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)

Advisor approved analysis and design electives within Civil and Environmental Engineering 3
Select from the following: 1

CE 400 Special Problems 2
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 2
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 2
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 2
ENVE 535 Physico-Chemical Water and Wastewater Treatment
ENVE 536 Biological Wastewater Treatment Processes Engineering
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

<table>
<thead>
<tr>
<th>Non-CE/ENVE advisor approved electives</th>
<th>0-14</th>
</tr>
</thead>
</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.
3 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.