CIVIL AND ENVIRONMENTAL ENGINEERING, PHD

Department Chair

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Program Directors

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Faculty

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Program Description

The graduate programs in civil and environmental engineering at Syracuse University have earned a reputation for superior quality and placing students at the center of attention. Degree recipients working in the public sector, private industry, and academic institutions have made important contributions to the profession. The civil and environmental engineering programs provide coursework and research opportunities in structural and materials engineering, geomechanics and geotechnical engineering, environmental engineering, and construction engineering and management.

In addition to these core areas, the students and faculty in the civil and environmental engineering programs engage in interdisciplinary teaching and research, expanding the opportunities available to graduate students. The department is home to the Center for Environmental Systems Engineering, which serves faculty in environmental, chemical, and mechanical engineering with a shared interest in environmental systems. The Geofoam Research Center is also administered in the department. We also have a collaborative degree program with the Maxwell School of Citizenship and Public Affairs, and we engage in joint teaching with faculty in the School of Architecture, the Whitman School of Management and SUNY-ESF.

The Department offers the Ph.D. degree to students interested in research and teaching. The primary focus is on the development of skills needed to pursue original research in careers in academia, public sector, private industry, or research institutions. Students usually complete the degree within three to five years.

Admission Requirements

1. B.S. in Civil Engineering or B.S. in Environmental Engineering or other acceptable field from an accredited institution
2. M.S. degree from an accredited institution
3. B+ average in M.S. program coursework
4. Satisfactory grades on all required graduate entrance examinations. A TOEFL score of 80 or higher is required for international students
5. Departmental approval
6. Demonstrated potential for excellent research work

Advising

The candidate, with advice from the department chair and/or the program director, selects a dissertation advisor, whose consent must be obtained. The candidate and the advisor, together with consent from the department chair, select the members of the examination and dissertation committees. The candidate, in consultation with the advisor and dissertation committee, selects a program of coursework appropriate to the research and scholarly interests of the student.

Department of Civil and Environmental Engineering Current Research Areas

- Accelerated and fast track construction
- Application of geosynthetics in dewatering and containment
- Applications of molecular biology to environmental engineering
- Applied environmental microbiology
- Applied surface chemistry
- Aquatic chemistry
- Biogeochemistry
- Bioremediation
- Bridge retrofit with CFRP composites
- Changes in microbial communities in response to anthropogenic disturbance
- Composite and hybrid systems
- Construction project management
- Construction safety and health
- Decentralized treatment processes
- Earthquake engineering
- Economy of preventive maintenance of highway bridges
- Environmental geostatistics
- Experimental investigation of structural concrete and steel systems
- FRP reinforced concrete structural systems
- Geotechnical engineering
- Global biogeochemical cycles
- Green materials for contaminants removal and containment
- In situ testing
- Infrastructure asset management
- Investigation of structural failures
- Lean and green construction
- Microbial fuel cell technologies
- Microstructure of soil and geosynthetics
- Natural and polymeric fibers in soil erosion mitigation
- Natural organic matter
- Non-destructive testing
- Nonlinear structural theories
- Numerical modeling
- Potable water supply
- Properties and applications of geofoams
- Renewable hydrogen production
- Resource recovery from wastewater

- Slurry wall containment systems and movement of organics in soil/rock systems
- Soil chemistry
- Solid-liquid separation processes
- Steel structures
- Structural dynamics
- Structural rehabilitation of civil infrastructure
- Structural stability
- Sustainable Infrastructure Systems
- Tactile sensing
- Transportation engineering
- UAS applications
- Water quality modeling

Student Learning Outcomes

1. Formulate and analyze difficult engineering problems using fundamental and advanced mathematics, science and engineering tools
2. Conduct literature surveys, to think critically and creatively in planning and designing a research program
3. Conduct independent laboratory and / or field research using state of the art sensing systems and testing facilities
4. Understand and use specialized computer programs to model experiments, represent engineering systems and process big data inputs in research and extended monitoring programs
5. Demonstrate abilities for documenting research procedures, organizing and archiving research results, preparing detailed reports and explaining findings; culminating in a dissertation

Course Requirements

Ph.D. students are required to take a minimum of 48 credit hours of coursework beyond the B.S. level, or at least 18 credit hours of coursework beyond the M.S. level.

For students with an M.S. degree, at least two-thirds of the Ph.D. coursework must be at or above the 600 level, and no more than one-third of the coursework can be independent study (CEE 690 Independent Study).

Ph.D. students are required to maintain an average GPA of B+ (3.333) in all Ph.D. coursework, and they are required to participate in the faculty/student seminar program (CEE 660 Seminar Civil Engineering).

Examinations

1. Qualifying Examination:
   The qualifying examination is to be conducted within the first year of enrollment in the Ph.D. program. The examination is composed of two parts: a written exam followed by an oral examination covering materials from at least three graduate-level classes that the student has taken at Syracuse University, as well as relevant materials from undergraduate coursework. The purpose of this examination is to assess the student's background knowledge in her/his primary subject area(s) and her/his preparation for Ph.D. level research. The exam committee shall consist of at least three faculty members. The majority of the committee membership shall be faculty members from the Department of Civil and Environmental Engineering at Syracuse University. For the candidate to pass this examination, a majority of the committee must vote favorably. If the student does not pass this examination, he/she can request to retake the examination one more time in the following semester. In the event that the student fails the examination for the second time, her/his Ph.D. program of study will be terminated.
2. Candidacy Examination:
   This examination is conducted in the semester after completion of the student's Ph.D. coursework, but no later than the fifth semester after admission into the Ph.D. program. Prior to this examination, the student shall prepare a detailed research proposal that includes, but is not limited to a review of relevant literature leading to a statement of objectives (including major questions or hypotheses to be addressed in the dissertation), a description of methods and approaches to be used, and a brief description of the significance of the proposed work. The proposal will often include preliminary results from the student's work to date.

   The candidacy examination is an oral exam and is presided over by a dissertation committee composed of at least five members. The majority of the committee membership shall be faculty members from the Department of Civil and Environmental Engineering at Syracuse University. This committee will follow the student's work through his/her Ph.D. dissertation defense. Students are required to deliver their research proposals to all dissertation committee members and notify the department graduate secretary of the examination time and place at least two weeks prior to the exam. Any committee member who receives the proposal less than 14 calendar days prior to the examination may ask the department chair for a postponement of the examination.

   The norm for the duration of the examination, which is open to all department faculty members, is two hours. The oral examination is initiated by a 30-40 minute summary of the dissertation research proposal and progress to date by the student. Following the presentation, the dissertation committee and department faculty ask the student questions concerning the research proposal. Following the examination, the dissertation committee confers to determine if the student is a suitable Ph.D. candidate based on his/her performance on the candidacy examination, as well as to determine if the student should be required to take additional coursework beyond the minimum required for the degree. If the student successfully completes the candidacy examination by receiving an affirmative vote from the majority of the committee, the advisor notifies the student and the graduate school and the student is considered a Ph.D. candidate. If the student does not successfully complete the candidacy examination, the committee determines whether the student will be permitted to retake the examination after a minimum period of six months or whether the student's Ph.D. program should be terminated.
3. Dissertation Defense:
   The final phase of the Ph.D. program is the dissertation defense. The doctoral dissertation is a summary of all phases of the student's research endeavor. The student should not distribute the final draft of the dissertation prior to approval by the advisor. Readers should be presented with a polished draft that has been proofread, paginated, and contains professional quality tables and figures with captions. All members of the dissertation committee must be given at least two weeks to review the dissertation before the defense. Any committee member who receives the thesis less than 14 calendar days prior to the defense may ask the Exam Committee chair/Graduate School for a postponement of the defense.

When the Ph.D. candidate has completed a dissertation that has been approved by her/his advisor, a copy is to be provided to each of the dissertation committee members and a defense date is scheduled. The dissertation defense is an open examination and all members of the University community are invited. This is accomplished by announcements to students and faculty in the department at least one week in advance of the defense, as well as a notice in The Syracuse Record.

The dissertation defense is to be conducted in accordance with University Policies and Procedures for Dissertation and Oral Examination. The norm for the duration of the dissertation defense is two hours. The dissertation defense is usually initiated with a 30-40 minute summary of the research. This is followed by open questioning from the audience. When this is completed, the candidate is questioned by the dissertation committee members. For the candidate to pass the dissertation defense, a majority vote on the quality and originality of the research, the quality of the dissertation, and the performance of the candidate at the examination is required.