

# MS CIVIL AND ENVIRONMENTAL ENGINEERING

## Program Learning Objectives

1. Apply and synthesize technical knowledge to solve solutions to advanced Civil and Environmental Engineering problems in a chosen subject area of mastery (Environmental, Geotechnical, Structural, Water Resources, or Transportation Engineering).
2. Demonstrate the ability for lifelong learning necessary for the constantly evolving nature of engineering design and practice.
3. Effectively communicate technical information orally and in writing.
4. Demonstrate independent thinking and decision making skills.
5. Integrate ethical and professional components into the solutions of complex engineering problems.
6. Evaluate engineering systems for sustainable performance and create solutions to encompass a project's full lifecycle.

### Required Courses

CE 591	Graduate Seminar I	1
CE 592	Graduate Seminar II	1
Select one of the following options:		9
CE/ENVE 599	Design Project (Thesis)	
Or 9 units of advisor approved analysis and design electives within the major (nonthesis option)		
<b>Advisor approved analysis and design electives within Civil and Environmental Engineering<sup>3</sup></b>		
Select from the following: <sup>1</sup>		20-34
CE 400	Special Problems <sup>2</sup>	
CE 407	Structural Dynamics	
CE 421	Traffic Engineering	
CE 422	Highway Geometrics and Design	
CE 423	Intelligent Transportation Systems	
CE 424	Public Transportation	
CE 429	Highway Pavement Designs	
CE 431	Coastal Hydraulics I	
CE 432	Coastal Hydraulics II	
CE 433	Open Channel Hydraulics	
CE 434	Groundwater Hydraulics and Hydrology	
CE 440	Hydraulic Systems Engineering	
CE 454	Integrated Structural Design	
CE 455	Design of Timber Structures	
CE 457	Bridge Engineering	
CE 459	FRP Strengthening of Reinforced Concrete Structures	
CE 475	Civil Infrastructure and Building Systems	
CE 481	Analysis and Design of Shallow Foundations	
CE 486	Introduction to Geological Engineering	

CE 488	Engineering Risk Analysis
CE 500	Individual Study <sup>2</sup>
CE 501	Advanced Matrix Analysis of Structures
CE 504	Finite Element Analysis
CE 523	Transportation Systems Planning
CE 525	Airport Planning and Design
CE 527	Sustainable Mobility
CE 528	Transportation Economics and Analysis
CE 529	Modeling and Simulation in Transportation
CE 533	Advanced Water Resources Engineering
CE 537	Groundwater Contamination
CE 539	Environmental Hydraulics
CE 552	Analysis and Seismic Design of Reinforced Concrete
CE 553	Ductile Design of Steel Structures
CE 555	Advanced Civil Engineering Materials Laboratory
CE 557	Seismic Analysis and Design
CE 559	Prestressed Concrete Design
CE 571	Selected Advanced Laboratory
CE 572	Engineering Project Management
CE 581	Advanced Geotechnical Engineering
CE 583	Geotechnical Earthquake Engineering
CE 584	Lateral Support Systems
CE 585	Slope Stability Analysis
CE 586	Analysis and Design of Deep Foundations
CE 588	Ground Improvement
CE 589	Geosynthetics Engineering
ENVE 400	Special Problems <sup>2</sup>
ENVE 411	Air Pollution Control
ENVE 421	Mass Transfer Operations
ENVE 434	Water Chemistry and Water Quality Measurements
ENVE 436	Introduction to Hazardous Waste Management
ENVE 438	Water and Wastewater Treatment Design
ENVE 439	Sustainable Solid Waste Engineering
ENVE 443	Bioremediation Engineering
ENVE 450	Industrial Pollution Prevention
ENVE 455	Environmental Health and Safety
ENVE 466	Senior Project Design Laboratory I
ENVE 467	Senior Project Design Laboratory II
ENVE 480	Environmental Engineering of Energy
ENVE 500	Individual Study <sup>2</sup>
ENVE 535	Physico-Chemical Water and Wastewater Treatment
ENVE 536	Biological Wastewater Treatment Processes Engineering

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ENVE 537	Decentralized Wastewater Management
ENVE 540	Advanced Membrane Technology and Applications
ENVE 542	Sustainable Environmental Engineering

**Advisor approved electives outside of Civil and Environmental Engineering<sup>3</sup>**

Non-CE/ENVE advisor approved electives <sup>1</sup>	0-14
<b>Total units</b>	<b>45</b>

<sup>1</sup> To be selected after consultation with your academic advisor and the CE/ENVE graduate coordinator

<sup>2</sup> No more than 4 total units of technical elective credit from CE 400, CE 500 and ENVE 400, ENVE 500 combined.

<sup>3</sup> In total, at least 27 units of advisor approved electives (both within and outside of Civil and Environmental Engineering) must be at the 500 level.