

# Old Dominion University

## Department of Civil and Environmental Engineering

Norfolk, Virginia 23529

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Web site: <http://www.odu.edu/cee>

### Graduate Programs

#### Opportunities

In this rapidly changing technological world, Master's degrees are highly desirable and sometimes required to hold truly professional civil and environmental engineering positions in the industry, and in federal, state and municipal government agencies. Doctoral degrees are required for college-level teaching and for employment in research institutions. Many leading industries and agencies seek well trained doctoral graduates for performing highly sophisticated engineering tasks. Our graduate programs are designed to train the technological leaders of the future in civil and environmental engineering.

#### Old Dominion University

Old Dominion University, founded in 1930, is a state supported institution in Norfolk, Virginia and has a combined undergraduate and graduate student population of 25,000 from 50 states and over 100 countries. Old Dominion University is located in Norfolk, Virginia, the hub of the world's largest natural harbor. The 200-acre of Old Dominion's campus stretch from the Elizabeth River to the Lafayette River, and it is only 20 miles from the pounding surf of Virginia Beach. The university operates on the semester system with a spring and fall semester and a variety of semester options in the summer.

#### Department of Civil and Environmental Engineering

The CEE Department in the College of Engineering and Technology offers an ABET accredited Bachelor of Science (B.S.) degrees in Civil Engineering, Master of Science (M.S.) both in Civil Engineering and in Environmental Engineering, and Doctor of Philosophy (Ph.D.) in Civil and Environmental Engineering. The graduate programs are structured to accommodate both the full-time and part-time student. Most of the graduate courses are offered in evenings, and many are offered as televised courses. The available specialty areas are coastal, geotechnical, structural, transportation and water resources engineering in Civil Engineering and a variety of sub-fields in Environmental Engineering. **Distance learning master degree programs in Coastal Engineering and Environmental Engineering** are available with allowed transfer credits. CEE also offers **Graduate Certificates** in Coastal Engineering and Energy Systems with a focus on renewable/bioenergy resources. Learn more at <http://www.odu.edu/cee/students/graduate>.

#### Admission

*For Master's degree Programs*, the applicant must hold an undergraduate degree (preferably in civil or environmental engineering). Applicants with bachelor's degrees in other field of engineering/sciences may have to complete undergraduate prerequisite courses (see *Potential Prerequisites* section below). *For Doctoral programs*, an applicant must normally have a master's degree or its equivalent in engineering or a related field. *For both Master's and Doctoral programs*, two letters of recommendation and an essay about the applicant's interest in the particular area, and goals and plans for the future are required. All applicants whose native language is not English must take TOEFL and have 550 point or above (or IELTS  $\geq$  6.5) for regular admission. Submission of GRE is required, except for applicants who hold a BS degree (for Master program applicants) or a Master degree (for Ph.D. program applicants) in engineering disciplines from ABET accredited institutions in U.S.A. *Application deadlines* for domestic applicants, are June 1, Nov.1 and April 1, for Fall, Spring, Summer semester admission, respectively. Those for international applicants are April 15 for Fall, October 1 for Spring, and February 1 for Summer. Visit <http://www.odu.edu/admission/graduate>.

#### Degree Requirements

Master's degree programs offer three options: Master of Science degree Thesis option (24 hours course work and 6 hours thesis work), Project option (27 hours course work and 3 hours project), and Course option (30 hours course works). The Ph.D. degree requires 24 hours of graduate course work and 24 hours of dissertation research.

#### Tuition and Financial Aid

2021-22 *Tuition* rate for graduate study is \$547 per semester credit hour for Virginia residents and \$1383 for non-Virginia residents. *Teaching and research assistantships* are available and are awarded on the basis of merit. TA/RA assistantships stipends range from \$12,800 for masters and \$15,000 for doctoral students and above. TA/RA recipients are expected to engage in 20 hours of teaching and/or research activity per week. Master's degree students holding TA/RA assistantships are eligible for in-state tuition rates. Doctoral students holding these positions are eligible for a complete tuition waiver.

#### Potential Prerequisites for non-Civil/Env BS Holders

Applicants who have completed an undergraduate degree in a field other than civil or environmental engineering may be admitted to the program provisionally, but generally are required to complete prerequisite courses as listed below.

#### Potential Prerequisite Courses for M.S. in Civil Engineering:

MATH211	Calculus I	PHYS232N	Univ. Phys.I I	CEE310	Structures I
MATH212	Calculus II.	CEE204	Statics	CEE323	Soil Mechanics
MATH307	Ord. Diff. Eq.	CEE205	Engr. Dynamics	CEE330	Hydromechanics
MATH312	Calculus III	CEE220	Mech. of Def. Bodies	CEE340	Hyd. & Water Res.
PHYS231N	Univ. Phys.I	CEE305	CE Computation	CEE410	Concrete Design

#### Potential Prerequisite Courses for M.S. in Env. Engineering:

MATH211	Calculus I	PHYS231N	Univ. Physics I	CEE204	Statics
MATH212	Calculus II	PHYS232N	Univ. Physics I I	CEE305	CE Computation
MATH307	Ord. Diff. Eq.	CHEM121	Found.of Chem. I	CEE330	Hydromechanics
MATH312	Calculus III	CHEM123	Found.of Chem. I I	CEE340	Hyd. & Wat. Res.
				CEE350	Env. Poll. & Contr.

#### Faculty and Research Activities

*Shahin N. Amiri, Ph.D.* (Kansas State University), *P.E.*, Lecturer, Computational mechanics (solid and fluid mechanics); geotechnical engineering; health monitoring of structures; aircraft cabin air quality.  
*Mecit Cetin, Ph.D.* (Rensselaer P. I.), Professor, transportation engr.; intelligent transp. systems; modeling and simulation; traffic signal control; freight transport.; big data & machine learning; dynamic tolling.  
*Mujde Erten-Unal, Ph.D.* (Missouri U. of S. & T.), Associate Professor, environmental engr.; wastewater treatment; env. microbiology; haz. waste treatment; sustainable develop. (Director, Sust. Develop. Inst.).  
*Sherif Ishak, Ph.D.* (University of Central Florida), *P.E.*, Professor & **Department Chair**; transportation engr.; intelligent transportation systems; traffic simulation & modeling; traffic safety & driving behavior.  
*Isao Ishibashi, Ph.D.* (U. of Washington), *P.E.*, Professor & **Graduate Program Director**, geotechnical engineering; earthquake engineering; soil dynamics; soil-structure interaction; experimental methods.  
*Sandeep Kumar, Ph.D.* (Auburn University), Professor, sustainable chemical conversion processes, biofuels; thermochemical conversion of biomass; sub- and supercritical water/CO2 technology  
*Gangfeng Ma, Ph.D.* (U. of Delaware), Associate Professor, Coastal engineering; coastal hazards; sea level rise and climate change; computational fluid mechanics.  
*Duc T. Nguyen, Ph.D.* (U. of Iowa), Professor (also in MSVE department), structural engineering; parallel computational mechanics; numerical algorithms for transportation networks; optimization.  
*Zia Razaq, D.Sc.* (Washington University), *P.E.*, University Professor, retrofitting buildings and bridges; flood/wind/fire/earthquake/impact resistant structures; stability; passive damping; FRP structures.  
*Gary C. Schafran, Ph.D.* (Syracuse Univ.), Professor, environmental engr.; fate and transport of contaminants in natural systems; lake oxygenation; aquatic chemistry; physicochemical treatment processes.  
*Navid Tahvildari, Ph.D.* (Texas A&M University), Associate Professor, coastal engineering; environmental fluid mechanics; nonlinear wave dynamics; ocean mixing; internal waves; inverse modeling.  
*Xixi Wang, Ph.D.* (Iowa State U.), *P.E.*, Professor, water resources, hydrological processes, ecohydrology, watershed analysis/modeling, climate change, stormwater, flooding and drought.  
*Kun Xie, Ph.D.* (New York University), Assistant Professor, transportation engr.; traffic safety; statistics & econometrics; big data analytics; emergency management; transport geography.  
*Jaewan Yoon, Ph.D.* (North Dakota State U.), Associate Professor, University Professor, environmental engineering; water quality modeling and management; stochastic and geospatial methods.

Visit <http://www.odu.edu/cee> for detailed individual research activities.

## Master's Degree Programs

The graduate courses applicable towards Master's degrees are grouped into following categories.

### Category A (3 credit hours each) - Upper Level Courses in Civil Engr.

CEE 710	Structural Dynamics
CEE 711 @	Finite Element Analysis
CEE 712 @	Advanced Reinforced Concrete
CEE 713 @	Prestressed Concrete
CEE 714 @	Advanced Structural Analysis
CEE 715* @	Engineering Optimization I
CEE 717 @	Bridge Structures Design
CEE 718 @	Flood Resistant Structural Design
CEE 719 @	Inelastic Structures
CEE 720 @	Structural Stability
CEE722 @	Cluster Parallel Computing
CEE 721 @	Plates
CEE 723	Seismic Design of Steel Structures
CEE 724 @	Retrofitting Methods for Bridges and Buildings
CEE 725	Smart Structures
CEE 730	Advanced Foundation Engineering
CEE 731	Advanced Soil Mechanics
CEE 732	Engineering Behavior of Soils
CEE 733	Soil Dynamics
CEE 741* @	Open Channel Flow
CEE 747* @	Groundwater Flow
CEE 761* @	Water Resources Process and Analysis Methods
CEE 770	Transportation Safety
CEE 771	Transportation Operation 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
CEE 782 @	Design of Coastal Structures
CEE 787 @	Dredging & Beach Engineering
CEE 788* @	Coastal Hydrodynamics & Sediment Processes
CEE 789 @	Computational Environmental Fluid Dynamics

### Category B (3 credit hours each) - Upper Level Courses in Env. Engr.

CEE 715* @	Engineering Optimization I
CEE 741* @	Open Channel Flow
CEE 747* @	Groundwater Flow
CEE 751% @	Physicochemical Treatment Processes (Env. Core)
CEE 752% @	Biological Wastewater Treatment (Env. Core)
CEE 753	Advanced Processes for Water & Wastewater Treatment
CEE 754	Environmental Engineering Microbiology
CEE 755% @	Water Quality Management (Env. Core)
CEE 756% @	Water Quality Modeling (Env. Core)
CEE 759	Carbon-Free Clean Energy
CEE 760	Managing Phosphorous in Circular Economy
CEE 761* @	Water Resources Process and Analysis Methods
CEE 762% @	Aquatic Chemistry in Env. Engineering (Env. Core)
CEE 788* @	Coastal Hydrodynamics & Sediment Processes

(continued to the next column)

Master's degree courses (continued from the previous column)

### Category C (3 credit hrs. each) - Lower Level Courses for Civil & Env.

CEE 512	Computational Methods in Structures
CEE 514 @	Masonry Structures Design
CEE 515 @	Steel Structural Design
CEE 516 @	Wood Structures Design
CEE 530	Foundation Engineering
CEE 531	Earth Structures Design with Geosynthetics
CEE 532	Introduction to Earthquake Engineering
CEE 533	Geomaterials Stabilization
CEE 540 @	Hydraulic Engineering
CEE 546 @	Urban Stormwater Hydrology
CEE 547 @	Groundwater Hydraulics
CEE 550	Water Distribution & Wastewater Collection System Design
CEE 552 @	Air Quality
CEE 554 @	Hazardous Waste Treatment
CEE 555 @	Pollution Prevention & Green Engineering
CEE 558 @	Sustainable Development
CEE 559 @	Biofuels Engineering
CEE 571	Transportation Operation I
CEE 574	Transportation Data Analytics
CEE 575 @	Geometrical Design of Roads
CEE 582 @	Introduction to Coastal Engineering

### Category D - Other Graduate Courses

Graduate level courses from other programs. These courses must be related to the program of study and must be approved by the academic advisor.

### MATH or STAT Category

CEE 700 @	Civil and Environmental Eng. Experimental Design
CEE 701	Applied Mathematics for Civil and Environmental Engineers or a graduate MATH or STAT course.

\* Double listings in A and B Categories.

@ Available in distance learning mode.

The required minimum course distributions are summarized below table for the various Master's degrees. Note that Transportation Engineering program (a field of Civil Engineering) has a different master degree requirement (visit Master Degree Handbook in CEE web site for details).

M.S.(Thesis) in Civil Eng. (Env. Eng.)	Credit Hours	M.S.(Project) in Civil Eng. (Env. Eng.)	Credit Hours	M.S.(Course) in Civil Eng. (Env. Eng.)	Credit Hours
A (Env. Core)	12	A (Env. Core)	12	A (Env. Core)	12
		A (B)	3	A (B)	6
A,B,C or D	9	A,B,C or D	9	A,B,C or D	9
MATH or STAT	3	MATH or STAT	3	MATH or STAT	3
Thesis	6	Project	3	Comp. Exam.	
Total credit Hours	30 ✘	Total credit hours	30 ✘	Total credit hours	30

✘ For MS Thesis and Project options, no more than 9 credit hours can be at 500 level.

(Updated: November 15, 2021)

# Graduate Programs

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Frank Batten College of Engineering and Technology