Master of Science

Engineering with a Concentration in Civil Engineering (MS)

Master's Degrees

In this rapidly changing technological world, graduate degrees are highly desirable and most often master's degrees are required to hold professional civil and environmental engineering positions in the industry, and in federal, state and municipal government agencies. The department's graduate programs are designed to educate the technological leaders of the future in civil and environmental engineering, and are structured to accommodate both full-time and part-time students. The specialty areas include coastal, geotechnical, structural, transportation, and water resources engineering in civil engineering, and sub-fields in environmental engineering including water quality, water and wastewater treatment, hydrologic processes, water resources, environmental engineering microbiology, air quality, hazardous and solid waste, biofuels, nutrient cycling, and pollution prevention. Online master's degree programs in Coastal Engineering and Environmental Engineering are available with/without allowed transfer credits. For additional information, please request a departmental handbook from the graduate program director (CEGPD@odu.edu).

Admission Information

Civil and Environmental master's degree applicants must have a bachelor's degree, preferably, in civil or environmental engineering with a strong background in mathematics and physical sciences. Each applicant must submit an essay of 500 words or less describing personal and academic goals, professional objectives, preparation for graduate study, and how the chosen program will help the applicant achieve these goals and objectives. Two letters of recommendation must be submitted from former or current professors, or employment supervisors. Regular admission to a master's program generally requires an undergraduate GPA of 3.0 or higher on a 4.0 scale. Applicants with a lower undergraduate GPA may be considered for regular or provisional admission on the basis of successful engineering work experience or other credentials demonstrating potential for success in the graduate program. The submission of Graduate Record Examination (GRE) is required unless the applicant holds an ABET accredited engineering degree from an institution in the USA. TOEFL (or IELTS) is required for all applicants whose native language is not English unless their BS degrees are from USA institutions. Provisional admission may also be possible for applicants with a bachelor's degree in a field other than the applicant's intended graduate program. In such cases there will be prerequisite course requirements. Provisional admission may be given to those applicants who do not hold a bachelor's degree in civil or environmental engineering; however, these students will be required to complete undergraduate course work in addition to the graduate program requirements. Potential prerequisite courses are listed below.

Curriculum Requirements

Potential Prerequisite Courses for M.S. Engineering - Civil Engineering (other than Transportation Engr. Emphasis)

MATH 211	Calculus I	4
MATH 212	Calculus II	4
MATH 307	Ordinary Differential Equations	3
MATH 312	Calculus III	4
PHYS 231N	University Physics I	4
PHYS 232N	University Physics II	4
CEE 204	Statics	3
CEE 205	Enginering Dynamics	3
CEE 220	Mechanics of Deformable Bodies	3
CEE 305	Numerical Methods for Civil and Environmental Engineering	1
CEE 310	Structures I	3
CEE 323	Soil Mechanics	3
CEE 330	Hydromechanics	3
CEE 340	Hydraulics and Water Resources	3
CEE 410	Concrete Design	3

Potential Prerequisites Courses for M.S. Engineering - Civil Engineering (Transportation Engr. Emphasis)

MATH 211	Calculus I	4
MATH 212	Calculus II	4
MATH 312	Calculus III	4
STAT 306	Introductory Statistics	3
PHYS 231N	University Physics I	4
PHYS 232N	University Physics II	4
CEE 305	Numerical Methods for Civil and Environmental Engineering	1

Civil Engineering and Environmental Engineering Graduate Course Requirements (except Transportation Engineering Emphasis)

The graduate courses applicable towards a master's degree in the Department of Civil and Environmental Engineering are grouped into various categories listed below. The required number of the credit hours from these categories for the Master of Science (M.S.) degree in Civil Engineering (except for the transportation engineering concentration) and the Master of Science (M.S.) degree in Environmental Engineering are summarized in Table CEE-1 and CEE-2, respectively. Note that the M.S. Thesis option students must pass an oral thesis defense examination and submit a thesis, M.S. Project option students must pass an oral project defense examination, and M.S. Course option students must pass an oral (for civil engineering) or written (for environmental engineering) comprehensive examination at the end of all course work.

Category A – Upper level master degree courses in Civil Engineering

CEE 710	Structural Dynamics	3
CEE 711	Finite Element Analysis	3
CEE 712	Advanced Reinforced Concrete	3
CEE 713	Prestressed Concrete	3
CEE 714	Advanced Structural Analysis	3
CEE 715	Engineering Optimization I *	3
CEE 717	Bridge Structures Design	3
CEE 718	Flood Resistant Structural Design	3
CEE 719	Inelastic Structures	3
CEE 720	Structural Stability	3
CEE 721	Plates	3
CEE 722	Cluster Parallel Computing	3
CEE 723	Seismic Design of Steel Structures	3
CEE 724	Retrofitting Methods for Bridges and Buildings	3
CEE 725	Smart Structures	3
CEE 730	Advanced Foundation Engineering	3
CEE 731	Advanced Soil Mechanics	3
CEE 732	Engineering Behavior of Soils	3
CEE 733	Soil Dynamics	3
CEE 741	Open Channel Flow *	3

CEE 747	Groundwater Flow *	3
CEE 761	Water Resources Processes and Analysis Methods *	3
CEE 770	Transportation Safety	3
CEE 771	Transportation Operations II	3
CEE 772	Intelligent Transportation Systems	3
CEE 773	Transportation Planning	3
CEE 774	Transportation Network Flow Models	3
CEE 775	Transportation Network Algorithms	3
CEE 776	Simulation in Transportation Networks	3
CEE 777	Econometric Modeling in Transportation	3
CEE 782	Design of Coastal Structures	3
CEE 787	Dredging and Beach Engineering	3
CEE 788	Coastal Hydrodynamics and Sediment Processes *	3
CEE 789	Computational Environmental Fluid Dynamics	3

Category C – Lower level courses in Civil & Environmental Engineering

CEE 514	Masonry Structures Design	3
CEE 515	Steel Structures Design	3
CEE 516	Wood Structures Design	3
CEE 530	Foundation Engineering	3
CEE 531	Slope Stability and Earth Structures Design	3
CEE 532	Introduction to Earthquake Engineering	3
CEE 533	Geomaterials Stabilization	3
CEE 540	Hydraulic Engineering	3
CEE 546	Urban Stormwater Hydrology	3
CEE 547	Groundwater Hydraulics	3
CEE 550	Water Distribution and Wastewater Collection System Design	3
CEE 552	Air Quality	3
CEE 554	Hazardous Waste Treatment	3
CEE 555	Pollution Prevention and Green Engineering	3
CEE 558	Sustainable Development	3
CEE 571	Transportation Operations I	3
CEE 574	Transportation Data Analytics	3
CEE 575	Geometric Design of Highways	3
CEE 582	Introduction to Coastal Engineering	3

Category D – Other graduate courses

Graduate level courses offered from other departments. These courses must be related to the program of study and must be approved by the student's academic advisor.

MATH or STAT Category

CEE 700 Civil and Environmental Engineering Experimental Design

CEE 701 Applied Mathematics for Civil and Environmental Engineering

or a graduate level MATH or STAT course.

* Double listings in A and B categories.

Table CEE-1. Required Course Distributions for M.S. Engineering - Civil Engineering (except for Transportation Engineering Emphasis)

M.S. - Thesis Option

Category	Credit Hours
A	12
A,B,C, or D	9
MATH/STAT	3
Thesis	6
Total	30*

M. S. - Project Option

Category	Credit Hours
A	15
A, B, C, or D	9
MATH/STAT	3
Project	3
Total	30*

M. S. - Course Option

Category	Credit Hours
A	18
A,B,C, or D	9
MATH/STAT	3
Total	30**

* For Thesis & Project options, no more than 9 credit hours can be at the 500 level.

** For Course option, no more than 12 credit hours can be at the 500 level.

M.S. Engineering - Civil Engineering Course Requirements (in Transportation Engineering Emphasis)

The department offers a Master of Science (M.S.) degree in Engineering with a concentration in Civil Engineering with emphasis in Transportation Engineering. Table CEE-3 summarizes the requirements for the Transportation Engineering emphasis. Note that the M.S. Thesis option students must pass an oral thesis defense examination and submit thesis, Project option students must pass an oral project defense examination, and Course option students must pass an oral comprehensive examination at the end of all course work.

Table CEE-3. Required Course Distributions for M.S. Engineering - Civil Engineering – Transportation Engineering Emphasis

M.S. - Thesis Option

Category	Credit Hours
Upper-level Transportation Courses	12
CEE 700 or a Graduate Statistic Course	3
Electives from Upper-level Transportation Courses and other approved electives	9
Thesis	6
Total	30*

M.S. - Project Option

Category	Credit Hours
Upper-level Transportation Courses	12
CEE 700 or a Graduate Statistic Course	3
Electives from Upper-level Transportation Courses and other approved electives	12
Project	3
Total	30*

M.S. - Course Option

Category	Credit Hours
Upper-level Transportation Courses	12
CEE 700 or a Graduate Statistic Course	3
Electives from Upper-level Transportation Courses and other approved electives	15
Comprehensive examination	
Total	30**

* Note: For Thesis and Project options, no more than 9 credit hours can be at the 500 level.

** For Course Option, no more than 12 credits can be at the 500 level.

Master's Level Courses in Transportation Engineering Emphasis

Upper-level Transportation Courses	
CEE 770	Transportation Safety
CEE 771	Transportation Operations II
CEE 772	Intelligent Transportation Systems
CEE 773	Transportation Planning
CEE 774	Transportation Network Flow Models
CEE 775	Transportation Network Algorithms
CEE 776	Simulation in Transportation Networks
CEE 777	Econometric Modeling in Transportation
Required Statistics Course	
CEE 700	Civil and Environmental Engineering Experimental Design
or Graduate STAT Course	
Other Approved Elective Courses	
See Table Below	
Thesis/Project	
CEE 699	Thesis
CEE 698	Master's Project

Other Approved Electives in Transportation Engineering Emphasis

(Note: In addition to these electives, other graduate-level courses approved by your advisor may also count towards the elective requirements.)

CEE 571	Transportation Operations I	3
CEE 574	Transportation Data Analytics	3
CEE 575	Geometric Design of Highways	3
CEE 552	Air Quality	3
CEE 558	Sustainable Development	3
CEE 715	Engineering Optimization I	3
ENMA 600	Cost Estimating and Financial Analysis	3
ENMA 603	Operations Research	3
ENMA 717	Cost Engineering	3
ENMA 724	Risk Analysis	3
MSIM 601	Introduction to Modeling and Simulation	3
MSIM 751	Advanced Analysis for Modeling and Simulation	3
PADM 634	Regional Planning	3
PADM 721	Transportation Policy	3
PORT 611	International Maritime Transport	3
PORT 612	Port Operations and Management	3
PORT 614	Port Planning and Economics	3
PSYC 870	Human Factors Psychology	3
STAT 531	Theory of Statistics	3
STAT 532	Sampling Theory	3
STAT 535	Design and Analysis of Experiments	3
STAT 537	Applied Regression and Time Series Analysis	3
STAT 549	Nonparametric Statistics	3