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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CE 591</td>
<td>Graduate Seminar I</td>
<td>1</td>
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<tr>
<td>CE 592</td>
<td>Graduate Seminar II</td>
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<tr>
<td>CE/ENVE 599</td>
<td>Design Project (Thesis)</td>
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Select one of the following options: 9 units of advisor approved analysis and design electives within the major (nonthesis option)

Advisor approved analysis and design electives within a specific area of focus

Select from the following: 1

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<thead>
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<th>Course Code</th>
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<tbody>
<tr>
<td>CE 400</td>
<td>Special Problems</td>
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<tr>
<td>CE 401</td>
<td>Advanced Mechanics of Materials</td>
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<tr>
<td>CE 405</td>
<td>Concrete Materials</td>
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<td>CE 407</td>
<td>Structural Dynamics</td>
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<td>CE 421</td>
<td>Traffic Engineering</td>
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<td>CE 422</td>
<td>Highway Geometrics and Design</td>
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<td>CE 423</td>
<td>Intelligent Transportation Systems</td>
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<td>CE 424</td>
<td>Public Transportation</td>
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<tr>
<td>CE 431</td>
<td>Coastal Hydraulics I</td>
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<tr>
<td>CE 432</td>
<td>Coastal Hydraulics II</td>
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<td>CE 433</td>
<td>Open Channel Hydraulics</td>
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<td>CE 434</td>
<td>Groundwater Hydraulics and Hydrology</td>
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<tr>
<td>CE 440</td>
<td>Hydraulic Systems Engineering</td>
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<tr>
<td>CE 454</td>
<td>Structural Design</td>
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<td>CE 455</td>
<td>Design of Timber Structures</td>
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<td>CE 456</td>
<td>Seismic Principles for Civil and Environmental Engineering</td>
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<td>CE 457</td>
<td>Bridge Engineering</td>
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<td>CE 458</td>
<td>Fiber Reinforced Polymer (FRP) Design</td>
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<tr>
<td>CE 459</td>
<td>FRP Strengthening of Reinforced Concrete Structures</td>
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</table>

CE 475: Civil Infrastructure and Building Systems
CE 481: Analysis and Design of Shallow Foundations
CE 486: Introduction to Geological Engineering
CE 487: Design of Foundations and Slopes in Rock
CE 488: Engineering Risk Analysis
CE 500: Individual Study
CE 501: Advanced Matrix Analysis of Structures I
CE 504: Finite Element Analysis
CE 521: Highway Pavement Designs
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 535: Water Resources Systems Planning and Analysis
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 for Civil Engineers
CE 559: Prestressed Concrete Design
CE 571: Selected Advanced Laboratory
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
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 500  Individual Study ²
ENVE 535  Physico-Chemical Water and Wastewater Treatment
ENVE 536  Biological Wastewater Treatment Engineering
ENVE 542  Sustainable Environmental Engineering

Advisor approved electives outside the primary area of focus
Approved electives outside the primary area of focus ¹  8-14
Total units  45

¹ To be selected after consultation with your academic advisor and the CE/ENVE graduate coordinator
² No more than 4 total units of technical elective credit from CE 400, CE 500 and ENVE 400, ENVE 500 combined.