

Civil and Environmental Engineering MS and PhD Degree Requirements by Program Area¹

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¹ This document is a draft that is based on requirements in place as of September 6, 2006. Please contact the Coordinator in your area for an updated set of requirements. This document will be updated accordingly in the next few months.

A. INTRODUCTION

The Department of Civil and Environmental Engineering (CEE) at Northwestern University is a premiere research and academic department ranked among the top CEE departments in the nation. With approximately 20 faculty members, CEE provides graduate students with an exceptional range of opportunities to advance their knowledge and careers in a scholarly community small enough to assure individual attention and effective mentoring.

CEE prepares students to become the next generation of leaders in research, academic, corporate, and public service settings. It offers the Master of Science (MS) and doctor of philosophy (PhD) degrees in civil and environmental engineering and in theoretical and applied mechanics through Northwestern University's Graduate School. Students work with their adviser to construct study plans suited to their unique interests. These include extensive options for courses outside civil and environmental engineering that address a wide variety of social, economic, and physical challenges in constructing and managing the industrial and public works infrastructure.

The department is divided into six programs: Environmental Engineering and Science, Geotechnics and Environmental Geotechnics, Mechanics of Materials and Solids, Structural Engineering and Materials, Transportation Systems Analysis and Planning, and Theoretical and Applied Mechanics. In the following document, requirements will be outlined individually for each program.

B. ADMISSION REQUIREMENTS

CEE graduate students come from throughout the world with degrees in a variety of fields including engineering, mathematics, the physical sciences, management, economics, and other social sciences. Admissions decisions are based on the overall academic picture presented through GRE exams and transcripts, as well as the statement of purpose and letters of recommendation.

C. COURSE REQUIREMENTS

Environmental Engineering and Science: MS students must complete a minimum of 12 courses (units) post-BS. PhD students must complete 18 to 22 courses post-BS. All students are required to complete 6 core courses: CEE 361, 440, 444, 448, 449-1,2,3, and 567. In addition, students must complete 3 courses in 1 of 3 specialties:

Environmental Analytical Chemistry: CEE446, 468, MatSci 466

Environmental Microbiology: CEE 441, 442, 443

Fluid Mechanics: ME 425-1,2, and 429

Geotechnics: MS students must complete a minimum of 10 courses plus research and thesis post-BS. PhD students must complete 18 courses post-BS or 12 courses post-external MS, excluding thesis. All students must complete core courses 450-1,2&3, 451, and 358, as well as 3 of the following: 355, 453, 454, and 458. Students must also build one or two minor areas of study through courses in a series of 3 or more.

Mechanics of Materials and Solids: MS students must complete a minimum of 10 courses plus research and thesis post-BS. PhD students must complete 18 courses post-BS or 12 courses post-external MS, excluding thesis. All students are required to take the following core courses: CEE 318, 327, 411, 413, 414-1,2, 415, 417-1,2, 419, 426-1,2. Students must also take electives from: Mechanics of Materials and Solids, Structural Engineering and Materials, Engineering Sciences and Applied Mathematics, Mechanical Engineering, Material Science and Engineering.

Structural Engineering and Materials: MS students must take a minimum of 11 courses post-MS plus a thesis or project (2 units). PhD students typically complete at least 6 additional courses. The following courses are required for all students: CEE 306, 307, 320, 321, 422, 423, 424. Students must also take electives from: Mechanics of Materials and Solids, Structural Engineering and Materials, Engineering Sciences and Applied Mathematics, Mechanical Engineering, Material Science and Engineering.

Theoretical and Applied Mechanics: MS students must take a minimum of 12 units post-BS as well as a final oral comprehensive exam on their thesis. PhD students must take a minimum of 18 units post-BS, excluding projects and MS thesis. All courses must be taken with advisor approval. Appropriate departments include: Chemical and Biological Engineering, Civil and Environmental Engineering, Applied Mathematics, Materials Science and Engineering, and Mechanical Engineering.

Transportation Systems Analysis and Planning: MS students are required to take a minimum of 12 courses post-BS plus thesis. For admission to PhD candidacy, one additional year of customized courses and an MS thesis at NU or elsewhere are required. Students are required to take the following core courses: CEE 479, 482, 483. Students must take 2 of the following: CEE 376, 471-1,2, and one of the following: CEE 480-1,2. Foundation courses are required from statistics, economics, operations research, and electives.

D. SATISFACTORY ACADEMIC PROGRESS

Environmental Engineering and Science: The first element of evaluation is performance in course work, which is measured both by the student's grades and individual evaluations by professors. These are discussed in our Environmental Engineering group meetings. Students must maintain a 3.0, but those students whose GPA falls below 3.5 are given careful consideration before they are allowed to move on to research.

Geotechnics: MS students must maintain a minimum GPA in accordance with TGS rules. Almost all are supported as RA's as well, and must satisfy project needs. Students will attend weekly group meetings. The required thesis must satisfy the principal advisor and at least one additional geotechnical reviewer.

Mechanics of Materials and Solids: Students must attend weekly meetings to discuss progress. In addition, each student is required to make monthly formal presentations to the entire group, where the results are discussed, debated, and criticized.

Structural Engineering and Materials: The first element of the evaluation is performance in course work, which is measured both by student's grades and individual evaluations by professors. Students whose GPA falls below 3.7 are given careful consideration before they are allowed to move on to research.

Theoretical and Applied Mechanics: Students must attend weekly meetings to discuss progress. In addition, each student is required to make monthly formal presentations to the entire group, where the results are discussed, debated, and criticized.

Transportation Systems Analysis and Planning: Student must maintain a minimum GPA of 3.5 and a good performance on graduate coursework, based on subjective assessment by all faculty members in the group. For admission to the PhD program, students must pass a qualifying exam based on course-work and research exercise with both oral and written components. Student must also have support of at least one faculty member to serve as the research advisor.

E. CANDIDACY AND PROPOSAL DEFENSE

Environmental Engineering and Science: Each student must take a Prequalifying Exam at the end of the first year. This involves the preparation and presentation of a short research proposal before an examining committee. Students can only take this exam if they have been accepted into a research group and have an advisor. Upon passing this exam they are allowed to proceed with their research and to prepare for the candidacy exam. A second Qualifying Exam is taken in the second or third year, consisting of preparing and defending an extensive research proposal. Their committee determines if they are able to proceed with their proposed research.

Geotechnics: Upon completion of course work or second year, students complete a written and oral Preliminary Qualifying Exam and formal written dissertation proposal. An External MS is counted as year one. Students must maintain a minimum GPA in accordance with TGS rules, and must pass the Qualifying Exam. This consists of a written exam, a comprehensive oral exam, and a written thesis proposal and presentation for a committee of four professors. Students will receive written guidelines and example schedules for qualifying exams as exam date approaches.

Mechanics of Materials and Solids: Students must take an oral qualifying exam, which is primarily an oral defense of the proposal before the PhD Qualifying Committee.

Structural Engineering and Materials: The PhD candidacy exam is typically taken at the end of the second or into the third year. The students prepare and defend a research proposal before a committee.

Theoretical and Applied Mechanics: Students must take an oral qualifying exam prior to admission to candidacy. Students must present and defend their thesis before the entire group prior to attaining committee approval.

Transportation Systems Analysis and Planning: After three years in the graduate program, students may advance to PhD candidacy if they pass the residency requirement, and have satisfactory academic progress as determined by the research advisor.

F. DISSERTATION DEFENSE

Environmental Engineering and Science: PhD dissertation research and thesis writing typically takes 3-6 years. If a problem arises, students will be dealt with on a case-by-case basis.

Geotechnics: Students are all supported as RA's, and must satisfy continuing project needs. Meetings are required every or every other week with a supervisor as a group or individually. In addition, students must make one or two presentations on thesis work at Geotechnical Seminars during the Winter/Spring Quarter. Average completion time is four to five years after BS.

Mechanics of Materials and Solids: Students must provide an oral defense with the PhD Final Committee.

Structural Engineering and Materials: PhD dissertation research and thesis-writing typically takes anywhere from 3-6 years. In most cases, students will complete their work, defend their thesis, and graduate.

Theoretical and Applied Mechanics: Students must provide an oral defense with the PhD Final Committee.

Transportation Systems Analysis and Planning: Average completion time for dissertation is four to five years.

Civil and Environmental Engineering MS and PhD Requirements by Program Area

	Environmental Engineering and Science	Geotechnics	Mechanics of Materials and Solids	Structural Engineering and Materials	Theoretical and Applied Mechanics	Transportation Systems Analysis and Planning
Units	Minimum of 12 courses (units) post BS for MS. 18 to 22 courses post BS toward PhD.	Minimum of 10 courses plus research and thesis post BS for MS. 18 courses post BS or 12 courses post external MS toward PhD (excluding thesis).	Minimum of 11 courses (units) post BS for MS. 18 courses post BS, excluding theses and projects toward PhD.	Minimum of 11 courses (units) post BS plus a thesis or project (2 units) for MS. At least 6 additional courses are typically taken for the PhD.	Minimum of 12 units post BS for MS + final oral comprehensive exam on thesis. Minimum is 18 units post BS for MS/PhD, excluding projects and MS thesis.	Minimum of 12 courses (units) post BS plus thesis for MS. Required for admission to PhD Candidacy: One additional year of customized courses; An MS thesis, at NU or elsewhere.
Specific Courses	Required 6 core courses: CEE 361, 440, 444, 448, 449-1,2,3, and 467; Plus three courses in 1 of 3 specialties: (Environmental Analytical Chemistry = CEE 446, 468, MatSci 466); (Environmental Microbiology) = CEE 441, 442, 443; (Fluid Mechanics = ME 425-1,2 and 429).	Core courses include 450-1,2&3, 451, & 358, and 3 of 355, 453, 454, 458. Plus courses in series of 3 or more to build one or two minor areas of study	Core courses: CEE 318, 327, 411, 413, 414-1, 2, 415, 417-1,2, 419, 426-1,2. Plus electives from: Mechanics of Materials and Solids, Structural Engineering and Materials, Engineering Sciences and Applied Mathematics, Mechanical Engineering, Material Science and Engineering	Required courses: CEE 306, 307, 320, 321, 422, 423, 424. Plus electives from: Mechanics of Materials and Solids, Structural Engineering and Materials, Engineering Sciences and Applied Mathematics, Mechanical Engineering, Material Science and Engineering	All courses taken with advisor approval. Appropriate depts.: Chemical and Biological Engrg; Civil and Environmental Engrg; Applied Mathematics; Materials Science and Engrg; Mechanical Engrg	Required core courses: CEE 479, 482, 483 Two of three required: CEE 376, 471-1,2 One of two required: CEE 480-1,2 Foundation courses required from statistics, economics, operations research, plus electives

