

# REQUIREMENTS AND PROCEDURES

## Doctor of Philosophy in Engineering

### Department of Civil and Environmental Engineering

The University of Michigan

(Revised August 2004)

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 the [www.rackham.umich.edu](http://www.rackham.umich.edu) website. Students with questions should seek the assistance of the appropriate program advisor or graduate secretary listed below:

Construction Engineering & Management	P. Ioannou
Environmental & Water Resources Engineering:	S. J. Wright
Geotechnical Engineering	R. D. Hryciw
Materials Engineering	V. C. Li
Structural Engineering	S. Goel/J. Lynch
Graduate Coordinators	J. Lineer & R. Teachout
Student Services Assistant	J. Miller

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 holding the degree Master of Science in Engineering, or its equivalent, is classified as a *Pre-Candidate*. A student without the Master's degree is normally required to enroll initially in the M.S.E. Program described in the department publication "Guidelines, Master of Science in Engineering, Department of Civil and Environmental Engineering."

The Post-Master's Student follows a program supervised by a doctoral adviser in the chosen field until passing the Qualifying 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. A Master's degree, or its equivalent, is normally required before entering the doctoral program. Students from outside The University of Michigan will file an Application for Admission. Those from within the University and enrolled in the Rackham Graduate School will file a Change of Field form and/or Change of Degree Level Authorization Form. Ordinarily this will be done at least two months before the beginning of the term of expected enrollment.

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 discriminating, 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.

### **Preliminary Program**

After admission to the status of Pre-Candidate, the student should confer with a doctoral adviser in the selected field 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. While detailed course requirements are initially determined by the above, the final program will be controlled 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. At least 21 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 21 hour minimum. Alternatively, for students proceeding directly to the Ph.D. degree from the Bachelor's level, at least 54 credit hours must be completed, not including English language courses. A maximum of 6 hours of independent study course work can be included in the 54 hour total. Up to 15 credit hours of transfer credit from inter-university and intra-university sources combined can be applied toward the 54 hour minimum, subject to the rules for graduate credit and pre-graduate credit given in the Department's guidelines for the Master of Science in Engineering degrees.

The Graduate School requires that at least two cognate courses (work related to the field of specialization) be included in the student's graduate program. The Department requires that at least one of these cognate courses be an advanced course in mathematics, probability, statistics or mathematical programming. Courses offered in the Civil and Environmental Department may not be used to satisfy this requirement.

## Course Load

The Department policy is that a typical full-time graduate student course load is 12 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.

## Qualifying Examination and Applicant Status

The Pre-Candidate student must pass the Qualifying Examination to be accepted as an Applicant for the Ph.D. Prior to being considered for the Qualifying Examination, the Pre-Candidate student will have completed 39 credit hours beyond the Bachelor's degree (including coursework taken during graduate studies at other universities), have a Graduate GPA of 6.50 or better in graduate course work at the University of Michigan (excluding independent study courses), and have taken at least one independent study course or have served at least one term as a Graduate Research Assistant. Eligibility to take the Qualifying Examination will then be determined by the Graduate Committee after critical review and evaluation of the student's academic performance submitted by the student's academic adviser.

The examination will ordinarily be given as soon as the student is eligible and should be taken no later than 12 months after admission as a Pre-Candidate. The student's adviser may require that the examination be taken at any time, given reasonable notice.

The Qualifying Examination is administered by a Qualifying Examination Committee selected by the student's adviser and appointed by 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.

Qualifying 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 Qualifying 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 Qualifying Examination may be required. The Qualifying Examination is open to all members of the departmental faculty and closed to others.

The Qualifying Examination Committee submits its recommendation to the Graduate Committee for decision and the Department Chair officially informs the student of the outcome. The three possible outcomes of the Examination are: 1) acceptance as an Applicant for the Ph.D.; 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.

## Selection of Thesis Topic and Dissertation Committee Chair

As soon as possible after becoming an Applicant, the student should choose a thesis topic in consultation with the faculty member chosen by the student to serve as Chair of the Dissertation Committee. A faculty member with less than a 50% appointment in the Department of Civil and Environmental Engineering can not 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.

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

Soon after the Dissertation Committee has been appointed, the Applicant should arrange for a Committee meeting to present the proposed course work, and thesis research program for its approval. The Dissertation Committee may establish requirements different from those specified earlier by the doctoral adviser. An early Committee meeting will avoid hardships resulting from deferring decisions on the final course program and research direction changes. A written proposal describing the scope and approach to the thesis research will be submitted and approved by the Dissertation Committee. A copy will be filed in the Dissertation Committee Chair's files.

### **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 Dissertation Committee to ensure that this requirement has been met. Certification by the Dissertation Committee Chair 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 advancement to Candidacy is achieved.

### **Preliminary Examination and Advancement to Candidacy**

After most of the course work has been completed<sup>1</sup> the English proficiency requirement has been met, and the thesis proposal has been submitted to the Dissertation Committee, the Applicant must arrange for a meeting of the Dissertation Committee for a Preliminary Examination to consider advancement to the status of Candidate for the Ph.D. degree. The Preliminary Examination will consist of an oral examination during which the Applicant presents the thesis proposal for review by the Dissertation Committee. In addition to the oral examination the Dissertation Committee may require a written examination as part of the Preliminary Examination. All members of the Civil and Environmental Engineering Faculty will be invited to participate in the oral examination. Advanced students may also be invited to attend.

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<sup>1</sup>This means that at least five courses at Michigan plus two cognates have been completed. The two cognate courses may have been taken either at the University of Michigan or within another acceptable graduate program. If the departmental math requirement has not been satisfied, the student must be enrolled in an acceptable math course during the term she/he becomes a Candidate.

Following successful completion of the Preliminary Examination the Dissertation Committee recommends to the Department Graduate Committee that the student be advanced to Candidacy. Advancement to candidacy is granted by the Dean of the Graduate School upon recommendation of the Department 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. and awards a Candidate Certificate to the student.

## **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 unbound final copy of the dissertation, incorporating all corrections required by the Dissertation Committee, is required by the Graduate School. This final version is sent to a publisher for binding the required number of copies requested by the Graduate School. One of the bound copies is sent back to the Department.

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 (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**

The Rackham School of Graduate Studies can arrange for the required publication of the dissertation. 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**

A student must complete all doctoral work within seven consecutive years, five for those entering with a MSE, after the first enrollment in the Graduate School. 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.