includes structural and bridge engineering; repair, evaluation, maintenance and rehabilitation of civil infrastructure, maintenance and experimental analysis of concrete; and more.

Code | Title | Hours
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CVEN 5402 | Contaminant Fate and Transport | 
CVEN 5404 | Water and Wastewater Treatment | 
CVEN 5434 | Biological Treatment Processes | 
CVEN 5405 | Environmental Life Cycle Assessment | 
CVEN 5460 | Introduction to Sustainable Urban Infrastructure | 
CVEN 5520 | Structural Engineering and the Ocean Environment | 

Graduate Electives

Any CVEN course listed above

ARCH 5330 | Sustainable Systems I | 
ARCH 5450 | Sustainable Design Practices | 
CEMT 5234 | Sustainable Construction | 
CVEN 5381 | Introduction to Geographic Information Systems | 
CVEN 5633 | Sustainable Transportation Systems | 
ENVS 5280 | Environmental Hydrology | 
ENVS 5757 | Urban Climate and Air Quality | 
GEMM 6000 | 21st Century Global Energy Issues and Realities | 
GEMM 6200 | Environmental, Regulatory, Legal & Political Environment in the Energy Industry | 
GEMM 6240 | Environmental, Social, Governance (ESG) Trends in Energy & Commodities | 
GEOG 5060 | Remote Sensing: Introduction to Environmental Remote Sensing | 
GEOG 5335 | Climate Change & Society | 
GEOG 5757 | Urban Climate and Air Quality | 
URPL 5040 | Urban Sustainability | 
URPL 6555 | Transportation, Land Use, and the Environment | 

Other topics as approved by faculty advisor

Total Hours: 30-33

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
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CVEN 5950 | Master's Thesis | 6
CVEN 5960 | Master’s Report | 3
CVEN 5952 | Computer-Aided Structural Analysis and Design | 
CVEN 5682 | Pavement Design | 
CVEN 6111 | Structural Dynamics II | 

Total Hours: 33-36
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<tr>
<td>CVEN 5641</td>
<td>Transit System Planning and Design</td>
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<td>CVEN 5642</td>
<td>Transit Operations</td>
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<tr>
<td>CVEN 5650</td>
<td>Urban Street Design</td>
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<tr>
<td>CVEN 5662</td>
<td>Transportation System Safety</td>
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<tr>
<td>CVEN 5388</td>
<td>Geographic Information Systems for Transportation Infrastructure (GIS-T)</td>
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<tr>
<td>CVEN 5381</td>
<td>Introduction to Geographic Information Systems</td>
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<tr>
<td>URPL 5000</td>
<td>Planning History and Theory</td>
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<td>URPL 5010</td>
<td>Planning Methods</td>
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<td>URPL 5050</td>
<td>Urban Development</td>
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<td>URPL 6205</td>
<td>Plan Making</td>
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<td>URPL 6225</td>
<td>Urban Policy Analytics</td>
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<tr>
<td>URPL 6250</td>
<td>GIS for Urban Planning</td>
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<tr>
<td>URPL 6350</td>
<td>City Design Fundamentals</td>
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<tr>
<td>URPL 6555</td>
<td>Transportation, Land Use, and the Environment</td>
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<tr>
<td>URPL 6600</td>
<td>Regional Growth and Equity</td>
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**Total Hours** 33-36