CIVIL ENGINEERING (PHD)

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

Ph.D. Requirements

The Ph.D. requirements in Civil Engineering conform to Graduate School requirements. The specific requirements for coursework and research are described below. The Ph.D. in Civil Engineering does not have a related area or foreign language requirement, unless one is specified by the advisory committee. All Ph.D. 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.

If a student is admitted to the Ph.D. program with only a B.S. degree, at least 30 credits of coursework are required. If the student has a M.S. degree, the minimum coursework requirement is 15 credits. Students are also required to complete at least 15 credits of GRAD 6950 Doctoral Dissertation Research in addition to coursework requirements. The Ph.D. in Civil Engineering does not have a related area or foreign language requirement.

Course requirements of individual areas of concentration are noted below.

Applied Mechanics Requirements

Two of the following three courses (six credits): CE 5122 Advanced Mechanics of Materials, CE 5150 Structural Vibrations, CE 5164 Finite Element Methods in Applied Mechanics I, one or more courses in Civil Engineering in the Applied Mechanics or Structural Engineering concentration (minimum three credits); no more than three credits may be taken as independent study.

Taking required courses (but not the course credits) may be waived by the advisory committee if content equivalent courses have already been taken. Additional credits of coursework beyond the required minimum may be required by the advisory committee.

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 full-time graduate assistantship.

Structural Engineering Requirements

Two of the following five courses (six credits): 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 courses in Civil Engineering in the Applied Mechanics or Structural Engineering concentration (minimum three credits); no more than three credits may be taken as independent study.

Taking required courses (but not the course credits) may be waived by the advisory committee if content equivalent courses have already been taken. Additional credits of coursework beyond the required minimum may be required by the advisory committee.

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 full-time graduate assistantship.

Transportation and Urban Engineering Requirements

Three of the following four courses (nine credits): 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 courses in Civil Engineering in the Transportation and Urban Engineering specialization (minimum three credits); two or more courses outside of Civil Engineering/Transportation and Urban Engineering (minimum six credits).

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.

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 advisory committee may substitute the above with equivalent courses. The remaining credits may be taken in one of the three areas of concentration with courses selected in consultation with the advisory committee.

Additional requirements of individual areas of concentration are noted below.

Structural Engineering and Applied Mechanics Areas of Concentration

Students must pass a Qualifying Examination taken after the student has completed at least 12 credits of coursework (with an M.S.) or 18 credits of coursework (with a B.S.). An approved Plan of Study must be filed with the Office of the Registrar before the Qualifying Examination can be taken. The Structural Engineering and Applied Mechanics Areas of Concentration administer the Qualifying Examination as both a written and an oral examination to test the student's fundamental engineering knowledge and ability to study, interpret, summarize, and present research in their area of study.

The General Examination consists of an oral presentation on the student's proposed research. It is recommended that the General Examination should be taken no more than 1 year (for students with M.S. degree) or 1.5 years (for students with B.S. degree) after the student successfully passing their Qualifying Examination.

The Dissertation Proposal is a written document that outlines the proposed research for the dissertation and has to be submitted and approved more than six months ahead of the Final Oral Defense.

In addition to Graduate School requirements, the Structural Engineering and Applied Mechanics Areas of Concentration require that a Ph.D. student must have three journal papers, one published or accepted for publication, one under review and one in the final stages of preparation. However, it is important that the three papers address a larger, coherent research question as outlined in the Dissertation Proposal and they are not isolated bodies of work.

Transportation and Urban Engineering Area of Concentration

Students must pass a Qualifying Examination taken after the student has completed at least 12 credits of coursework (with a M.S.) or 18 credits of coursework (with a B.S.). The program administers the examination once per academic year, usually in December. An approved Plan of Study must be filed with the Office of the Registrar before the Qualifying Examination can be taken. The Transportation and Urban Engineering Area of Concentration administers the Qualifying Examination as both a written and an oral examination to test student mastery of core transportation and urban engineering concepts and student ability to integrate concepts across disciplinary areas.

The General Examination is typically taken within one year after the qualifying examination. The student will prepare a dissertation proposal that outlines the proposed research for the dissertation. The student will defend their proposal in an oral examination to a minimum of five faculty, including all members of their advisory committee.

In addition to Graduate School requirements, the Transportation and Urban Engineering Area of Concentration requires that a Ph.D. student must have three journal papers, one published or accepted for publication, one under review and one in the final stages of preparation. However, it is important that the three papers address a larger, coherent research question as outlined in the Dissertation Proposal and they are not isolated bodies of work.

Learning Objectives

1. Knowledge: Demonstrate appropriate breadth and depth of disciplinary knowledge and comprehension of the major topics, theories, and issues of the discipline, including demonstration of specialized knowledge of a sub-field sufficient to carry out substantive independent research or creative pursuits.
2. Research/applied skills: Use disciplinary methods and techniques to apply knowledge, critically analyze, and, as appropriate to the degree, create new knowledge or achieve advanced creative accomplishments.
3. Communication: Communicate proficiently and effectively to a specialist and non-specialist audience, verbally and in writing, a structured, coherent academic presentation, representation, or argument that cogently summarizes their research or creative pursuit, relevant literature, and its significance at the level appropriate to 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.