Master of Science

Engineering with a Concentration in Civil Engineering (MS)

Program Website: https://www.odu.edu/academics/programs/masters/civil-engineering (https://www.odu.edu/academics/programs/masters/civil-engineering/)

Contact Information

Graduate Program Director: Mujde Erten-Unal
Department Chair: Sandeep Kumar

Inquiries: CEGPD@odu.edu

Master of Science Degree

In a rapidly changing technological world, graduate degrees are highly desirable and very 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. Our 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.

Specialty areas in the program 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. Programs in all speciality areas are available to on-campus students and online master's degree programs are available in the specialty areas of Coastal Engineering and Environmental Engineering.

For additional information, please request a departmental handbook from the Graduate Program Director (CEGPD@odu.edu).

Program Overview

The Master of Science in Engineering with a Concentration in Civil Engineering requires 30 credits and is available in three pathways – the *Thesis Option*, the *Project Option*, and the *Coursework-Only Option*. The curricular requirements for each of these options are describe in detail in this catalog. These pathways provide a range of options for pursuing advanced study. Prospective students are encouraged to speak with the Graduate Program Director (or a faculty advisor) if unsure which pathway is most suitable for their needs.

Additional Information

Graduate Student Program Handbook: For additional information, please request a departmental handbook from the Graduate Program Director (CEGPD@odu.edu).

Additional Graduate Student Resources (Graduate School): The Graduate School has extensive additional resources for graduate students at https://www.odu.edu/graduateschool/graduate-student-resources (https://www.odu.edu/graduateschool/graduate-student-resources/)

Program Financial Aid: Our programs offer graduate assistantships with stipends that are awarded to students after a competitive review process. The level of award is determined on the basis of previous experience and performance as a graduate assistant and on the student's academic achievement and potential in the field. In addition, a number of teaching and research positions are available for financial support of graduate assistants during the summer months (June and July).

Accelerated Study (Dual Dominion Program): Undergraduate students in the Frank Batten College of Engineering and Technology can apply for entry into the Dual Dominion Program, which permits students to begin pursuit of a graduate degree in Civil Engineering while they are still pursuing their undergraduate degree in a complementary discipline. Subject to the approval of the undergraduate and graduate program directors, a student enrolled in the Dual Dominion program can count up to six credit hours of course work towards both the undergraduate and the graduate degrees. Full-time students may be able to complete the requirements for the bachelor's degree in four years and the master's degree in one additional year. Students who are matriculated in an undergraduate major in the Frank Batten College of Engineering and Technology with a GPA of at least 3.00 overall and 3.00 in the major are eligible to apply for admission to a Dual Dominion Bachelor's/Master's program. Additional Undergraduate Catalog information on the Dual Dominion program can be found at https://catalog.odu.edu/undergraduate/registrationrequirementsandprocedures/linked_programs/.

Admission Information

Application Process

Summary: Applications for graduate study in the Master of Science in Engineering Program (Civil Engineering) should be made through the general ODU Application Portal (https://www.odu.edu/apply/). Additional materials supporting your application (outlined below) will be required. Once complete, your application package will be reviewed and forwarded to the Civil and Environmental Engineering Program's Graduate Program Director (CEGPD@odu.edu) for consideration. Questions regarding the general application process can be directed to admissions@odu.edu (on-campus) or globaladmissions@odu.edu (online).

Application Deadlines: The Master of Science in Engineering Program uses a rolling admission process and does not have a formal application deadline. Entrance into the program and commencement of studies will be timed to begin with the start of the next academic term following admission.

General ODU Requirements

General ODU Requirements: General requirements for graduate admission to the Master of Science in Engineering Program (Civil Engineering) can be found on the ODU Graduate Admissions (https://www.odu.edu/admission/graduate/) website. Additional details can be found in the Admissions section of the Graduate Catalog (https://catalog.odu.edu/graduate/graduateadmission/).

Additional Program Requirements:

Prior Degrees: Civil and Environmental Engineering 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. Provisional admission (see below) may also be possible for applicants with a bachelor's degree in a related field other than the applicant's intended graduate program.

Undergraduate GPA: 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.

Transcripts: Official transcripts from all post-secondary institutions attended are required.

Examination/Test Scores: Submission of Graduate Record Examination (GRE) scores is nominally required. However, this requirement is waived if the applicant holds an engineering degree from an ABET accredited institution in the USA.

Language Proficiency Requirements: TOEFL (or IELTS) scores are required for all applicants whose native language is not English unless their BS degrees are from USA institutions. These applicants must meet University admission requirements (IELTS: 6.5 or TOEFL iBT: 79); please

refer to the website: https://www.odu.edu/admissions/proficiency (https://www.odu.edu/admissions/proficiency/) for additional details.

Résumé: A résumé or CV detailing relevant experience is required.

Personal Statement: 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.

Recommendation Letters: Two letters of recommendation must be submitted from former or current professors, or employment supervisors.

Provisional Admission: Students not meeting the above requirements may be admitted provisionally. Only the Graduate Program Director (GPD) can waive an admission requirement. Please reach out directly to the GPD if you think you are eligible for a waiver from a requirement. The GPD may request additional information, including GRE scores. Provisionally admitted students may be required to complete additional prerequisite course requirements to prepare them for the graduate curriculum in the discipline.

Curriculum Requirements

Curriculum requirements in the Master of Science in Engineering (Civil and Environmental Engineering Concentration) are in accordance with the general requirements for Ph.D. degrees at Old Dominion University as specified in the Requirements for Graduate Degrees (https://catalog.odu.edu/graduate/universityrequirementsforgraduatedegrees/) section of this catalog.

Progression in the M.S. program is governed by a Plan of Study that is established by the student in conjunction with his/her advisor and guidance committee within the first nine credit hours of coursework. The Plan of Study will follow the established course requirements (below) unless a substitution to one or more courses is agreed upon between the student and their primary advisor and approved by the Graduate Program Director.

The plan of study is designed to prepare the student to undertake scholarly research in the particular field and specialization of their dissertation. The coursework selected will provide the student with (1) the requisite foundational knowledge of the selected field, and (2) the necessary research skills. A high degree of flexibility is provided to customize the plan of study, taking into account the diversity in the fields of study, the multidisciplinary nature and variety of research that is undertaken, as well as the different levels of preparation that individual students have upon entry to the program.

The Master of Science in Engineering with a Concentration in Civil Engineering can be focused into one of two directions: 1) General Emphasis, or 2) Transportation Engineering Emphasis. Within the emphasis areas, the M.S. can be earned through three possible Options with differing combinations of classwork, projects, and thesis requirements.

1. **Thesis Option:** 30 credit hours total (24 credits coursework + 6 credit thesis)*
2. **Project Option**: 30 credit hours total (27 credits coursework + 3 credit project)*
3. **Coursework Option**: 30 credit hours total (all credits coursework)*

**Note* that completion of all three Options requires students to pass an examination. The *Thesis Option* requires students to complete a thesis, the *Project Option* requires students to pass an oral project defense examination, and the *Coursework Option* requires students to pass an oral (for civil engineering) or written (for environmental engineering) comprehensive examination at the end of all course work.

Degree requirements for each of the three Options are outlined below.

M.S. Thesis Option

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

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

* Double listing in A and B Category

** For thesis option, no more than 9 credit hours can be at the 500 level.

M. S. - Project Option

Table CEE-2. Required Course Distributions for M.S. Engineering - Civil Engineering (except for Transportation Engineering Emphasis)

Category	Credit Hours
A	12
A, B, or C (open electives)	12*
D: MATH/STAT	3
Project	3
Total	30**

* Double listing in A and B Category

** For project option, no more than 9 credit hours can be at the 500 level.

M. S. - Course Option

Table CEE-3. Required Course Distributions for M.S. Engineering - Civil Engineering (except for Transportation Engineering Emphasis)

Category	Credit Hours
A	12
A,B, or C	15*
D: MATH/STAT	3
Total	30**

* Double listing in A and B Category

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

Category A - Core Courses (Except for Transportation Track). Select 12 credits from this Category:

Coastal		
CEE 782	Design of Coastal Structures	3
CEE 695	Topics in Civil and Environmental Engineering ((Harbor Design and Port Engineering))	3
Geotechnical		
CEE 730	Advanced Foundation Engineering	3
CEE 731	Advanced Soil Mechanics	3
Structural		
CEE 711	Finite Element Analysis	3
CEE 721	Plates	3
Transportation		
CEE 770	Transportation Safety	3
CEE 774	Transportation Network Flow Models	3
Water Resources		
CEE 741	Open Channel Flow	3
CEE 761	Water Resources Processes and Analysis Methods	3

Category B

CEE 512	Computational Methods in Structures	3
CEE 513	Prestressed Concrete	3
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 540	Hydraulic Engineering	3
CEE 546	Urban Stormwater Hydrology	3
CEE 547	Groundwater Hydraulics	3
CEE 558	Sustainable Development	3
CEE 571	Transportation Operations I	3
CEE 575	Geometric Design of Highways	3
CEE 582	Introduction to Coastal Engineering	3
CEE 710	Structural Dynamics	3
CEE 712	Advanced Reinforced 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 723	Seismic Design of Steel Structures	3
CEE 724	Retrofitting Methods for Bridges and Buildings	3
CEE 725	Smart Structures	3
CEE 733	Soil Dynamics	3
CEE 747	Groundwater Flow	3
CEE 771	Transportation Operations II	3
CEE 772	Intelligent Transportation Systems	3
CEE 773	Transportation Planning	3
CEE 776	Simulation in Transportation Networks	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

Graduate-level courses in the M.S. in Environmental Engineering program, as well as courses offered by other departments that are approved by the student's academic advisor or the CEE Graduate Program Director.

Category D

CEE 700

CEE 701 **or** any graduate-level mathematics or statistics course.

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

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-4. 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**

** For thesis option, no more than 9 credit hours can be at the 500 level.

Table CEE-5. Required Course Distributions for M.S. Engineering - Civil Engineering – Transportation Engineering Emphasis

M.S. - Project Option

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

** For project option, no more than 9 credit hours can be at the 500 level.

Table CEE-6. Required Course Distributions for M.S. Engineering - Civil Engineering – Transportation Engineering Emphasis

M.S. - Course Option

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

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

Upper Level Transportation Courses

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	
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	

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

Other Approved Electives ***

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 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

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

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

Additional Requirements

Responsible Conduct of Research

Prior to the completion of 12 credit hours in the Master of Science in Engineering (Civil Engineering Concentration) program, all graduate students must also complete the *Collaborative Institutional Training Initiative* (CITI) basic course, ***Responsible Conduct of Research for Engineers***. The basic course includes the following modules: Misconduct (falsification, fabrication, and plagiarism); Data acquisition, management, sharing and ownership; Mentor/trainee relationships; Publication practice and responsible authorship; Peer review; Conflicts of interest; and Collaborative research. Students who fail to complete this requirement within the allotted time period will have a registration hold placed on their records. For additional details on this training, see the Responsible Conduct of Research Training (https://www.odu.edu/research/responsible-conduct-of-training/) website.

Colloquium/Seminar Requirement

The Master of Science in Engineering (Civil Engineering Concentration) program encourages but does not require students to attend or participate in research seminars on contemporary topics given by professionals in the field.

Foreign Language Requirement

There is no foreign language requirement for the Master of Science in Engineering with a Concentration in Civil Engineering.

Residency Requirement

There is no residency requirement for the Master of Science in Engineering with a Concentration in Civil Engineering.