## 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</th>
<th>Title</th>
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<tbody>
<tr>
<td>CE 591</td>
<td>Graduate Seminar I</td>
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<tr>
<td>CE 592</td>
<td>Graduate Seminar II</td>
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Select one of the following options: 9 units

- CE/ENVE 599 Design Project (Thesis)
- Or 9 units of advisor approved analysis and design electives within the major (nonthesis option)

### Advisor approved analysis and design electives within Civil and Environmental Engineering

Select from the following: 20-34 units

- CE 400 Special Problems
- CE 401 Advanced Mechanics of Materials
- CE 405 Concrete Materials
- 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 458 Fiber Reinforced Polymer (FRP) Design
- 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 487 Design of Foundations and Slopes in Rock
- CE 488 Engineering Risk Analysis
- CE 500 Individual Study
- 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 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
- CE 559 Prestressed Concrete Design
- CE 571 Selected Advanced Laboratory
- CE 581 Advance 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
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ENVE 467</td>
<td>Senior Project Design Laboratory II</td>
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<tr>
<td>ENVE 480</td>
<td>Environmental Engineering of Energy</td>
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<tr>
<td>ENVE 500</td>
<td>Individual Study (^2)</td>
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<tr>
<td>ENVE 535</td>
<td>Physico-Chemical Water and Wastewater Treatment</td>
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<tr>
<td>ENVE 536</td>
<td>Biological Wastewater Treatment Processes Engineer</td>
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<tr>
<td>ENVE 542</td>
<td>Sustainable Environmental Engineering</td>
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**Advisor approved electives outside of Civil and Environmental Engineering**

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<tr>
<th>Description</th>
<th>Units</th>
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<tr>
<td>Non-CE/ENVE advisor approved electives (^1)</td>
<td>0-14</td>
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</table>

**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.