

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).

Code	Title	Hours
<i>Required core courses:</i>		9
CEMT 5231	Construction Materials and Methods	
CEMT 5232	Construction Planning and Control	
CEMT 5233	Construction Cost Estimating	
<i>Construction Electives</i>		12
CEMT 5234	Sustainable Construction	
CEMT 5235	Advanced Construction Engineering	
CEMT 5236	Project Management Systems	
CEMT 5237	Advanced Project Management	
CEMT 5238	Integrated Construction Leadership	
CEMT 5239	Introduction to Temporary Structures and Construction Engineering	
CEMT 5240	Building Information Modeling (BIM)	
CEMT 5242	Construction Safety	
CEMT 5245	Construction Dispute Resolution	
CEMT 5246	Construction, Business and Innovation	
CEMT 5800	Special Topics in Construction	

General Electives 9

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	
Total Hours	30

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

Code	Title	Hours
Courses approved by faculty advisor		30
Total Hours		30

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.

Code	Title	Hours
<i>Research credits (requires advisor approval):</i>		3
CVEN 5960	Master's Report	
<i>Required Course:</i>		3
CVEN 5381	Introduction to Geographic Information Systems	
<i>GIS Electives</i>		12
CVEN 5382	Geospatial Data Development	
CVEN 5383	GIS Analysis	
CVEN 5384	GIS Project Management	
CVEN 5385	GIS Relational Database Systems	
CVEN 5387	Advanced Remote Sensing	
CVEN 5388	Geographic Information Systems for Transportation Infrastructure (GIS-T)	
CVEN 5390	Interactive Web Mapping GIS	
CVEN 5391	Introduction to Geomatics	
CVEN 5392	Unmanned Aerial Systems	
CVEN 5395	GPS/GNSS	
CVEN 5396	HDS/LiDAR Tools & Data Analyses	
<i>Graduate Electives</i>		12
Any 5000+ CEMT or CVEN course		
GEOG 5090	Environmental Modeling with Geographic Information Systems	
GEOG 5092	GIS Programming and Automation	
URPL 6260	Advanced Geo-Spatial Methods	
Other topics as approved by faculty advisor		
Total Hours		30

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.

Code	Title	Hours
<i>Research credits (requires advisor approval).</i>		3
CVEN 5960	Master's Report	
Breadth courses		9
Depth courses		9
Elective courses		9
<i>Hydrology and Hydraulics</i>		
CVEN 5333	Surface Water Hydrology	
CVEN 5334	Groundwater Hydrology	
CVEN 5335	Vadose Zone Hydrology	
CVEN 5426	Pipe Network and Sewer Design	
CVEN 5427	Storm Water System Design	
<i>Environmental Engineering</i>		
CVEN 5402	Contaminant Fate and Transport	
CVEN 5404	Water and Wastewater Treatment	
CVEN 5434	Biological Treatment Processes	
<i>Sustainability Engineering</i>		
CVEN 5405	Environmental Life Cycle Assessment	
CVEN 5460	Introduction to Sustainable Urban Infrastructure	
CVEN 5520	Structural Engineering and the Ocean Environment	
<i>Graduate Electives</i>		
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 I: 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

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

URPL 6600 Regional Growth and Equity

Other topics as approved by faculty advisor

Total Hours

30