

University of Rochester
Hajim School of Engineering and Applied
Sciences

Department of Mechanical Engineering
Graduate Studies Handbook

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Preface: Welcome to the Mechanical Engineering Department

Welcome to the University of Rochester's Department of Mechanical Engineering. We are happy that you have chosen to continue your studies with us. This handbook will explain the formal requirements for completion of your graduate degree in Mechanical Engineering. It supplements and clarifies the general University requirements spelled out in the Official Bulletin for Graduate Studies and the Regulations and University Policies (available on the University web site at www.rochester.edu/GradBulletin/). In Mechanical Engineering, we take great pride in providing a friendly as well as educational environment for your graduate studies. Whether you are here for just one year, or for several, we look forward to working with you. Feel free to ask questions, and do your best to get to know as many other students and faculty members as possible. The office staff can answer many of the questions you will have while getting settled here in Rochester. In particular, the Graduate Coordinator is essential to keeping you on track, and is your best source of administrative information.

During your first year, you will be assigned a faculty advisor to assist you in course selection and preparation for either your first year exam or further research. You will be provided with office space and access to our computational facilities. You may be asked to assist with teaching or grading of an undergraduate course. Teaching assignments are made by the department to best match the needs of the faculty and students. If you have a specific preference, speak to the Graduate Coordinator or your advisor; the department may be able to honor your preference.

We hope you will take advantage of the many opportunities available here in Rochester. Several weekly seminar series will help you become more familiar with the nature of our research. Attending many of our seminars (and social events!) is an excellent way to meet some of the faculty and other graduate students. If you are interested in learning more about a particular area, speak to your advisor or one of the office staff to find out about arranging a meeting or a tour. Finding an excellent match with your interests is an important step toward your success.

The Master of Science (MS) Degree

General requirements

The MS degree requires 30 semester hours of graduate credit. No more than 10 credits may be transferred from nonmatriculated study at the University of Rochester or from an outside institution. To request transfer credit, attach an official copy of transcript to your Program of Study. There are two routes to the degree: Plan A (thesis) and Plan B (examination). Every student must complete a *Program of Study* form (available from the Graduate Coordinator). This form is completed with the help of your academic advisor, and is then given to the Graduate Coordinator, who will submit this form to the Department Chair for approval. The completed form goes to the Dean's office for signature and distribution to appropriate offices. The Program of Study should be completed as soon as possible, but in no case later than the end of the second semester. This form may be updated by submitting a Graduate Program Change Notice to the Dean's Office (through the ME office).

Plan A requirements

Plan A requires a written dissertation prepared by the student under the supervision of his/her advisor. The thesis research represents 6 to 12 hours of the 30 required credit hours. Of the remaining 18 to 24 hours, at least 16 must be in courses at the 400 level or higher, and at least 12 of these 16 must be M.E. courses. The formal defense of the dissertation takes place after the completion of all course work, and the student must be registered for the semester in which the defense takes place. The remainder of this section deals with the defense.

Arranging for the defense: When you and your advisor begin thinking about defending, remember to contact the Graduate Coordinator. He/she will guide you through the administrative requirements. He/she will also explain specific deadlines for the defense and dissertation submission for each degree conferral date, *i.e.* May, October, or March. You must be registered for the semester in which you defend.

Scheduling and paperwork: Check with the Graduate Coordinator for allowable defense dates. Your dissertation must be submitted to your committee and to the Dean's office at least two weeks (10 working days) before you defend. The following bound (spiral or tape binding) copies

are required: 1 copy to each committee member and 1 copy to the Graduate Coordinator along with the following paperwork:

- Program of Study: (must be up to date).
- Nomination of Committee form.

When your committee has been selected and a date chosen, you need to have the Graduate Coordinator schedule the conference room for your defense and provide an abstract of your thesis defense.

The examining committee: You will defend your dissertation before a committee of two full-time professors from the M.E. department and one full-time professor from outside the department. The committee members are selected by your advisor, with input from you, and then it is your responsibility to contact these faculty members and to complete the appropriate form.

Final copies of the dissertation: You must turn in two corrected unbound copies of your dissertation after successful completion of the defense. These copies will go to the Dean's Office. Also, give the Graduate Coordinator a third bound copy for your folder. It is also customary to provide bound copies to the members of your examining committee.

Plan B requirements

Candidates in Plan B must take at least 18 of the required 30 hours in the Dept. of Mechanical Engineering, and at least 16 of these 18 must be in formal courses at the 400 level or higher, excluding reading and research credits. The maximum number of research credits for Plan B is 6. Also, a broader College rule requires that at least 18 of the 30 credit hours must be in formal courses at the 400 level or higher. The M.S. Program of Study form must be completed by the time you have finished 12 credit hours of course work. You must take a comprehensive oral examination at the end of your course work. No examination appointment form is necessary, but you must see the Graduate Coordinator as well as your faculty advisor to schedule this exam. Degrees are conferred in October, March and May. See the Graduate Coordinator for deadlines for the appropriate semester: she will make sure that the requirements are adhered to.

The oral examination: The examination questions will be based on the courses you have taken and any research you have done (if applicable). The examining committee consists of your advisor and one other M.E. faculty member, chosen by your advisor. It is your responsibility to find the members of your examining committee, in consultation with your faculty advisor. At the end of the examination, which lasts approximately 2 hours, the committee will complete an examination report form for the Dean's Office.

The Degree Doctor of Philosophy (Ph.D.)

General requirements

The Ph.D. degree requires 90 semester hours of graduate credit. Students holding a master of science degree receive 30 credit hours toward the total of 90 (see page 81 of the Graduate Bulletin). Students are required to take at least 32 hours of coursework at the 400 level or higher, of which at least 24 credit hours should be mechanical engineering courses. The dissertation is typically about 30 of the total of 90 credit hours. No more than 10 of these may be transferred from nonmatriculated work at Rochester. There are three examinations during the Ph.D. program: the preliminary examination at the end of the first full academic year of study, the qualifying examination, typically taken at the end of the second year or during the third year, and the final oral examination.

The Ph.D. Program of Study form should be completed and approved within two years of matriculation (four semesters). The student completes this form in consultation with his/her advisor. It requires the signature of the Department chair and is then forwarded to the Dean's Office. The program of study can be modified if necessary with a Program Change Notice form. The program of study must be completed and approved before the student can take the qualifying examination.

Part-time study: Part time study is defined as registration for fewer than 12 credit hours per semester. Part time students must satisfy the same requirements as full time students, as well as a residency requirement. Residency is defined as registration for at least 12 credit hours in each of two consecutive semesters. *i.e.:* fall – spring, or spring – fall.

Finding an advisor (research supervisor) and getting started

You will be assigned a faculty advisor when you arrive at Rochester, but the advisor may not be your eventual research supervisor, whom you should identify by the end of your first year here, preferably before taking the preliminary examination. (This exam is discussed below.) It is important that you find a good match between your academic interests and those of your faculty advisor, that your advisor is willing to accept you as a graduate research assistant, and that he/she is able to provide your graduate stipend and tuition. It is also important that you contact every faculty member in the Department to explore all possibilities for an academic adviser. Often first year students will presume that only one or two faculty members may serve as their advisor, thus excluding the rest of the faculty. This is acceptable if a good match between student and faculty is made, but no possibilities should be left unexplored. First year graduate students are required to contact all faculty in the Department to explore the possibilities for research. A list of the faculty is provided to keep track of the faculty contacted. You may meet with the faculty either before or after taking the Preliminary Exam. When you have met with a faculty member and discussed research possibilities together, please have him or her sign next to their name to confirm that such contact has occurred. When you have met with the entire faculty, you should be able to identify your advisor. Be sure to return this list to the Graduate Coordinator, identifying your research advisor. This procedure must be completed within three weeks of the completion of the Preliminary Exam

Once you have identified your research advisor following the steps above, it is equally important that you begin your research: for overall efficiency, it is best to conduct your research in parallel with your course work. Summer is a good time for conducting research as there are no classes or teaching duties. Making a strong start on research during the first year is a significant sign of good progress towards your degree.

Ph.D. first year preliminary examination

First year Ph.D. students take this exam after their second semester, usually in late May immediately following commencement. This examination is required of all first year Ph.D. students, and successful completion of this examination is required for formal admission into the Ph.D. program in the Department of Mechanical Engineering.

The examination: The examination process takes fourteen days. The examining committee consists of three Mechanical Engineering faculty members, one of whom is the student's advisor. The examining committee and the date and time of the examination are chosen by the department Graduate Committee. You must have a GPA ≥ 3.0 in 400-level courses and register with the Department office (Graduate Coordinator) by the date specified in order to take the exam.

Each student will be given three published research papers for review. The Graduate Committee chooses these from papers submitted by the faculty. The papers will usually be no more than two years old and will not be directly related to the student's chosen area of research, nor will they have been written by a member of the ME faculty. Within three days of receiving the papers, each student must inform the Graduate Coordinator in writing which paper he/she has chosen to serve as a basis for the preliminary exam. Seven days later, each student must submit to the Graduate Coordinator four copies of a carefully written document containing three sections of equal importance:

- *Questions addressed by the author(s).* Identify the questions addressed in the article and the reasons for examining these questions.
- *Critical appraisal of the article.* Discuss the author's contribution to the solution of those questions and the significance of this contribution.
- *Proposal for additional research.* Propose, in concrete terms, new research that might be done to extend or improve upon the study presented in the article.

This document should be no longer than ten pages (12 pt double-spaced, 1 inch margins), excluding figures.

Approximately three days after submission of the document, each student will appear before a three-member faculty examining committee for an oral examination defending the document (the date, time, place, and examining committee members for each exam will be selected by the Graduate Committee). Each exam will begin with a 20-minute oral presentation by the student followed by questions from the examining committee. The entire examination will last about two hours. At the end of the exam the committee will submit a written report on the examination.

When all the examinations have been given, the entire M.E. faculty meets to decide the outcome, based on the following:

- Student's ability to evaluate published research critically.
- Student's creativity in suggesting new lines of research.
- Strength of the written document with respect to both content and style.
- Performance in the oral examination.
- Course grades.

Students will be notified of the results in writing.

Ph.D. dissertation advisory committee

Each Ph.D. student shall have a dissertation advisory committee consisting of a research advisor, at least one other faculty member in the Department, and at least one faculty member from another department. This committee shall be appointed during the student's second year of study (or earlier) and shall meet at least once during that year. The membership of the committee shall be approved by the Department chair and reported to the dean of graduate studies. The committee shall meet with the student at least once each year to evaluate the student's progress and offer advice, and a written record of the meeting shall be placed in the student's file. (A standard form for this written record is available from the Graduate Coordinator.)

Ph.D. qualifying examination

The purpose of the qualifying examination is to determine whether the student is fully prepared to undertake original research in the chosen area. This examination must be taken by the end of the third year of graduate study. The basis for the examination is a written research proposal prepared by the student, describing the current state of knowledge of a particular research topic and outlining a research program that will lead to a satisfactory dissertation. Note that the student need not demonstrate significant progress in the proposed research, but must demonstrate a thorough understanding of the problem and present a sound plan of attack. Contact the Graduate Coordinator as soon as you and your advisor begin thinking about

scheduling your qualifying examination. There are several things you must complete before you can take this examination. The Graduate Coordinator can guide you through this process.

- You must submit your written research proposal to your examining committee and your committee nomination form to the Dean's Office at least 15 working days (weekends and University holidays not included) before the examination is to take place.
- Your program of study, which should have been completed at the end of your 2nd semester must be on file, and updated if necessary.

The examining committee: The committee will consist of a minimum of three full-time faculty members of professorial rank. Two must be from within the Department of Mechanical Engineering and one from outside the Department. The committee members are chosen by your advisor in consultation with you: often they are the members of your advisory committee.

Typical examination format: The student will give an oral presentation giving an overview of the research proposal, for the first 20-30 minutes. Occasionally, this oral presentation is made to a larger audience as part of the M.E. seminar series. If so, then additional background material may be appropriate and an abstract should be given to the Graduate Coordinator a week in advance for posting. The committee will then examine the student orally in a closed session. A typical examination will take between two and three hours. The candidate is judged on the significance of the research proposed, the written and oral presentation, understanding of the fundamental issues, the ability to apply the background from formal course work to problems related to the proposal, and demonstration of critical assessment of results. It is important to recognize that while the written proposal serves as a focus for the oral examination, questions about related areas can also be raised.

The final Ph.D. oral examination

The Ph.D. defense is the last step in your studies. Your dissertation should be in nominally final form before you defend. When you and your advisor begin thinking about defending remember to contact the Graduate Coordinator. There are several administrative matters you must attend to in the defense process.

Thesis Preparation and Registration: A booklet entitled “The Preparation of Doctoral Theses” is available online at <http://www.rochester.edu/Theses/>. It is the responsibility of the student to see that the style, format, margins, paper, binding, etc. are in accordance with the University regulations. The student should also be aware of deadlines for registering a thesis in conjunction with degree dates. The current graduate calendar is available at <http://www.rochester.edu/college/gradstudies/gcalendar.html>. **Registration with the office of the Associate Dean of Graduate Studies must take place 25 working days (weekends and holidays not included) before the final exam, during the academic year, and 30 working days during the summer months.** You must submit the following bound (spiral or tape binding) copies: one copy to each committee member, one to the Graduate Coordinator with paperwork for the Dean’s office and Department Chair. Keep in mind that draft copies are not acceptable. Refer to the Graduate Studies Bulletin for details. Note that the Graduate Coordinator needs approximately one week to prepare paperwork and request advising records from the Registrar’s Office.

Calendar/Schedule: Check with the Graduate Coordinator for permissible defense dates. There are a number of blackout dates when you cannot defend, and specific deadlines for each conferral date (listed on the graduate calendar). When your examining committee has been selected, and while the paperwork is in process, you should see the Graduate Coordinator to reserve the conference room. You must also give her an abstract of your presentation.

The examining committee: The final examination committee must consist of at least two full-time professors from M.E. and one full-time professor outside M.E. Members of the committee will be recommended by your advisor and approved by the Department Chair. Often the members of a student’s dissertation advisory committee also serve on the final examination committee. The University Dean of Graduate Studies will also assign an outside chair to the examining committee.

Paperwork: (see the Graduate Coordinator for forms)

- Program of Study - must be done at the end of your 2nd yr.
- Appointment Form for Ph.D. Final Oral Examination
- UMI form (\$70.00 fee is required)

- Departmental Statement of Completion of Ph.D. requirements
- Advising Record from Registrar's Office (Graduate Coordinator will request)
- Ph.D. Advisor Form
- Committee e-mail address form
- A printed copy of the cover page and abstract of your dissertation

The student's advisor will receive confirmation of the scheduling of the exam and the name of the chairperson of the examination committee appointed by the University Dean of Graduate Studies and before the examination takes place.

Examination format: The first 45 minutes of the examination is typically a seminar open to the public. The student's presentation should last approximately 30-35 minutes, and an additional 10-15 minutes should be allowed for questions from the audience. Notes, slides, charts, and visual aids for the seminar are encouraged. The student and the examining committee will then adjourn to a closed session where the second part of the exam will be conducted. The committee will scrutinize the student's thesis including comprehension, execution, description, and interpretation of the research described in the thesis.

After successful completion of the final oral examination, the student may be required to make necessary corrections in the dissertation. When corrections are completed and reviewed by the thesis advisor (or designated member of the examining committee), one unbound copy and one electronic copy are to be submitted to the University Dean of Graduate Studies in 257 Wallis Hall. A student's stipend normally ends when the final copy of the dissertation is turned in.

Mechanical Engineering Faculty

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