

# CIVIL AND INFRASTRUCTURE ENGINEERING, PHD

Banner Code: EC-PHD-CEIE

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The Doctor of Philosophy in Civil and Infrastructure Engineering was created to prepare students for advanced leadership positions in research and development in the public or private sector, academics, or government. Students may elect to study in the areas of: construction engineering and management, environmental and water resources engineering, geotechnical engineering, structural engineering, or transportation engineering. Admitted students will complete both required and applicable coursework in their technical interest area based on a plan of study prepared with a doctoral advisor. They will take qualifying exams that assess student's breadth of knowledge at the graduate level and competency to conduct research. They will form a doctoral committee and prepare and defend a dissertation proposal leading to PhD candidacy. Finally, they will conduct original scholarly research and prepare, then defend a doctoral dissertation. Both part-time and full-time study is available.

## Admissions & Policies

### Admissions

#### Requirements

All general George Mason University and specific College of Engineering and Computing admission requirements (including deadlines) apply. In addition, all applicants, including Mason undergraduates, must submit the following:

- Official transcript of undergraduate and graduate course work,
- For applicants whose official language is not English, official TOEFL scores which meet the minimum requirements set by the College of Engineering and Computing,
- Three letters of recommendation from individuals knowledgeable about the applicant's professional or academic work (at least two of the letters should be from individuals with doctorates),
- Recent professional résumé,
- Substantial statement of interest that includes a description of the specific area of proposed dissertation research, contacts the student has made with potential faculty advisors, and an explanation of career and research goals

Admission decisions will be based on the student's qualifications, the availability of a faculty advisor, and the faculty advisor's approval in their proposed area of research. The application materials will be reviewed by the department doctoral committee and decisions made with input from appropriate faculty members.

Financial support for outstanding applicants is available in the form of fellowships as well as research and teaching assistantships. For best consideration, applicants are encouraged to apply early and to contact potential faculty advisors to express interest in support.

### Policies

#### Transfer of Credit

Students must complete a minimum of 72 graduate credits. A maximum of 30 credits from a completed master's degree in civil engineering or other related fields may be applied to this program. Transfer of credit, AP.6.5. (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-5>), requires the approval of the program director or designee and the dean or designee of the school. They determine whether the credits are eligible for transfer, if they are applicable to the degree program and the total number of credits to be transferred.

#### Program Requirements

The PhD in Civil and Infrastructure Engineering requires 72 graduate credits. Admitted students are expected to hold at a minimum a Bachelor of Science in Civil Engineering or a degree in a closely-related engineering or science field.

The degree plan outlined in Degree Requirements is based on a student who receives 30 transfer credits. Students who do not receive 30 credits of transfer must choose additional credits in consultation with their advisor.

## Requirements

### Degree Requirements

Total credits: 72

#### Doctoral Coursework

A minimum GPA of 3.50 is required and no C grades are allowed for the coursework earned beyond the MS. A detailed plan of study will be prepared for each student upon acceptance into the program and in consultation with the faculty advisor, which outlines all course requirements to include:

#### Required Courses

The following must be completed while in residence in the program.

Code	Title	Credits
The following must be completed while in residence in the program.		3
CEIE 800	Civil, Environmental, and Infrastructure Engineering Colloquium (must be taken at least twice)	
CEIE 990	Civil and Infrastructure Dissertation Topic Presentation	
Select one from the following:		3
CEIE 603	Research Methods in Civil Engineering	
CEIE 796	Directed Reading	
Total Credits		6

**Courses Chosen with Advisor**

Code	Title	Credits
Courses, especially in the student's technical interest area, chosen in consultation with his or her advisor (minimum) <sup>1</sup>		12
Total Credits		12

1

No more than three courses used for credit toward the PhD may be cross-listed as undergraduate courses. None may repeat material completed as part of the student's previous studies.

**Qualifying Exam**

The PhD qualifying exam is offered twice a year prior to the start of the fall and spring semesters. The qualifying exam is intended to test students' breadth of knowledge at the MS level in their research area and to evaluate readiness for research. Students entering with a MS degree are required to attempt the qualifying exam within 18 months of admission to the program. Students entering without a MS degree must attempt the qualifying exam within two years of admission to the program.

The qualifying exam consists of one written exam and one oral exam in the student's primary research area. The available examination areas include:

- Area A: Construction Engineering and Management
- Area B: Environmental Engineering
- Area C: Geotechnical Engineering
- Area D: Structural Engineering
- Area E: Transportation Engineering
- Area F: Water Resources Engineering

The requirements of the written exam (deadlines for exam request, list of topics, allowed aid sheets, calculator policy etc.) are posted on the department's website. The oral exam is conducted by an examining committee of three CEIE graduate faculty, of whom two must be in the student's research area. Students give a five minute research presentation, and answer questions from the examination committee about the written exam, the research presentation and other related topics.

Students who receive an overall passing grade form a dissertation committee and register for CEIE 998 Doctoral Dissertation Proposal. Students who receive an overall failing grade may petition to repeat the exam. If granted, the second attempt, which includes both the written and the oral exam, must be completed within one calendar year. The petition to repeat the exam must be received within one month of the first exam attempt. No more than two exam attempts are permitted. Students who do not receive an overall passing grade are terminated from the program.

**Dissertation Research**

Students become eligible for CEIE 998 Doctoral Dissertation Proposal upon passing the qualifying exam (preceding section). Upon admission to candidacy, which requires satisfactory preparation and defense of a dissertation proposal, students may register for CEIE 999 Doctoral Dissertation.

Code	Title	Credits
Select 12- 24 credits from the following: <sup>1</sup>		12-24
CEIE 998	Doctoral Dissertation Proposal	

CEIE 999	Doctoral Dissertation (minimum 3 credits required)
Total Credits	12-24
1	

Note: 60 total credits of coursework is required if only completing 12 credits of research.

**Dissertation Committee**

A dissertation committee (separate from the examination committee) is formed upon successful completion of the qualifying exams.

The dissertation committee is composed of at least four members, including the student's advisor. The student, in consultation with their advisor, shall select at least one other full-time CEIE Department faculty member to serve on the committee, and at least one committee member from outside of the CEIE department. At least three members of the committee are to be members of the Mason graduate faculty. All committee members must hold earned doctorates and possess applicable knowledge and experience in the student's chosen topic. The CEIE Department Chair must approve the composition of the dissertation committee. Additional committee members from outside Mason (e.g., from industry, other institutions, etc..) may be appointed if approved by the majority of the CEIE faculty. The committee must be formed and approved before admission to candidacy (described in the next section) and before registering for CEIE 999 Doctoral Dissertation. Substitutions to the dissertation committee are allowed with the approval of the CEIE Department Chair.

**Dissertation Proposal Preparation and Advancement to Candidacy**

After successfully passing the qualifying exams and forming of a dissertation committee, the student may register for CEIE 998 Doctoral Dissertation Proposal research credits and begin preparation of the dissertation research proposal. The student will consult with his or her advisor on the selection of an original scholarly topic and preparation of a formal research proposal. Students are also encouraged to register for the required CEIE 990 Civil and Infrastructure Dissertation Topic Presentation course during this time. Students must schedule a formal proposal defense (also known as the research competency exam) with all members of their chosen committee present. This cannot be done before successful completion of the qualifying exams. Committee members should receive printed copies for the final proposal not less than two weeks prior to the scheduled defense date.

The research competency exam (proposal defense) includes the written proposal and a presentation of the planned dissertation research. The dissertation proposal defense shall not include already completed research. The dissertation proposal defense is the main opportunity for the committee to provide input and for the dissertation committee members to examine the student's knowledge in higher-level coursework and familiarity with existing and emerging research related to the student's research area. After the student's presentation, and after private deliberation, the committee makes a pass/fail determination that is given to the student by his or her advisor.

Students who pass the research competency exam are admitted to candidacy and become PhD Candidates. Students who do not pass the exam may, in consultation with their advisor, schedule a second exam within 120 days of receiving notice of the first exam result. Students who do not successfully pass the research competency within this period are terminated from the program.

## **Dissertation Research and Defense**

On successful completion of the dissertation proposal, students are to conduct original research under the guidance of their dissertation director and dissertation committee members. Students are not to schedule their dissertation defense sooner than two semesters after advancement to candidacy. The dissertation must represent achievement in research, must be a significant contribution to the field of civil engineering, and should be deemed publishable in refereed journals. When the majority of the research has been completed, the candidate is to submit a written draft of the dissertation to the doctoral dissertation committee and schedule an oral defense to be attended by the doctoral dissertation committee. The CEIE department and the CEIE Graduate Coordinator must be notified of the defense at least two weeks prior to the defense to allow time to advertise it broadly.

On successful completion of the oral defense, students must submit a final dissertation that meets the guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects. If the student fails to defend the dissertation successfully, the student may request a second defense following the same procedures as the initial defense. This request has no time limit, other than the general time limits for the doctoral degree as per Mason policy. The student is strongly advised to consult with the committee before scheduling the second defense. If the student fails on the second attempt to successfully defend the dissertation, the student will be terminated from the PhD program. Following a successful public defense and completion of the final form of the dissertation, the dissertation committee recommends the candidate for the degree of Doctor of Philosophy.

## **Teaching Opportunities**

All PhD students are encouraged to participate in teaching activities in consultation with their major advisors. Teaching opportunities include presenting lectures, conducting recitation sessions, serving as a teaching assistant, working as a laboratory assistant, participating in teaching workshops, preparing course materials, and other related activities approved by the student's advisor.