

# CIVIL ENGINEERING, M.S.

All programs of study must be approved by the student's academic advisor and the Department of Civil and Environmental Engineering graduate director.

## Learning Outcomes

- Graduates will be able to demonstrate expertise in a core subject area of civil and environmental engineering.
- Graduates will demonstrate a working knowledge of various areas of civil and environmental engineering and in related fields, including other engineering disciplines, the sciences, and mathematics.
- Graduates will be able to describe and discuss advances of knowledge in civil and environmental engineering.
- Students will be able to apply knowledge of mathematics, science and engineering.
- Graduates will demonstrate the basic skills (e.g., leadership, presentation, time managements, problem solving, study, and organizing) required for life-long learning and professional development.

## Admissions

Students with Bachelor of Science (B.S.) degrees in civil or environmental engineering are eligible to enter the M.S. degree program. Students with engineering degrees in areas other than civil engineering may be required to complete deficiency/prerequisite undergraduate courses. As a minimum, the following deficiency/prerequisite courses or equivalent will be required: MATH 141, MATH 142 and MATH 242; CHEM 111; PHYS 211 and PHYS 212; ECIV 200; ECIV 201; STAT 509. Students will also be required to take all undergraduate courses that are listed as prerequisites for courses taken for graduate credit. In general, deficiency/prerequisite courses must be completed with a **B** average. Specific Program Areas may require additional course work.

An undergraduate grade point average (GPA) of 2.8 on a 4.0 scale, and 3.0 on a 4.0 scale on any graduate course work is required for students wishing to enter the M.S. degree programs with B.S. degrees in engineering. Exceptions to the minimum undergraduate GPA requirements for admission to the M.S. degree program may be made for students with special qualifications.

For students with non-engineering baccalaureate degrees, or engineering degrees from programs not accredited by ABET, the minimum grade requirement is a GPA of 3.0 on a 4.0 scale on their undergraduate coursework, and 3.0 on a 4.0 scale on any graduate course work.

The general Graduate Record Examination (GRE) is required for all students entering the M.S. degree program. Typically, successful applicants have combined scores of at least 301 (1100 in the old scale) on the Verbal and Quantitative (V + Q) sections, and 3.5 on the Analytical Writing section.

## Degree Requirements (30 Hours)

For the M.S. degree, 30 credit hours, of which 6 credit hours must be ECIV 799, are required. At least 15 hours of course work must be 700-level or higher. Up to 9 credit hours of course work may be taken outside of the department for degree credit with the approval of the student's advisor and the graduate director. Prescribed core courses are required

for each area of study (see "Core Courses" below). A maximum of 6 credits of ECIV 797 may be used toward the student's program of study.

Credits earned in ECIV 798 do not count toward a student's program of study.

## Core Courses

Each area of study has a minimum core requirement for the M.S., M.E., and Ph.D. degrees. The core requirements in the different areas of study are as follows:

### Environmental Engineering

Course	Title	Credits
ECIV 750	Principles of Environmental Engineering Process	3
Select two of the following:		6
ECIV 555	Principles of Municipal Solid Waste Engineering	
ECIV 556	Air Pollution Control Engineering	
ECIV 558	Environmental Engineering Process Modeling	
ECIV 751	Water and Wastewater Treatment Theory I	
ECIV 752	Water and Wastewater Treatment Theory II	
ECIV 753	Unit Operations Laboratory for Water and Wastewater Treatment	
ECIV 755	Industrial Wastewater Treatment	
<b>Total Credit Hours</b>		<b>9</b>

### Geotechnical Engineering

Course	Title	Credits
ECIV 730	Advanced Soil Mechanics	3
Select three of the following:		9
ECIV 731	Slope Stability, Retaining Systems and Lateral Earth Pressure	
ECIV 732	Theoretical and Numerical Methods in Geomechanics	
ECIV 733	Physico-chemical Properties of Soils	
ECIV 734	Dynamics of Soils and Foundations	
ECIV 736	Ground Improvement Techniques	
ECIV 737	Advanced Foundation Design	
<b>Total Credit Hours</b>		<b>12</b>

### Structural Engineering

Course	Title	Credits
ECIV 720	Advanced Structural Mechanics and Analysis	3
Select three of the following:		9
ECIV 722	Theory and Design of Plates and Shells	
ECIV 724	Dynamics of Structures	
ECIV 725	Advanced Analysis and Design in Structural Metals	
ECIV 726	Repair and Retrofit of Structures	
ECIV 727	Advanced Analysis and Design of Reinforced Concrete	
ECIV 728	Prestressed Concrete Analysis and Design	
ECIV 737	Advanced Foundation Design	
<b>Total Credit Hours</b>		<b>12</b>

**Transportation Engineering**

Course	Title	Credits
Select one from each group:		9
<b>Group One</b>		
ECIV 535	Geotechnical Engineering in Transportation	
ECIV 540	Transportation Systems Planning	
ECIV 541	Highway Design	
<b>Group Two</b>		
ECIV 542	Traffic Engineering	
ECIV 748	Traffic Flow Theory	
<b>Group Three</b>		
ECIV 705	Deterministic Civil and Environmental Systems Engineering	
ECIV 706	Probabilistic Civil and Environmental Systems Engineering	
<b>Total Credit Hours</b>		<b>9</b>

**Water Resources Engineering**

Course	Title	Credits
Select one of the following options:		9
<b>Option One</b>		
Select two of the following:		
ECIV 760	Computational Hydraulics	
ECIV 761	Numerical Methods in Subsurface Hydrology	
ECIV 762	Advanced Hydrology	
ECIV 763	Unsaturated Flow Theory	
ECIV 764	Contaminant Transport	
ECIV 765	Erosion and Sediment Control	
ECIV 766	Fluid Transients	
ECIV 767	Sediment Transport and River Mechanics	
Select one of the following:		
ECIV 560	Open Channel Hydraulics	
ECIV 562	Engineering Hydrology	
ECIV 563	Subsurface Hydrology	
<b>Option Two</b>		
Select three of the following:		
ECIV 760	Computational Hydraulics	
ECIV 761	Numerical Methods in Subsurface Hydrology	
ECIV 762	Advanced Hydrology	
ECIV 763	Unsaturated Flow Theory	
ECIV 764	Contaminant Transport	
ECIV 765	Erosion and Sediment Control	
ECIV 766	Fluid Transients	
ECIV 767	Sediment Transport and River Mechanics	
<b>Total Credit Hours</b>		<b>9</b>