# CIVIL ENGINEERING (MS)

The Department of Civil and Environmental Engineering offers graduate courses and research opportunities for students seeking a Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) through the Civil Engineering field of study. An M.S. degree awarded in Civil Engineering may be either research-based, Plan A, or coursework-based, Plan B. Plan A students often pursue Ph.D. studies or careers in research and development in government and private institutes. Plan B students often pursue professional careers in government and private institutes. Areas of concentration within Civil Engineering include Applied Mechanics (Ph.D. only), Geotechnical Engineering, Structural Engineering and Transportation and Urban Engineering.

## Location

- Storrs Campus

## Modality

- In Person

## Requirements

The M.S. requirements in Civil Engineering conform to Graduate School requirements. The specific requirements for coursework and research are described below. All M.S. students have to maintain a GPA of 3.0 to maintain their status in the program. Failure to meet this standard triggers a probationary of period of one semester, after which the student is subject to dismissal.

## M.S. Plan A Requirements

A total of 30 credits are required for graduation, with a minimum of 21 credits of coursework and a minimum of nine credits of GRAD 5950 Master's Thesis Research. A student may enroll in GRAD 5950 Master's Thesis Research credits at any time during the M.S. degree and it is their responsibility to coordinate with their research advisor (and secondarily, with their research committee) on the research plan and requirements for graduation.

An M.S. Plan A requires the submission of an M.S. Thesis, in the form of a submission-ready paper manuscript, and an oral defense for graduation. The oral defense fulfills the role of the final examination for the M.S. degree. The scope, content and length of the M.S. thesis results from the agreement between the research advisor and the student. An advisory committee of at least two additional faculty members will also weigh in on the originality and quality of the thesis prior to graduation. In general, the thesis should present the methodology and results of novel, independent research conducted by the student. Thus, the thesis cannot be solely literature reviews or replicate research already published in the scientific literature.

Additional requirements of individual areas of concentration are noted below.

### Concentrations

#### Geotechnical Engineering Concentration

| Course | Title | Credits |
|---|---|---|
| Three of the following: | | |
| CE 5122 | Advanced Mechanics of Materials | |
| CE 5164 | Finite Element Methods in Applied Mechanics I | |
| CE 5542 | Earthquake Engineering | |
| CE 5543 | Advanced Foundation Design | |
| ENVE 5821 | Vadose Zone Hydrology | |
| ENVE 5830 | Groundwater Flow Modeling | |
| **Total Credits** | | **0** |

The remaining courses may be selected in consultation with the advisor.

#### Structural Engineering Concentration

The Structural Engineering concentration requires 21 credits of advanced coursework, of which at least 18 credits must be at the graduate level.

| Course | Title | Credits |
|---|---|---|
| Select two of the following: | | 6 |
| CE 5122 | Advanced Mechanics of Materials | |
| CE 5150 | Structural Vibrations | |
| CE 5164 | Finite Element Methods in Applied Mechanics I | |
| CE 5380 | Bridge Structures | |
| CE 5383 | Design of Bridges for Extreme Events | |
| CE 5610 | Advanced Reinforced Concrete Structures | |
| CE 5640 | Prestressed Concrete Structures | |
| One or more CE courses in the Applied Mechanics or Structural Engineering concentration | | 3 |
| **Total Credits** | | **9** |

No more than three credits may be taken as independent study. Students must register for and attend CE 5010 Seminar in Structures and Applied Mechanics every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship. The remaining courses may be selected in consultation with the advisor.

#### Transportation and Urban Engineering Concentration

Transportation and Urban Engineering students must complete three of the following courses:

| Course | Title | Credits |
|---|---|---|
| Three of the following: | | 9 |
| CE 5200 | Operations Research in Civil and Environmental Engineering | |
| CE 5720 | Street and Highway Design | |
| CE 5730 | Transportation Planning | |
| CE 5740 | Traffic Engineering I | |
| One or more CE courses in the Transportation and Urban Engineering specialization | | 3 |
| Two or more courses outside of Civil Engineering/Transportation and Urban Engineering | | 6 |
| **Total Credits** | | **18** |

If the student's prior degrees are in an area other than civil engineering with a focus on transportation (or equivalent), the following background preparation courses are required if not previously taken: CE 2251 Probability and Statistics in Civil and Environmental Engineering, CE 2710 Transportation Engineering and Planning, and MATH 2110Q Multivariable Calculus.

Students must register for and attend CE 5030 Seminar in Transportation and Urban Engineering every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship.

The remaining courses may be selected in consultation with the advisor.

# M.S. Plan B Requirements

A total of 30 credits are required for Plan B Master's, with a minimum of 27 credits of coursework in Civil Engineering or a related area. The remaining credits may be used towards a research project as CE 5020 Independent Graduate Study in Civil Engineering.

Additional requirements of individual areas of concentration are noted below.

## Concentrations

### Geotechnical Engineering Concentration

| Course | Title | Credits |
|---|---|---|
| Select five of the following: | | 15 |
| CE 5122 | Advanced Mechanics of Materials | |
| CE 5164 | Finite Element Methods in Applied Mechanics I | |
| CE 5542 | Earthquake Engineering | |
| CE 5543 | Advanced Foundation Design | |
| ENVE 5821 | Vadose Zone Hydrology | |
| ENVE 5830 | Groundwater Flow Modeling | |
| **Total Credits** | | **15** |

The remaining courses may be selected in consultation with the advisor.

### Structural Engineering Concentration

Three of the following seven courses (nine credits):

| Course | Title | Credits |
|---|---|---|
| Three of the following: | | 9 |
| CE 5122 | Advanced Mechanics of Materials | |
| CE 5150 | Structural Vibrations | |
| CE 5164 | Finite Element Methods in Applied Mechanics I | |
| CE 5380 | Bridge Structures | |
| CE 5383 | Design of Bridges for Extreme Events | |
| CE 5610 | Advanced Reinforced Concrete Structures | |
| CE 5640 | Prestressed Concrete Structures | |
| One or more CE courses in the Applied Mechanics or Structural Engineering concentration | | 3 |
| CE 5020 | Independent Graduate Study in Civil Engineering (used toward a research project) | 3 |
| **Total Credits** | | **15** |

### Transportation and Urban Engineering Concentration

| Course | Title | Credits |
|---|---|---|
| Three of the following: | | 9 |
| CE 5200 | Operations Research in Civil and Environmental Engineering | |
| CE 5720 | Street and Highway Design | |
| CE 5730 | Transportation Planning | |
| CE 5740 | Traffic Engineering I | |
| Two or more CE courses in the Transportation and Urban Engineering specialization | | 6 |
| Two or more courses outside of Civil Engineering/Transportation and Urban Engineering | | 6 |
| CE 5020 | Independent Graduate Study in Civil Engineering (used toward a research project) | 3 |
| **Total Credits** | | **24** |

Students must register for and attend CE 5030 Seminar in Transportation and Urban Engineering every semester in which they are either enrolled for nine or more credits or supported by a graduate assistantship.

If the student's prior degrees are in an area other than transportation, the following background preparation courses are required if not previously taken: CE 2251 Probability and Statistics in Civil and Environmental Engineering, CE 2710 Transportation Engineering and Planning, and MATH 2110Q Multivariable Calculus.

The remaining courses may be selected in consultation with the advisor.

# Learning Objectives

1. Knowledge: Demonstrate appropriate breadth and depth of disciplinary knowledge and comprehension of the major topics, theories, and issues of the discipline.
2. Research/applied skills: Uses, disaggregates, reformulates and/or adapts principal ideas, techniques or methods of the field of study.
3. Communication: Communicate proficiently and effectively to a specialist and non-specialist audience, verbally and in writing, a coherent argument or explanation summarizing aspects of the discipline.
4. Ethics/Professional behavior: Conduct themselves in accordance with the highest ethical and responsible standards, values, and, where these are defined, the best practices of the discipline.