

# REQUIREMENTS AND PROCEDURES

## Doctor of Philosophy in Engineering

### Department of Civil and Environmental Engineering

#### The University of Michigan

The goal of The University of Michigan Civil and Environmental Engineering Doctoral Programs is to prepare talented students to pursue successful professional careers in teaching, research, and the practice of Civil and Environmental Engineering.

This document describes the principal requirements to be met and procedures to be followed by students pursuing the doctorate in Civil or Environmental Engineering. Basic information common to all programs is contained in the Horace H. Rackham School of Graduate Studies Graduate Student Handbook and the On-Line BULLETIN, both of which may be found at [www.rackham.umich.edu](http://www.rackham.umich.edu). Students with questions should seek the assistance of their advisors.

The Doctor of Philosophy (Civil Engineering and Environmental Engineering) degrees are conferred by the Horace H. Rackham School of Graduate Studies. Before being awarded either degree, the student must satisfy both the requirements established by the Graduate School (described in the publications mentioned above) and the additional requirements of the Department of Civil and Environmental Engineering stated in this publication. The administration of the Doctor of Philosophy program throughout The University of Michigan is the responsibility of the Dean of the Graduate School. The administration of the doctoral programs in Civil and Environmental Engineering is directed by the Department's Graduate Committee.

### SYNOPSIS OF THE PROGRAM

The program of the student seeking the Civil or Environmental Engineering doctorate follows the general scheme shown on the attached flow chart, which also links the milestones reached in pursuing the degree.

Upon admission to the doctoral program the student is classified as a *Pre-Candidate*.

The student follows a program supervised by a doctoral advisor in the chosen field until passing the Preliminary Examination and then is advanced to the status of *Applicant* for the Ph.D. degree. The student is then eligible to have the Dissertation Committee appointed. Thereafter, the Dissertation Committee guides the Applicant's program through advancement to the status of *Candidate* for the Ph.D. degree and completion of the remaining requirements of the Ph.D. program.

### PROGRAM REQUIREMENTS

#### Admission

Requirements for admission to the Ph.D. program are described in detail in the current Graduate School On-Line BULLETIN and the Graduate Student Handbook. Interested students should visit our admissions webpage linked here for more information: <https://cee.engin.umich.edu/graduate-studies/admissions-information/>

Decisions on admission to the doctoral program as a Pre-Candidate are made by the Graduate School upon recommendations from the Department. These recommendations are primarily based on the student's performance in prior academic efforts.

#### Equal Opportunity

The University of Michigan complies with applicable Federal and State law prohibiting discrimination, including Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973. It is the policy of The University of Michigan that no person, on the basis of race, sex, color, religion, national origin or ancestry, age, marital status, handicap, or Vietnam-era veteran status, shall be discriminated against in employment, education

programs and activities or admissions. More information can be found in the University of Michigan Standard Practice Guide (<https://spg.umich.edu/policy/201.82>).

## Preliminary Program

After admission to the status of Pre-Candidate, the student should confer with their doctoral advisor, and they will jointly develop a tentative program suited to the student's career goals and consistent with the course, research, and other requirements of the Department and the Graduate School. The final program will be guided by the student's Dissertation Committee.

## Course Program

The student is required to complete course work to provide an adequate background in the chosen field and to undertake thesis research effectively. For students who have already completed an external Master's degree, at least 18 credit hours of course work beyond the Master's level must be completed, not including independent study and English language courses. No transfer credit can be counted toward this 18 hour minimum. For students proceeding directly to the Ph.D. degree from the Bachelor's level, or who obtain their MSE degree at the University of Michigan in the same discipline as their Ph.D., at least 39 credit hours of approved graduate course work must be completed, not including English language courses. Students who obtained their Master's degree at the University of Michigan may count relevant master's course work towards the requirement of 39 credit hours of approved graduate course work, not including research credits.

The Graduate School requires that at least three hours of cognate course credit (work related to the field of specialization) be included in the student's graduate program. Cognate courses need to be taken with a letter grade and must be passed with a grade of B- or better. Seminar courses or independent study courses may not be counted toward the cognate requirement.

A cumulative minimum GPA of B (3.0 on a 4.0 point scale) is required for all graduate work taken for credit.

Courses taken in fulfillment of Rackham degree requirements must be approved for Rackham graduate credit. Courses at the 300 level or below may not be used for graduate credit. Courses at the 400 level must be approved by the Registrar to carry graduate credit, and usually require additional work for graduate students. [Graduate programs maintain lists of approved graduate courses, which are listed by graduate program in Rackham's Programs of Study website: rackham.umich.edu/programs-of-study.](http://rackham.umich.edu/programs-of-study)

## Course Load

The Department policy is that during the fall and winter terms, the minimum full-time enrollment for Graduate Students is 8 credit hours. Pre-Candidates and Applicants who are employed in remunerative work are permitted to take a full-term course load up to the maximum indicated in the following schedule.

Full-time employment	-	6 credit hours
3/4 - time employment	-	8 credit hours
1/2 - time employment	-	10 credit hours
1/4 - time employment	-	12 credit hours

Students receiving remuneration from a University appointment are required by Department policy to elect at least six credit hours during the term of appointment.

## Preliminary Examination and Applicant Status

The Pre-Candidate student must pass the Preliminary Examination to be accepted as an Applicant for the Ph.D. Prior to being considered for the Preliminary Examination, the Pre-Candidate student will have completed 18 credit hours of graduate courses beyond the Bachelor's degree (or 9 credits of graduate coursework beyond an external Master's degree), have a cumulative GPA of 3.30 or better in graduate course work at the University of Michigan (excluding independent study courses), and have taken at least 3 credits of research or have served at least one term as a Graduate Research Assistant. Students must also have a GPA of 3.5 or better in CEE courses.

The examination will ordinarily be given as soon as the student is eligible and should be taken no later than 13 months for students entering with a Master's degree or 17 months for students entering with a Bachelor's degree after admission as a Pre-Candidate. Each Ph.D. student in consultation with his or her advisor should determine the appropriate semester to take the Preliminary Examination. The examination typically takes place in January or May of each year.

The Preliminary Examination is coordinated by a Preliminary Examination Coordinator (PEC) of each program or area of concentration. The student's advisor requests authorization from the PEC to hold the exam. The PEC determines the student's eligibility to take the exam after critical review and evaluation of the student's academic performance submitted by the student's academic advisor.

The Preliminary Examination is administered by a Preliminary Examination Committee selected by the student's advisor or by the PEC and approved by the PEC or the Chair of the Graduate Committee. The examining panel will contain at least four graduate faculty members, three of whom must be from the Civil and Environmental Engineering faculty.

Preliminary examinations are given separately for each student and are normally administered in the following manner: the student is given a specified time to prepare responses to a set of written examination questions selected to test the student's knowledge in the chosen and closely related fields. The student then makes an oral presentation to the Preliminary Examination Committee of the solutions to the examination questions. The student also is expected to defend the solutions and answer oral questions from the Committee on related topics in the field of study. In some cases, a more extensive and comprehensive Preliminary Examination may be required. The Preliminary Examination is open to all members of the departmental faculty and closed to others.

After the exam is completed, the Chair of the Preliminary Examination Committee is responsible for notifying the student of the exam outcome. This should be done in the form of an official letter or memorandum, sent to the student via email and cc'd to the PEC and the student's Preliminary Examination committee. The Chair should also communicate the result to the Chair of the Graduate Committee and cc'd to the Graduate Programs Coordinator. The three possible outcomes of the Examination are: 1) acceptance as an applicant for the Ph.D. or conditional acceptance under the conditions specified by the committee; 2) deferment for reexamination at a later date after steps have been taken to remedy deficiencies made apparent by the Examination; or 3) denial. The student denied acceptance as an Applicant will not be permitted to continue work toward the Ph.D. and will be expected to terminate studies within the Department by the close of the current term.

## **English Language Proficiency**

Every doctoral student must satisfy the departmental requirement of demonstrated proficiency in English writing before being advanced to candidacy. It is the responsibility of each Preliminary Exam Committee to ensure that this requirement has been met. Certification by the Chair of the Preliminary Exam Committee to the Graduate Committee that the Pre-Candidate has demonstrated proficiency in English writing will satisfy this requirement. Otherwise, this requirement must be fulfilled by the successful completion of Technical Communications 610, Thesis, Dissertation Proposal, and Dissertation Writing for Engineers and Scientists with a grade of "P", or English Language Institute 620, Dissertation Writing and Writing for Publication I. In the event that one of the above courses is used to satisfy the English proficiency requirement, the student must have taken the course previously or be enrolled in the course during the semester that the advancement to Candidacy is achieved. In addition, effective Fall 2019, all incoming international students must take the Oral English Test (OET) or receive a waiver within their first academic year. International students will be directed by the Graduate Office to set up an advising appointment (remotely or in person) with the English Language Institute (ELI) advisor. The advisor will assess the student's language capabilities and either give them a waiver from the OET, or give them an ELI course assignment for the term that they are recommended to take throughout the semester in preparation for the OET.

## **Advancement to Candidacy**

After most of the course work has been completed (including the cognate course), the Preliminary Examination has been passed, and the 8 hours of Responsible Conduct in Research & Scholarship (RCRS) training offered by College of Engineering and the online RCRS training offered by the Program for Education and Evaluation in Responsible Research and Scholarship (PEERRS) have been completed, the Applicant may be advanced to candidacy upon request of the advisor to the Chair of Graduate Committee. Advancement to candidacy is granted by

the Dean of the Graduate School upon recommendation of the Chair of the Graduate Committee. The written recommendation must be received at the Graduate School in accordance with published deadlines for the term for which Candidacy is requested. The student should become familiar with Graduate School time deadlines for admittance to Candidacy. The Graduate School formally recognizes this milestone in the pursuit of the Ph.D. Students and advisors should note that after reaching candidacy, students are allowed to take only one course per semester (unless the advisor commits additional funds beyond candidate tuition or if the student did not take any courses in a previous term).

### **Selection of Thesis Topic and Dissertation Committee Chair**

As soon as possible after becoming a candidate, the student should choose a thesis topic in consultation with their advisor, who serves as Chair of the Dissertation Committee. A faculty member with less than a 50% appointment in the Department of Civil and Environmental Engineering cannot serve as the sole Chair. A faculty member with less than a 50% appointment in the Department of Civil and Environmental Engineering can serve as the Co-Chair provided that a faculty member with a greater than 50% appointment in Civil and Environmental Engineering is also chosen as a Co-Chair.

The student's dissertation research must make a significant and important contribution to knowledge in the chosen area of specialization. However, the scope and complexity of the research should not make completion impossible within a reasonable period of time.

### **Selection and Appointment of Dissertation Committee**

The Dissertation Committee must include at least four members of the graduate faculty, including at least two from the Civil and Environmental Engineering Department and at least one from a cognate field outside the Department. Committee members may be appointed from qualified individuals not affiliated with the University of Michigan, but this person may not serve as the Cognate Committee Member. It is also necessary to file an application along with documentation describing their qualifications to have any person who is not a member of the graduate faculty approved to serve as a committee member

*When the Dissertation Committee has been selected and each prospective member has consented to serve, the designated Committee Chair requests that the Department recommend appointment of the Dissertation Committee by the Dean of the Graduate School.*

### **Research Proposal Defense**

The Research Proposal Defense will consist of an oral examination during which the candidate presents the Thesis Proposal for review by the Dissertation Committee. This is a formal opportunity for the student to present their research work and to obtain critical input regarding their proposed plans. The student will also benefit from preparing a proposal type document that is a first step towards their final dissertation. The Research Proposal Defense is expected to occur no later than 36 months after enrollment for Ph.D. students entering with a Bachelor's degree and 30 months after enrollment for students entering with a Master's degree. While early completion of the Research Proposal Defense is recommended, this examination must occur no later than 6 months before the Final Oral Examination. The Dissertation Committee Chair should arrange the Research Proposal Defense. In coordination with the candidate, the Dissertation Committee Chair may invite other faculty members or advanced graduate students to attend.

A Thesis Proposal Document must be submitted to all members of the Dissertation Committee no later than two weeks before the date of the Research Proposal Defense. If the proposal document is not submitted by that date, the Proposal Defense may be postponed. The Thesis Proposal Document should identify the research problem, give some preliminary view of existing research on the problem, describe the student's proposed approach to the problem, and outline steps towards completing the planned research. The student should work closely with their advisor in developing the Thesis Proposal Document. It is recommended that the Thesis Proposal Document is no more than 15 pages in length and formatted based on the NSF guidelines for unsolicited research proposals.

The Dissertation Committee will decide whether the Research Proposal Defense is satisfactory, or if it needs to be repeated. Following successful completion of the Research Proposal Defense the Dissertation Committee Chair will notify the Graduate Chair of this milestone.

## **Final Program and Scope of Thesis Research**

After the Research Proposal Defense, the candidate should arrange for regular meetings with the Dissertation Committee to present their thesis progress for approval. The Dissertation Committee may establish requirements different from those in the research proposal defense. Having regular Committee meetings will avoid hardships resulting from deferring decisions on the final course program and research direction changes.

## **Preparation and Submission of the Dissertation**

The dissertation must be prepared in a style acceptable to the Graduate School as given in its current HANDBOOK FOR DOCTORAL CANDIDATES. The several steps in the process of completion, submission and approval of the dissertation are specified in the HANDBOOK. The Dean of the Graduate School approves each dissertation.

A *final* draft of the dissertation must be reproduced and submitted to each member of the Dissertation Committee for review and evaluation twelve days before the dissertation evaluation forms are due at the Graduate School. The Final Oral Examination would then be conducted at least two working days after the evaluation forms are submitted to the Graduate School.

An electronic final copy of the dissertation, incorporating all corrections required by the Dissertation Committee, is required by the Graduate School. After your degree is conferred, the Graduate School will forward your dissertation as the copy of record to Deep Blue, the permanent digital repository of the University Library.

Perhaps the most frequent miscalculation made by doctoral candidates is *underestimation of the time required to write the dissertation*. Ordinarily, preparation of the dissertation will require a minimum of one full term after all of the research has been completed. Students are cautioned to be aware of the Graduate School deadlines for thesis submissions, which are early in the term in which the student wishes to graduate.

## **Final Oral Examination (Dissertation Defense)**

The Final Oral Examination is conducted by the Dissertation Committee after the Committee has reviewed the dissertation and submitted the evaluation forms to the Dean of the Graduate School. At the Examination, The Candidate gives an oral presentation of the research and defends the dissertation. The Final Oral Examination is advertised by the Graduate School and the Department and is open to any member of the University faculty or student body, with permission of the Dissertation Committee Chair. Following successful completion of the Examination, the Dissertation Committee recommends that the Graduate School award the Ph.D. degree.

## **Publication of the Thesis**

In addition, the Department expects that the Doctor will prepare one or more technical articles based on the dissertation research for publication in a technical journal. It is requested that a reprint of each journal article be furnished to the Department.

## **Registration**

The Graduate School requires that the student fulfill minimum registration requirements (See the BULLETIN or the Graduate Student Handbook).

## **Time Limits**

The target time for completion of all doctoral work from the time of matriculation is five years for students who joined the Program after the baccalaureate degree and four years for those who matriculated with MS degree. The Graduate School sets the following maximum length of completion: Students must complete all doctoral work within five years of achieving candidacy but no more than seven years from the date of the first enrollment in their Rackham doctoral program. The student exceeding this time limit must petition the Dean of the Graduate School through the Department for an extension of time and may be required to take additional examinations and/or course work.

## **Annual Evaluation**

The annual evaluation report must be completed at least once a year, preferably before the end of Winter Term, by all CEE Ph.D. students regardless of year in their education. The advisor or the Graduate Committee may request more frequent submissions.

This report serves several purposes. Most importantly, it is used by the students and their advisors to formally review progress toward completing the Ph.D. degree. Students are encouraged to work closely with their advisors when drafting the report. The report must be submitted via e-mail to the CEE Graduate Program Office and will be maintained by the CEE Department as part of the student's academic record.

This report focuses on progress leading to successful completion and defense of the dissertation. There are other aspects of professional development (GSI and GSRA employment, off-campus employment, consulting, community service, etc.) that are also very important. Students are encouraged to update their curricula vitae (CV) and personal web page on a regular basis and to submit the most current version of CV as an appendix to the report.

Information in the progress reports and the submitted CVs will be used by the advisors, the Graduate Program Committee, and the CEE faculty for several purposes, including: monitoring research progress, advising, assessment of eligibility and qualifications for honors and awards, and evaluation of progress for continued financial support.

## **Ph.D. Advising and Mentoring Plan**

All first-year Ph.D. students, in collaboration with their faculty advisors, are required to prepare an advising and mentoring plan. While not intended to serve as a comprehensive guide or an official "contract", this advising and mentoring plan is expected to assist students and faculty advisors in facilitating discussions that aim to advance an effective working relationship. It is recommended that the plan includes key points covered by the sample advising and mentoring framework developed by the Graduate Committee.

The plan needs to be established when students start their Ph.D. programs. By revisiting and updating shared expectations within the plan (at least annually), it can then be tailored to emphasize relevant and important topics in a timely way during the course of a student's time in the graduate program. The students are required to upload the advising and mentoring plan during their annual progress review.