



**HAJIM SCHOOL OF ENGINEERING & APPLIED SCIENCES**  
**UNIVERSITY *of* ROCHESTER**

## Department of Chemical Engineering

### Graduate Handbook

2020-2021

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## REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY IN CHEMICAL ENGINEERING

The doctoral degree requires a total of 90 credit hours. In practice, most of these are research credits. Note that, during the first year of residence, students are typically asked to take a total of 32 credits. (To maintain the full-time student status, a minimum of 12 credits/semester should be taken.) In addition to research, it is required that entering students **with an MS degree** complete a minimum of 18 credit hours of formal coursework. Those students entering the Ph.D. program **without an MS degree** must complete a minimum of 30 credit hours of formal coursework. Of the formal coursework, four courses must satisfy the “core” fundamentals of Chemical Engineering as defined below.

**All incoming Chemical Engineering PhD students will be required to take four core classes in their first year of study:**

### Mathematics

CHE 400, Applied Boundary Value Problems (Fall) (or petition to take a different math course)\*

### Transport Phenomena

CHE 441, Advanced Transport Phenomenon (Fall) (or petition to take both ChE 443 & 444)\*

### Graduate Level Kinetics

CHE 461, Advanced Kinetics and Reactor Design (Spring) (or petition to take ChE 431)\*

### Thermodynamics

CHE 485, Thermodynamics and Statistical Mechanics (Spring)

\*It will be up to the students to determine if they need to petition for a change to a course, and to use the standard Chemical Engineering petition form.

Find courses at: <https://cdcs.ur.rochester.edu/>

## PROGRAM OF STUDY (POS)

The student's academic advisor assists the student in developing a complete program of study for the anticipated degree. Each program of study course list and all subsequent changes must be approved by the student's advisor and the associate dean for graduate studies. Students who take courses without the approval of the advisor and the associate dean, or without registering for them, may not receive credit toward their degree requirements.

The Ph.D program of study course list, approved by the department chair, program director, or their representative, should be filed with the department early in the second semester after consultation with student's advisor. Program of Study course list will be forwarded to the associate dean for graduate studies by the department.

**University of Rochester Department of Chemical Engineering  
 Student Program of Study Course List**

**Student Name:** \_\_\_\_\_ **UR ID** \_\_\_\_\_ **MS** \_\_\_\_ **PhD** \_\_\_\_  
**Previous Institution** \_\_\_\_\_ **Prev. Ins.** \_\_\_\_\_ **Prev. Ins.** \_\_\_\_\_  
 \_\_\_\_\_ **Degree** \_\_\_\_\_ **Major** \_\_\_\_\_

<b>Subject/ Course #</b>	<b>Course Title</b>	<b>Credits/ Units</b>	<b>Grade</b>
CHE 400	Applied Boundary Value Problems	4.0	A
CHE 441	Advanced Transport Phenomenon	4.0	A
CHE 496	Departmental Seminar	0.0	A
	At least four additional credits during first semester		
CHE 461	Advanced Kinetics and Reactor Design	4.0	
CHE 485	Thermodynamics and Statistical Mechanics	4.0	
CHE 496	Departmental Seminar	0.0	
	At least four additional credits during second semester		
	List remainder of courses. 90 credits of coursework/research		
	Is required for the PhD		

**Remarks:** \_\_\_\_\_

**Approved: Student Advisor:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Approved: Dean of Graduate Studies:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### **WAIVING THE CORE COURSE REQUIREMENTS**

Students who have taken similar graduate courses elsewhere may in some instances be allowed to waive the core course requirements. Interested students must file a petition for accepting courses taken elsewhere in lieu of the recommended core courses to the Director of Graduate Studies with research advisor's endorsement. Waiving the core course requirements will not eliminate the requirement that students with MS degrees complete 18 credit hours of formal coursework as part of the Ph.D. program of study.

### **RESEARCH SEMINAR REQUIREMENT**

All students are required to register for the Chemical Engineering Departmental Seminar Series (CHE 496), unless they are in-absentia. The department chairperson should be indicated as the instructor for the course with zero credit hours. Grading for this course is based on attendance. Attendance at all the seminars is expected. Students may miss one seminar per semester and still receive a grade of "A". Each additional seminar missed will lower the grade by one letter. The dates and times of the seminars are posted on the departmental web page and announced via e-mail. A sign in sheet will be passed around during the seminar. (For Zoom seminars, the graduate coordinator will monitor attendees.) If you do not sign in, you will not get credit for attendance, so be sure to find the clipboard with the sign in sheet before you leave the seminar. If you attend another department's seminar, please find a way to provide some proof that you attended, perhaps take a picture and email it to the graduate coordinator. The dates and times of the seminars are posted on the departmental web page and announced via e-mail. **If there is a conflict with another class or workshop, the student must email the chair of the department to explain the situation, and copy the graduate director and graduate coordinator. The student must be sure to receive a reply from the chair excusing the student, and be sure the graduate coordinator has received the reply.**

### **TEACHING ASSISTANT (TA) REQUIREMENT**

All PhD students are required to TA two courses. TAs must register for CHE 497, "Teaching Chemical Engineering" with zero credits. If the registration asks for the instructor, please enter the name of the professor/instructor that teaches the class you will be a TA for. Satisfactory performance is required in each TA assignment. Students who fail their TA assignment will be required to TA again. TA training hosted by the graduate dean's office is available in late August, and possibly at some time during the academic year. Please check with your graduate coordinator.

### **Ph.D. MAXIMUM TIME OF COMPLETION\***

All Ph.D. students admitted to the program are offered graduate fellowships that provide a competitive 12-month stipend and cover the costs of tuition and other fees. Continued support is contingent on maintaining satisfactory academic and research progress, as well as on the availability of funds. The time limit for completion of the PhD is seven years from the date of initial registration. For students entering with a MS degree for which the full 30 credit hours is accepted in the PhD program the time limit for completion of the PhD is six years from the date of initial registration. Any extension of study beyond this time limit requires justification from the student, a recommendation from both the faculty advisor and department chair, and a petition that must be approved by the dean. The extension, if granted, must be limited in duration and reapproved at least annually, following the policies described in latest version of the [Regulations and University Policies Concerning Graduate Studies](#). Students' academic performance is evaluated based on the grades in the formal courses, the performance on the first year PhD exam, and the attendance of the research seminar. The research performance evaluation is based on the grades in the laboratory research courses, the performance on the second year PhD exam, annual PhD student evaluations, and reports from the dissertation committee meetings.

\* All categories including "Leave of Absence" count towards the time limit

**Example Elective Courses in Chemical Engineering:**  
**(Class availability and schedule subject to change)**

For up-to-date course listings go to  
<https://cdcs.ur.rochester.edu/> or  
[UR Student Course Sections](#)

CHE 413 Engineering of Soft Matter (Spring)

CHE 414 Math Meth for Optics & Phy (Fall)

CHE 420 Biomedical Nanotech (Fall)

CHE 447 Liquid-Crystal Materials & Optical Applications (Fall)

CHE 456 Electrochemical Engineering Fundamentals and Applications (Spring)

CHE 457 Practicum Soft Materials (Fall)

CHE 458 Electrochemical Engineering & Fuel Cells (Fall)

CHE 460 Solar Cells (Fall)

CHE 462 Cell & Tissue Engineering (Spring)

CHE 464 Biofuels (Fall)

CHE 465 Sustainable Chemical Processes (Spring)

CHE 466 Bioprocess Engineering (Spring)

CHE 469 Biotechnology & Bioengineering (Spring)

CHE 476 Polymer Synthesis & Characterization (Fall)

CHE 477 Advanced Numerical Methods (Fall)

CHE 482 Processing of Microelectronic Devices (2 cr.)(Fall)

CHE 486 Polymer Physics (Spring)

CHE 487 Surface Analysis (Spring)

CHE 488 Introduction to Energy Systems (Spring)

CHE 489 Biosensors (Spring)

## QUALIFYING EXAMINATIONS FOR THE PH.D DEGREE IN CHEMICAL ENGINEERING

### Philosophy

It is essential that the Ph.D. bound graduate student have a sound technical background and the creativity and judgment necessary to conduct independent research. In addition, it is critical that the student have demonstrated a breadth of knowledge of Chemical Engineering fundamentals before proceeding to specialized Ph.D. research. The purpose of the qualifying examination procedure is to assess these qualities in each student who desires admission to Ph.D. candidacy. The graduate student's competence and promise are evaluated by his/her performance in graduate courses, by a critique of a recently published research article, on thesis research, and by an oral defense of a proposal for Ph.D. thesis research.

### Selection of Ph.D. Thesis Advisor

The students are required to formally declare their preferences for at least three Ph.D. thesis advisors by submitting an advisor selection form to the Graduate Program Coordinator before the end of January of their first year of residence. Students should discuss their research interests with the faculty members in the Department and attend faculty research presentations, which are scheduled in September/October. These presentations are 20 – 30 minutes long and give the student an opportunity to ask questions. After the research presentations, it is up to the student to meet with faculty and express an interest in joining that faculty members research group. **Failure to secure an advisor by the appointed time can jeopardize financial support.**

### First Year PhD Exam:

The examination is based upon the student's critical evaluation of a recently published research article, which will be given to the student by mid-April. (Subject to change based on situation.) The paper will be outside the student's main research interest. The student must evaluate the paper in a written report and oral presentation. In particular, the student is asked to:

- (a) Identify the fundamental scientific questions addressed by the author
- (b) Formulate a critical appraisal of the author's approach and contribution
- (c) Propose research to extend and improve upon the study presented in the article

The purpose of the exam is to determine student's ability to critically analyze scientific literature and to successfully complete our PhD program. The exam is administered in the first year at the end of the spring semester by the faculty committee.

Students are asked to:

- Submit a **written document** not longer than fifteen double-spaced typewritten pages plus appendices which contain three sections: Questions addressed by the author, critical appraisal of the article and proposal for additional research.
- Give a **20 minute presentation** with slides that overviews and critically analyses the paper.
- Participate in a **discussion** to assess:
  - (a) The student's ability to evaluate published research critically
  - (b) The student's creativity in suggesting new lines of research
  - (c) The strength of the written document with respect to both content and style
  - (d) The student's grasp of Chemical Engineering fundamentals (i.e. transport phenomena, thermodynamics and reaction engineering).

The goal is to evaluate the student's general knowledge, his/her command of the relevant literature and the ability to plan and execute experiments that will test the research hypothesis.

The committee will report their evaluation of the student's performance to the Graduate Committee. In addition, the committee will examine the student's entire record (coursework, research performance, and examination results) and recommend to the department faculty whether the student should be encouraged to proceed toward PhD candidacy. Recommendations of the committee include, among others:

- (a) The student should be regarded as suitable for doctoral work and should proceed accordingly.
- (b) The student should proceed with MS research and might be considered for PhD candidacy after repeating the First-Year Examination.
- (c) The student should be regarded as an MS candidate only and should be encouraged to plan accordingly.

An affirmative decision may include recommendations to the student to address deficiencies such as taking technical courses or taking courses designed to improve written or oral communication skills.

#### **Example of First-Year Examination Scheduling/Timeline**

- |                 |   |
|-----------------|---|
| April 9, 2021:  | The graduate program coordinator will email three papers for you to choose one that you will use for the written portion of the exam. |
| April 16, 2021: | Notify graduate program coordinator by email informing the department which paper you selected by noon.                               |
| May 14, 2021:   | Email written document to graduate program coordinator by noon.   |
| Examinations:   | Week of May 17, 2021  |

**Dates subject to change.**

### **PhD Proposal Exam**

The purpose of the exam is to assess student's ability to carry out high-quality research and successfully complete our PhD program. Student must have his/her thesis committee formed, and is responsible for scheduling the exam and reserving a room. This information must be communicated to the graduate coordinator a month in advance.

The exam is administered in the 2<sup>nd</sup> year at the end of the spring semester by the student's PhD committee. Students are asked to:

- Submit a **proposal document** a month in advance that (1) assesses intellectual merit of the research project; (2) summarizes the research hypothesis, project aims and the experimental plan for the entire project, and (3) discuss already collected data and results. The document is limited to 25 pages (double-spaced typewritten pages, excluding reference and experimental details.)
- Give a **30 minute presentation about the proposal document**.
- **Participate in a ~60 minute discussion** with the goal to determine student's general knowledge in the proposed area, his/her command of the relevant literature, and the ability to plan and execute experiments that will test the research hypothesis.

Possible Outcomes of the Proposal Exam:

- Pass
- Pass with contingency that does not require another oral examination.
- Fail with a possibility to retake the exam over the summer or at the beginning of the fall semester.
- Fail with a possibility to complete an MS degree.

After the proposal, PhD students are required to have annual committee meetings, where the students give reports on their progress and the committee makes additional suggestions and recommendations relevant to the research project.

### **PHD SELF-EVALUATIONS**

A self-evaluation will done once a year. PhD students should complete the form no later than June 30. Students should request a day/ date/ time to discuss their self-evaluation with their advisor. This discussion should take place by July 15. Your advisor will add comments to the form. You can then respond to any comments made by your advisor by July 22. Your advisor will then forward the form to the graduate director for review. All forms will be sent to the graduate dean's office by August. \*Dates subject to change.

### **THESIS DEFENSE**

**Consult the GEPA website. The information you need will be found here:**  
<https://www.rochester.edu/college/gradstudies/phd-defense/index.html>

**Registration of Your Thesis for Defense:** Will be done online in conjunction with the graduate program coordinator in Sharepoint PhD Process.

**Collaborative Work in Dissertation/Thesis:** The Graduate Studies Bulletin and The Preparation of Doctoral Theses: A Manual for Graduate Students (page four, [www.rochester.edu/Theses](http://www.rochester.edu/Theses)) state that if a candidate for the degree Doctor of Philosophy has collaborated with others in carrying out the research upon which the dissertation is based, the character and extent of the candidate's own participation in the project must be stated clearly in a Foreword to the dissertation. **The Foreword is a separate section immediately preceding the text and is numbered as page 1. Each co-authored chapter must be identified in the Foreword, listing its co-author(s).** This would apply to articles already published or accepted for publication, manuscripts that have been submitted for publication, or any other manuscripts.

**Defense Committee:** A defense committee should consist of two full-time faculty members from ChE and one full-time faculty member outside ChE. **The outside member cannot be your co-advisor.** See the graduate bulletin for full details.

The formatting specified in the [manual](#) must be strictly adhered to.

The day you upload your defended and corrected thesis to ProQuest is your last day of being considered a student.

### **CHEMICAL ENGINEERING FELLOWSHIPS**

Ph.D students in Chemical Engineering have the opportunity to apply for two fellowships:

**Costich Fellowship:** PhD students in chemical engineering are encouraged to apply for the Earl W. Costich Graduate Fellowship, which carries a one-year stipend of about \$1,800. The award, named after a 1942 alumnus of the department, can supplement a student's existing stipend.

**Wang Fellowship:** The Kwang-Yu and Lee-Chien Wang Fellowship supports excellence in Chemical Engineering research at the graduate level. It covers a portion of the academic stipend, provides an additional \$12k in research funds, and up to \$2k to present results at academic conferences. Fellowship winners will organize a Kwang-Yu and Lee-Chien Wang yearly distinguished lecture.

### **INTERNSHIPS**

For information on research internships, see the Graduate Education Handbook. It is important to contact the graduate coordinator well in advance of your internship start date. Paperwork cannot begin until a signed offer on letterhead has been received from the company or government laboratory where you will be an intern. If you are an international student, your pre-internship paperwork will require additional Curricular Practical Training approval forms, and review by the International Services Office. Time must be allowed for paperwork to be done, reviewed and approved.

**Graduate Education Handbook:** <https://www.rochester.edu/college/gradstudies/graduate-handbook/index.html>

<http://www.iso.rochester.edu/employment/students/cpt.html>

## REQUIREMENTS FOR THE MASTER OF SCIENCE IN CHEMICAL ENGINEERING

### 1. BACKGROUND COURSES

#### Basic Sciences

All students who intend to follow a Master of Science degree program in chemical engineering should have acquired technical background in chemistry, mathematics and physics. Prior coursework should include at least include one full semester course in general chemistry, organic chemistry, physical chemistry, differential equations, and calculus-based Newtonian mechanics (physics). If such courses are absent from a student's undergraduate curriculum, the student must upgrade his/her technical background to at least these minimum standards by taking the necessary courses.

#### Chemical Engineering

The requisite background in chemical engineering is normally provided by a series of one semester courses in each of the following areas: fundamentals of transport processes, thermodynamics, separation processes and reactor design. These requirements are automatically satisfied by a BS degree in Chemical Engineering. Those graduate students who do not have an undergraduate degree in chemical engineering may satisfy these minimum engineering requirements by taking at least **two additional courses in core areas offered by the department**. Master of Science students who do not have a baccalaureate degree in engineering should normally select all their courses from those offered by the School of Engineering and Applied Science. Background courses in chemistry, mathematics and physics cannot be included as part of the coursework requirement for an advanced degree in chemical engineering.

### 2. MASTER OF SCIENCE DEGREE PROGRAMS

The faculty advisor and the Dean for Graduate Studies must approve all Master of Science programs by approving your Program of Study form. \*\*\* As of September 1, 2020, this requirement is being revised. \*\*\* (See an example Program of Study on page 6.) The Master of Science degree may be earned with or without writing a thesis; the general requirements for the degree are described in the University of Rochester's Graduate Studies Bulletin. Graduate students have the option to complete the MS degree with a **thesis (Plan A)** or coursework-only **non-thesis (Plan B)**. Full time students receiving a stipend must complete a thesis (Plan A) unless the research advisor and the Graduate Committee approve the Plan B program

### Master of Science with Thesis (Plan A)

The MS degree with thesis (Plan A) requires **30 credit hours** of which **at least 18 should be formal coursework** acceptable for graduate credit. The balance of credit hours required for the degree is earned through MS reading and/or research courses (ChE 495). **A minimum of six research credits are required for a Plan A.** Satisfactory completion of the Master's thesis is also required for the degree.

### Master of Science without Thesis (Plan B)

Students who pursue the MS degree without thesis (Plan B) must earn a minimum of **32 credits of coursework acceptable for graduate credit**. **At least 18** of these credits should be taken from courses **within the department**. Overall **no more than 6 credits** towards the degree may be earned by research and/or reading courses. The additional courses in the Plan B program (over Plan A) are intended to compensate for the elimination of a thesis as a degree requirement, and they must support a MS in chemical engineering even if offered outside of the department.

All students in Plan B must pass a thirty minute oral exit exam before a committee comprised of at least three Chemical Engineering faculty members. A written report is not required. Two weeks prior to the exam, the M.S. candidate will be provided three recently published papers, one of which he or she must choose to evaluate. Students are not allowed to discuss their chosen manuscript with other students or faculty. The exam begins with the candidate presenting a ten minute oral summary and critique of the chosen manuscript. The presentation should consist of projected slides (e.g. PowerPoint). Slides should introduce the chosen manuscript, demonstrate a solid understanding of relevant physical principles, and offer an evaluation / critique of the manuscript. The examination committee members will then ask questions for approximately twenty minutes to evaluate (i) the student's ability to identify and clearly explain the physical principles upon which the paper is based, (ii) the scientific basis and appropriateness of the student's critique, and (iii) student competency in chemical engineering subjects, particularly those related to completed M.S. coursework.

It is considered important that the total exam time (30 minutes for each student) be rigorously maintained. As a result, students are reminded that it is very important for them to use their time well during both the presentation and question portions of the exam. Students are encouraged to rehearse their presentations and will be stopped after ten minutes.

Following the exam, the committee will recommend to the Director of Graduate Studies that the student pass, pass with contingency, or fail. Possible Outcomes:

- *pass*
- *contingent pass*: either take additional course(s) or write a follow-up document to be reviewed and voted on by the committee
- *failure*: can retake the exam the next time it is offered. Students who fail the exam twice are terminated from the program.

The oral exams will normally be held twice a year, after spring break and after fall break. Exams will normally be held in a single block, with students following each other at half-hour intervals.

**Timing is subject to change depending on current circumstances.**

NOTE: For both the Plan A and B degree options, all courses must be at the 400 level or above and 18 must be courses taken from within the department. The formal courses must also include four “core” chemical engineering courses as described below.

**All incoming Chemical Engineering MS students will be required to take four core classes:**

**Mathematics**

CHE 400, Applied Boundary Value Problems (Fall) (or petition to take a different math course)\*

**Transport Phenomena**

CHE 441, Advanced Transport Phenomenon (Fall) (or petition to take both ChE 443 & 444)\*

**Graduate Level Kinetics**

CHE 461, Advanced Kinetics and Reactor Design (Spring) (or petition to take ChE 431)\*

**Thermodynamics**

CHE 485, Thermodynamics and Statistical Mechanics (Spring)

\*It will be up to the students to determine if they need to petition for a change to a course, and to use the standard Chemical Engineering petition form. Find courses at: <https://cdcs.ur.rochester.edu/> or [UR Student Course Sections](#)

See page six for a list of Che course electives.

### **3. PROGRAM OF STUDY**

A faculty advisor will generally be named for each Master’s student by the end of the first semester. The advisor assists the student in developing a complete program of study for the anticipated degree. Each program and all subsequent changes must be approved by the student’s advisor and the associate dean for graduate studies. Students who take courses without the approval of the advisor and the associate dean, or without registering for them, may not receive credit toward their degree requirements. Master’s degree programs must be filed no later than the date specified by the college, generally the beginning of the second semester. It is important that students keep a copy of their program of study form, as it will need to be updated every semester with grades received for each course.

**University of Rochester Department of Chemical Engineering  
 Student Program of Study Course List**

**Student Name:** \_\_\_\_\_ **UR ID** \_\_\_\_\_ **MS** \_\_\_ **PhD** \_\_\_  
**Previous Institution** \_\_\_\_\_ **Prev. Ins.** \_\_\_\_\_ **Prev. Ins.** \_\_\_\_\_  
 \_\_\_\_\_ **Degree** \_\_\_\_\_ **Major** \_\_\_\_\_

<b>Subject/ Course #</b>	<b>Course Title</b>	<b>Credits/ Units</b>	<b>Grade</b>
CHE 400	Applied Boundary Value Problems	4.0	A
CHE 441	Advanced Transport Phenomenon	4.0	A
CHE 496	Departmental Seminar	0.0	A
	At least four additional credits during first semester		
CHE 461	Advanced Kinetics and Reactor Design	4.0	
CHE 485	Thermodynamics and Statistical Mechanics	4.0	
CHE 496	Departmental Seminar	0.0	
	At least four additional credits during second semester		
	List remainder of courses. 30 - 32 credits of coursework/		
	Research Is required for the MS degree		

**Remarks:** \_\_\_\_\_

**Approved: Student Advisor:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Approved: Dean of Graduate Studies:** \_\_\_\_\_ **Date:** \_\_\_\_\_

#### 4. SEMINAR REQUIREMENT

All students are required to register for the Chemical Engineering Departmental Seminar Series (CHE 496), unless they are in-absentia. The department chairperson should be indicated as the instructor for the course with zero credit hours. Grading for this course is based on attendance. Attendance at all the seminars is expected. Students may miss one seminar per semester and still receive a grade of "A". Each additional seminar missed will lower the grade by one letter. The dates and times of the seminars are posted on the departmental web page and announced via e-mail. A sign in sheet will be passed around during the seminar. (For Zoom seminars, the graduate coordinator will monitor attendees.) If you do not sign in, you will not get credit for attendance, so be sure to find the clipboard with the sign in sheet before you leave the seminar. If you attend another department's seminar, provide some proof that you attended. The dates and times of the seminars are posted on the departmental web page and announced via e-mail. **If there is a conflict with another class or workshop, the student must email the chair of the department to explain the situation, and copy the graduate director and graduate coordinator. The student must be sure to receive a reply from the chair excusing the student, and be sure the graduate coordinator has received the reply.**

#### 5. TEACHING ASSISTANT (TA) REQUIREMENT

As part of the educational experience, all MS students are required to TA at least once. TAs must register for CHE 497, "Teaching Chemical Engineering" with zero credits. If the registration asks for the instructor, please enter the name of the professor/instructor that teaches the class you will be a TA for. Satisfactory performance is required in each TA assignment. Students who fail their TA assignment will be required to TA again. TA training hosted by the graduate dean's office is available in late August, and possibly at some time during the academic year. Please check with your graduate coordinator.

#### 6. MS DEGREE MAXIMUM TIME OF COMPLETION\*

A candidate must complete all the requirements for the master's degree within **five years** from the time of initial registration for graduate study, and must maintain continuous enrollment for each term after matriculation. Students who for good reason have been unable to complete a program within five years may, upon recommendation by the faculty advisor and department chair, petition the associate dean for an extension of time. Such extension, if granted, will be of limited duration. \* All categories including "Leave of Absence" count towards the time limit

## REQUIREMENTS FOR THE THESIS PROPOSAL FOR MASTER'S FUNDING

### **Proposal Description:**

The thesis proposal serves two primary purposes. First, it is the means by which the funding committee evaluates the merit of the research. The objective of the Master's funding program is to support research experiences for our students wanting to pursue Plan A degrees, while seeding new research directions within the laboratories of departmental faculty. Our department emphasizes original, innovative, high impact research on important applied and scientific problems. The proposal should present your proposed approach to a problem or open question – demonstrating your technical acumen and convincing the committee of the likelihood of its success. Second, the proposal is used to judge your writing abilities. A Plan A Master's degree requires that you conduct original research, and then prepare and defend a dissertation to be read and evaluated by a thesis committee. From UR's *Preparing Your Thesis* manual (<http://www.rochester.edu/Theses/ThesesManual.pdf>), "At the University of Rochester, the doctoral [also master's] thesis is expected to be an original work by the student, formulated in a scholarly manner and with content of a quality consistent with respected publications in your field." This statement is not intended to dissuade you from pursuing a Plan A degree but rather emphasize the importance of strong writing skills required to produce a high quality, defensible thesis.

The thesis proposal should describe the research topic, impress the scientific interest or practical utility of the topic, review the current status in the field and previous results from your advisor's laboratory, and describe your proposed approach to an important question or problem.

### **Proposal Instructions:**

*The proposal must be prepared solely by you. You are encouraged to seek assistance from friends and the UR Writing Center ([writing.rochester.edu](http://writing.rochester.edu)), but the text and ideas must be developed by you independently. Do not copy text from other sources, including materials that your perspective advisor might provide you.*

The written reports should be no more than 1600 words in length (the cover page, figure captions, references, and budget justification are excluded from the word count). The report should contain enough information that an outside reviewer with a technical background but who is not an expert in the field can fully understand and critique it. The formatting and the technical content of the proposal is left to your discretion, but it should be a highly polished document written at a technical level. Feel free to discuss the content of the proposal with your advisor, but some examples and suggestions are provided below:

- *Introduction and Background:* Describe the research topic. Why is it important? What is its technological relevance or what fundamental property/phenomenon do you expect to uncover?
- *Previous work:* What has been achieved? What are recent breakthroughs? What contributions has your advisor's lab made and how is your research distinct?

- *Proposed work*: Thoroughly describe your idea – specifically, what experiments do you intend to do. Justify your proposed approach.
- *Conclusion*: Briefly summarize the main points.
- *References: (required)*
  - Must be cited in the body of the text
  - Should come from high quality, reliable sources - often peer-reviewed publications and/or books
  - A consistent formatting of the references and in-text citations should follow the general practice of your discipline, but the ACS Style Guide is a good starting point:  
<http://pubs.acs.org/isbn/9780841239999>  
Example: Stark, T.; Potts, P. The Body Weight Distribution of Mutants at Xavier's School for Gifted Youngsters. *Journal of Obscure Data* **2014**, *20*, 200-215.
- *Figures (required)*
  - Should be embedded throughout main body of the text (not listed at the end)
  - At least some should be original figures that you have prepared (not reproduced from references)
  - If you do reproduce a figure, it should be cited appropriately.
- *Appendix, Budget Justification (limited to 1 page)*
  - Maximum allowable budget is \$5000
  - With input from your PI, describe and justify the requested budget.
  - *A table categorizing the various expenses is an effective way to present the budget, but concise justification of each line is required.*
  - Examples of allowed costs: small equipment, chemicals, supplies & consumables, user facility instrument fees, conference registration fees, specialized software, etc.
  - Unallowed costs: salaries, equipment maintenance & service contracts, new computers & office equipment for your advisor's group

Document formatting (do not deviate)

- 8-1/2 x 11" paper
- 1" margins on all sides
- Font: 11 pt., Times New Roman or Arial. Other fonts are not allowed.

## MASTER'S THESIS REGISTRATION INSTRUCTIONS

- Plan ahead: Contact graduate program coordinator at least 4 weeks prior.
- Thesis must be registered at least 10 full working days prior to defense date. Earlier is better!
- All paper work must be completed BEFORE those 10 days.( See #1)
- Program of study must be completed.
- Student must have completed or will have completed 30 hours of study by the anticipated graduation day.
- Student coordinates committee members prior to thesis registration. Committee must consist of the following faculty members:
  - Two full-time (assistant professor or higher) from within ChE°
  - One non-department full-time (assistant professor or higher)
  - If non-department student advisor, need additional committee member from within ChE°
- Student needs to contact graduate program coordinator to reserve room for defense.
- Thesis registration:
  - Examination Appointment Form must be completed
  - One bound copy of the thesis must be registered with the Graduate Students Office (218 Lattimore) at least 10 working days prior to defense date along with Examination Appointment Form.
- Student needs to provide and deliver a copy of their thesis to each committee member. This is done the same day the thesis is registered.
- Student needs to provide graduate program coordinator with the abstract & title of their thesis. This is done the same day the thesis is registered
- Master's defense guidelines:
- <http://www.rochester.edu/college/gradstudies/masters-defense/before.html#writing-guidelines>  
You may obtain a copy of the UR Theses Manual online:  
<http://www.rochester.edu/theses/ThesesManual.pdf>

**After your defense and any corrections are made to the thesis, two final unbound copies are delivered to Grad Studies. One unbound copy and one on e-copy are provided to graduate program coordinator.**  
<http://www.rochester.edu/college/gradstudies/current/>

## VACATION & TRAVEL

Graduate students are entitled to two weeks of vacation each year in addition to official University Holidays. University holidays include Christmas Day, New Year's Day, Martin Luther King Day, Memorial Day, the 4th of July, Labor Day, and 2 days at Thanksgiving. While the scheduling of vacations is left to the discretion of the student, prior approval from the advisor must be obtained so as not to conflict with coursework, laboratory experiments and other duties.

Before scheduling an extended absence from the University (i.e., more than 10 business days), students must obtain permission from their thesis advisor and the ChE Program Director. It is extremely important that ALL international students contact ISO to get their recommendations for international travel (including Canada) at least 10 days in advance.

### **Occupational Safety Unit Safety Training for Research Laboratory Personnel**

#### OSHA Required Training

**To assure compliance with federal and state regulations, those working in labs or supervising lab personnel must complete EH&S laboratory safety training annually.** Is your lab safety training current? You can now check your individual training history through the HRMS PeopleSoft site - [HRMS Sign-in](#). Once you log in using your netid and password, select the "Self Service" option from the main menu, then select "Learning and Development" and "Training Summary". You'll see a list of the various training courses you have completed at the University.

EH&S Lab Safety Training sessions include topics to comply with the following regulations:

- OSHA (Occupational Safety and Health Administration) compliance training for the standards:
  - Bloodborne Pathogens
  - Fire Safety
  - Formaldehyde Standard
  - Gas Cylinder Safety
  - Laboratory Standard
  - Personal Protective Equipment
- EPA (Environmental Protection Agency) issues for minimizing waste and disposal of regulated medical waste and hazardous waste
- General biosafety information including CDC (Centers for Disease Control and Prevention), New York State Department of Health, and Department of Environmental Conservation issues

**Departments can schedule a live 3-hour session for their department provided a minimum of 20 people are scheduled for attendance. This can be scheduled by calling EH&S at x5-3241.**

Computer-based Laboratory Safety Training, through the Blackboard system, is available for staff who are unable to attend a "live" session. Non-UR employees, non-UR students and volunteers may complete their lab safety training using the same Blackboard system, but must register for a "basic account" first. (Go to [https://www.urmc.rochester.edu/libraries/miner/teaching\\_and\\_learning/blackboard/forms/create\\_user.cfm](https://www.urmc.rochester.edu/libraries/miner/teaching_and_learning/blackboard/forms/create_user.cfm).)

Instructions on how to self-enroll in the course are available - [Self-enroll in Lab Safety Training](#). The safety training has been customized for the various University lab staff:

- **Clinical Lab Personnel** - training program designed only for those who process human specimens.
- **Phlebotomists and Clinical Study Coordinators** - training program designed only for those who draw blood or coordinate clinical studies
- **Research Lab Personnel** - Laboratory Safety Training is now available through Blackboard. All individuals within a particular lab must complete the same training program. Select the program based on the activities in the lab - **You need to complete only one of the four options below. If you are not sure which one to take, the Biologicals/Chemicals/Animals covers the most information.**
  - **Biologicals/Chemicals/Animals** - training program designed for those staff working with chemicals, recombinant DNA, human specimens, or infectious agents
  - **Biologicals/Chemicals** - training program designed for those for those staff working with chemicals and recombinant DNA, human specimens or infectious agents but **NO** animals
  - **Chemical/Animals** - training program designed for those staff working with chemicals and animals
  - **Chemicals** - training program designed for those staff working with chemicals only and miscellaneous physical hazards are present

QUESTIONS or COMMENTS? Contact EH&S at (585) 275-3241 or e-mail [EH&S Questions](#).

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## Academic Honesty Policy:

<http://www.rochester.edu/College/honesty/graduates.html>

## **MORE INFORMATION FOR GRADUATE STUDENTS**

### **CREDENTIALS**

Each entering student must eventually provide all documents requested in the application form (even when an offer is made prior to receipt of all such documents). These include supplementary or final transcript, including certification of the completion of any degrees (by date TBA, or a hold will be put on your ability to register for classes) & Health History Form. Graduate admission is, in addition, contingent upon completion of the requirements for a Bachelor's degree, or equivalent, unless an exception is explicitly noted in the letter of appointment.

The Immigration Reform and Control Act of 1986 requires all students receiving assistantships from the University to submit proof of their employment eligibility. Failure to complete an Employment Eligibility Verification (Form I-9) will result in termination of an assistantship.

Documents that establish both identity and employment eligibility are (a) a US passport, (b) a certificate of US citizenship, (c) a certificate of naturalization, (d) an unexpired foreign passport with attached employment authorization or (e) an alien registration card with photograph. -OR- You can prove your identity by providing a US Military Card, a state-issued driver's license, or a state-issued ID card with a photograph that includes your name, sex, date of birth, height, weight, and color of eyes. You can establish employment eligibility by producing either an original Social Security number card (other than a card stating it is not valid for employment), a birth certificate issued by a state, country, or municipal authority bearing a seal or other certification, or by an unexpired USCIS Employment Authorization

Students should begin the (Form I-9) online at <https://www.uscis.gov/i-9>. Email ChE Administrator Sandra Willison [sandra.willison@rochester.edu](mailto:sandra.willison@rochester.edu) to set up an appointment for verification of your identification documents.

### **REGISTRATION**

All students must register for at least twelve credit hours in order to be considered full-time. Students who will be a teaching assistant for that semester may register for nine credits. Registration must be completed within two weeks from the first day of classes or a late registration fee will be charged (\$160.00). Registration is online through UR Student.

### **DROPPED COURSES**

A regular semester course may be dropped at any time through the sixth week of classes, provided the student obtains the approval of his or her faculty advisor and the instructor(s), notifies the graduate registrar on the proper drop/add form, and the change does not alter the student's time status. No record of such actions appears on the official transcript.

Following the start of the seventh week of classes, a drop notification (or a change from credit to audit) sent to the graduate registrar must bear the signatures of the faculty advisor, course instructor(s), and associate dean of graduate studies. Such late drops will be recorded on the official transcript and identified by the grade W. At the option of the course instructor, a grade of E may also be attached.

In exceptional circumstances, the associate dean of graduate studies will review the circumstances as initiated by an appropriate written petition.

**TAX INFORMATION:**

**<http://rochester.edu/provost/policiesandreports/grad-student-pay-changes.html>**

**EXTERNAL WORK POLICY**

Full-time students holding fellowships, assistantships, or scholarships may not accept other full-time employment.

**FINANCIAL AID**

Please contact the Financial Aid Office at (800) 881-8234 or visit the website at <http://enrollment.rochester.edu/financial/> for additional details on loans and contact information for staff members.

**UNIVERSITY OF ROCHESTER STUDENT HEALTH PROGRAM:** <http://www.rochester.edu/uhs/>  
**Click this link for information on immunizations, the Mandatory Health Fee, Student Health Insurance and other University Health Services issues.**