

Graduate Studies Handbook

HOME

Information on Masters and Doctoral Programs

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1. Program Overview

The Department of Chemical Engineering and Materials Science offers Master of Science and Doctor of Philosophy degree programs in chemical engineering and in materials science and engineering. A wide range of course offerings and research activities allows an individual program to be designed to fit the background, capabilities, and aims of the student. Studies in the department may be supplemented with courses offered by other departments in the College of Engineering and in other colleges.

The graduate programs in chemical engineering and materials science and engineering are designed to develop research expertise needed for the graduate to serve as a principal investigator in industrial or academic research. The coursework is designed to expand the student's knowledge of engineering principles and applications. Each student also conducts an extensive research project that significantly advances fundamental understanding of a chemical engineering or materials science system. Results of the research are documented in a dissertation and research paper(s) for publication in a peer-reviewed journal.

The program descriptions and requirements provided below are intended to be consistent with the [Academic Programs](#) content provided by the MSU Registrar. In the case of any discrepancies, the Registrar's content will be given priority.

Chemical Engineering

The chemical engineering program emphasizes a fundamental approach to chemical engineering principles and contemporary applications of chemistry, biosciences, and advanced mathematics. Specialized studies (selected topics) in chemical engineering build upon fundamentals with opportunities for study and

research in such areas as nanotechnology, biotechnology, biomedical engineering, bioprocessing, metabolic engineering, process analysis, thermodynamics, chemical reaction engineering, composite materials, polymers, heat transfer, mass transfer, distillation, absorption, extraction, transport phenomena, and diffusion.

Materials Science and Engineering

Special emphasis is placed on the mastery of basic principles and methods. Courses and research opportunities are available in such areas as alternative energy materials, biomaterials, ceramic materials, composite materials, electron microscopy, electronic and photonic materials, impact damage, intermetallic alloys, nanotechnology, polymers and their composites, shape memory alloys, surface modification of ceramics, metals and polymers, structural thin films, and superplasticity of metals.

2. Master's Degree Requirements

Master of Science in Chemical Engineering

Plan A

The Plan A (thesis option) master's degree requires a total of 30 credits, including 24 credits of coursework at the 400 level or above, as approved by the faculty advisor. In addition, a minimum of six credits in thesis research must be completed. The Plan A program must include the following:

- Four CHE Core Courses:
 1. CHE 801 Advanced Chemical Engineering Calculations
 2. CHE 821 Advanced Chemical Engineering Thermodynamics
 3. CHE 822 Transport Phenomena
 4. CHE 831 Advanced Chemical Reaction Engineering
- Two (2) credits of CHE 892 Seminar. CHE 892 is limited to three credits per student.
- A minimum of six (6) credits in supporting courses from outside Chemical Engineering. This requirement is waived if the student enters with a degree other than Chemical Engineering.

- A minimum of 20 credits at the 800 level or above.

Courses at the 400 level are acceptable as long as the minimum of 20 credits at the 800 level or above are met. Courses below the 400 level are not acceptable toward a graduate degree.

Students register for thesis research credits under the Departmental course, CHE 899. CHE 899 credits appearing on the Plan A program will change to the grade given at the time of the Masters Oral Examination. Credits taken in excess of those appearing on the Plan A program will remain as DF-Deferred on the transcript.

Students supported by department research assistantships while under a Plan A program are expected to graduate under the Plan A program. Students having a bachelor's degree from a discipline other than chemical engineering must also complete collateral courses as described below.

Plan B

The Plan B (non-thesis option) master's degree requires a total of 30 credits of coursework at the 400 level or above, as approved by the faculty advisor. The Plan B program must include the following:

- The CHE Core Courses (see Plan A above.)
- Two (2) credits of CHE 892 Seminar. CHE 892 is limited to three credits per student.
- A minimum of 18 credits at the 800 level or above.
- Six to nine credits taken in a coordinated technical minor, as approved by the faculty advisor.

Courses at the 400 level are acceptable as long as the minimum of 18 credits at the 800 level or above are met. Courses below the 400 level are not acceptable toward a graduate degree.

Students having a bachelor's degree from a discipline other than chemical engineering must also complete collateral courses as described below.

Master of Science in Materials Science and Engineering

Plan A

The Plan A (thesis option) master's degree requires a total of 30 credits, including 24 credits of coursework at the 400 level or above, as approved by the faculty advisor. In addition, six credits of thesis research must be completed. The Plan A program must include the following:

- Four MSE Core Courses:
 1. MSE 851 Thermodynamics of Solids;
 2. MSE 855 Advanced Rate Theory and Diffusion;
 3. MSE 860 Advanced Theory of Solids;
 4. MSE 870 Electron Microscopy in Materials Science **OR** MSE 881 Advanced Spectroscopy and Diffraction Analysis of Materials;
- Two (2) credits of MSE 892 Seminar. MSE 892 is limited to three credits per student.
- One mathematical or statistical course of at least 400-level (for example, MSE 880; CHE 801; or CMSE 801), as approved by the faculty advisor.
- A minimum of 16 credits at the 800 level or above.

Courses at the 400 level are acceptable as long as the minimum of 16 credits at the 800 level or above are met. Courses below the 400 level are not acceptable toward a graduate degree.

Registration for thesis research credits will be under the Departmental course, MSE 899. MSE 899 credits appearing on the Plan A program will change to the grade given at the time of the Masters Oral Examination. Credits taken in excess of those appearing on the Plan A program will remain as DF-Deferred on the transcript.

Students supported by department research assistantships while under a Plan A program are expected to graduate under the Plan A program.

Plan B

The Plan B (non-thesis option) master's degree requires a total of 30 credits of coursework at the 400 level or above, as approved by the faculty advisor. The Plan B program must include the following:

- The MSE Core Courses (see Plan A above.)
- Two (2) credits of MSE 892 Seminar. MSE 892 is limited to three credits per student.
- One mathematical or statistical course of at least 400-level (for example, MSE 880; CHE 801; or CMSE 801), as approved by the faculty advisor.

- A minimum of 18 credits at the 800 level or above.
- Six to nine credits taken in a coordinated technical minor, as approved by the faculty advisor.

Courses at the 400 level are acceptable as long as the minimum of 18 credits at the 800 level or above are met. Courses below the 400 level are not acceptable toward a graduate degree.

General Information for Master's Programs

Enrolling for Courses: All students admitted into the master's program are assigned a temporary faculty advisor who is a member of the Department's Graduate Studies Committee. Plan A Master's students should identify a permanent advisor in their first semester. Plan B Master's students will be assigned an advisor in their first semester. Students must consult with their advisor before enrolling for classes. Once the student and advisor have agreed on the course enrollment, the advisor must approve any additional change(s).

Transfer Credits: The department may accept credits earned at another institution. In such cases, the completed "Credit Evaluation for the Graduate Program" form must be included with the program. As many as nine semester credits of graduate coursework (excluding research and thesis credits) may be transferred into a master's degree program from other accredited institutions provided they are appropriate to a student's program and they were completed within the specified time limits for earning of the degree. Transfer credit will be given only for courses in which a grade of 3.0 or higher was earned. Credits from foreign universities (other than Canada) are not transferable to the program.

Dual Enrollment: A master's student can be enrolled simultaneously in another department's master's or Ph.D. program. A Request for Permission to Complete Two Degrees Concurrently form must be completed and approved by both departments.

Undergraduate-Graduate Dual and Linked Degree Options: Current MSU undergraduate students have three options for pursuing a graduate degree within the MSU College of Engineering:

1. Apply for admission to a **Linked BS+MS degree program** (the BS and MS are completed sequentially.)
2. Apply for **dual enrollment** in a MS or PhD program (the BS and MS or PhD are

- completed concurrently).
3. Apply for **regular admission** to a MS or PhD program (the BS and MS or PhD are completed sequentially). This is the normal option for most students.

More information on these options is provided by the [College of Engineering](#). Students interested in the Linked BS+MS program should contact the appropriate [Graduate Program Director](#) and complete the [application form](#).

Collateral Courses: Students may be required to take *additional* collateral courses to supplement their academic background. For example, students entering the chemical engineering graduate program with a B.S. in a field other than chemical engineering must take the following collateral courses:

- CHE 804 Foundations of Chemical Engineering I (3 credits)
- CHE 805 Foundations of Chemical Engineering II (3 credits)
- CHE 432 Process Control (3 credits)
- CHE 433 Process Design and Optimization I (4 credits)

A grade of 3.0 or higher is required in each course. In some cases, students may be granted provisional status in the program until collateral coursework has been satisfactorily completed. Collateral coursework does not count towards fulfillment of degree requirements.

Selection of Research Advisor for Plan A Students: Plan A Master's students are encouraged to contact faculty with matching research interests to identify possibly research advisors. MS students do not participate in the formal Ph.D. advisor selection process as outlined below.

Formulating a Master's Degree Program Plan: Students' should meet with their faculty advisor to design a program plan that will develop the student's competence in chemical engineering/materials science engineering and related fields. The program plan must include the master's degree course requirements, and it should be submitted for approval to the faculty advisor, CHEMS Department Chairperson and The College of Engineering Associate Dean for Research and Graduate Studies upon the completion of six course credits. Registration beyond the spring semester of the first year will not be permitted until this requirement has been met. Any changes in the program must also be submitted for approval to the faculty advisor, CHEMS Department Chairperson and the College of Engineering Associate Dean for Research and Graduate Studies. NO COURSE MAY BE ADDED OR DELETED FROM THIS PROGRAM AFTER A GRADE (INCLUDING DF) HAS BEEN RECEIVED. This includes courses that have been dropped after the middle of the term and in which a grade of N has been received. The Master's Degree

Program Plan form is located on the [Graduate Reporting System \(GRS\)](#).

Transfer to Ph.D. Program: the departmental chairperson and the Graduate Studies Committee must approve Transfers from the master's program to the doctoral program. Students wishing to transfer to the Ph.D. program after completing the master's program must submit a letter of intent to the department chairperson during their fourth semester in the master's program. The department secretary can provide Form IV - Transfer Master's to Ph.D. Program.

Master's Degree Graduation Requirements

Application for Graduation: The form "[Graduation Application](#)" can be obtained from the Registrar either via the web at or in room 150 Administration Building. The form should be submitted in the first week of the semester in which the student plans to graduate. Summer graduates should submit the form by the first week of spring semester.

Thesis Formatting: The Graduate School offers an online [Thesis/Dissertation Formatting Guide](#). A formatted preliminary copy of the Thesis/Dissertation can be taken to the Graduate School (118 Linton Hall) any time during the semester to ensure that proper formatting requirements are met.

Final Master's Oral Examination: A committee consisting of at least three MSU regular faculty members will be convened by the department chairperson to administer a Master's Oral Examination. The exam will consist of a presentation of the thesis research, followed by an oral examination. The exam must be scheduled for a date not earlier than two weeks after the thesis has been submitted to the committee members. A majority vote of the committee constitutes a pass. The student will be given a maximum of two opportunities to pass. The second opportunity, if needed, must take place the following semester. Students must be registered during the semester in which the exam is taken.

Prior to the examination, the student is responsible for preparing the [Record of Thesis Defense form](#). Upon completion of the examination, this form must be signed by the student's committee members and the CHEMS Department Chairperson.

Submission of thesis to The Graduate School: MSU only accepts theses and dissertations submitted electronically, as described by the web page "[Thesis and Dissertation Electronic Submissions](#)". After the final Oral Examination, revisions

recommended by the faculty advisor must be made by the student to produce a final unbound thesis manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the [Approval Form](#), obtained from the Graduate School. These materials are then submitted electronically to the Graduate School, whereupon the candidate is required to complete an [Exit Survey](#). Note that the survey site for MS students will change in Spring 2021. Questions about master's exit surveys may be sent to CareerServices@csp.msu.edu.

The target date for the FINAL APPROVAL of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester. Submission via ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extent of the necessary revisions and how diligent the author is when making the necessary revisions. Graduation on the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.

One hardbound copy of the thesis may be delivered to the research advisor upon request. Granting agencies etc. may require additional copies. Students are responsible for all dissertation preparation and expenses. Departmental equipment or materials may not be used for this purpose.

Commencement: Commencement information can be obtained from commencement.msu.edu.

Student Departure: Departing students are required to fill out the [Termination-Separation Checklist](#). The checklist is provided to highlight the range of issues that may need to be addressed when terminating MSU employment or otherwise separating from a department. The research advisor and graduate secretary must sign the checklist.

3. Ph.D. Degree Requirements

The Ph.D. degree has the following requirements: (1) coursework, (2) research and selection of advisor, (3) qualifying examination (4) formation of the guidance committee and doctoral degree program, (5) comprehensive examination, (6) meeting the Ph.D. graduation requirements including completion of a dissertation and final oral examination. Each of these requirements is described in more detail in subsequent sections of this handbook.

(3.1) Course Requirements

The candidate must fulfill the requirements listed in the MSU regulations and procedures. To ensure that the candidate has a comprehensive knowledge of a major field, the guidance committee will prescribe a customized course program plan that must include:

- Coursework taken after the bachelor's degree equivalent to that required for the Plan A (thesis option) master's degree in the program, plus several (typically about four) additional relevant courses. Course requirements for the master's degrees are listed above under [Master's Degree Requirements](#).
- CHE 802 Research Methods (1 credit)
- Five (5) credits of CHE/MSE 992 Seminar. CHE/MSE 992 is limited to five credits per student.
- **A minimum of 24 credits and no more than 36 credits** of doctoral dissertation research (CHE/MSE 999). The research credits will be assigned a grade of Pass or Fail on the transcript, based on the outcome of the dissertation defense.

For a typical student entering the Ph.D. program with a BS degree in discipline, 34-36 credits of coursework is expected. A typical student with an MS degree in discipline may need 12 course credits plus some core courses.

Collateral Courses: Students may be required to take *additional* collateral courses to supplement their academic background. For example, students entering the chemical engineering graduate program with a B.S. in a field other than chemical engineering must take the following collateral courses:

- CHE 804 Foundations of Chemical Engineering I (3 credits)
- CHE 805 Foundations of Chemical Engineering II (3 credits)
- CHE 432 Process Control (3 credits)
- CHE 433 Process Design and Optimization I (4 credits)

A grade of 3.0 or greater in collateral courses is required. In some cases, students may be granted provisional status in the graduate program until collateral coursework has been satisfactorily completed.

Course enrollment: Courses taken during a student's degree program will be determined by the student, their advisor, and their Ph.D. committee; with approval of the CHEMS Department Chair and College of Engineering Associate Dean for Research and Graduate Studies. As highlighted below, item #4 of this section,

students should meet with their Ph.D. guidance committee to determine their program plan in the semester following the semester in which the Ph.D. qualifying exam is satisfactorily completed. First year students will take designated courses as outlined below.

Chemical Engineering Students: First-year chemical engineering graduate students typically take the following courses.

- Fall Semester:
 - CHE 801 Advanced Chemical Engineering Calculations, 3 credits
 - CHE 821 Advanced Chemical Engineering Thermodynamics, 3 credits
 - CHE 802 Research Methods, 1 credit, Ph.D. only
 - CHE 892/992 Seminar, 1 credit
 - CHE 999 Doctoral Dissertation Research, 1 credit
- Spring Semester:
 - CHE 822 Advanced Transport Phenomena, 3 credits
 - CHE 831 Advanced Chemical Reaction Engineering, 3 credits
 - CHE 892/992 Seminar, 1 credit
 - CHE 999 Doctoral Dissertation Research, 2 credits

Materials Science and Engineering Students: First-year Materials Science and Engineering graduate students typically take the following courses.

- Fall Semester:
 - MSE 851 Thermodynamics of Solids, 3 credits
 - MSE 8XX Graduate Elective: Dislocation Theory or Electron Microscopy or Mat. Surf. Interfaces or Eng. Ceramics, etc, 3 credits
 - MSE 802 Research Methods, 1 credit, Ph.D. only
 - MSE 892/992 Seminar, 1 credit
 - MSE 999 Doctoral Dissertation Research, 1 credit
- Spring Semester:
 - MSE 855 Advanced Rate Theory and Diffusion, 3 credits
 - MSE 860 Advanced Theory of Solids, 3 credits
 - MTH/STT/CMSE Advanced Math/Statistics 400 level or above, 3 credits
OR MSE 881: Advanced Spectroscopy and Diffraction Analysis of Materials, 3 credits

Course Changes: Once enrolled, classes may be dropped or added as outlined by the [Office of the Registrar](#). The period allowed for adding and dropping generally runs from the time the first billing is sent out until about the second week of the semester. After that period, the department that offers the course makes schedule changes.

To change a schedule after the drop and add period, students must complete a Drop/Add form (obtained from the departmental secretary) and have it signed by the instructor. The departmental secretary will update enrollment status online.

Paying for Classes: Students will receive a registration bill after enrolling for classes. The bill is sent according to the schedule on the fee payment page of the *Quick Guide to Enrollment and Registration* booklet. This bill will reflect tuition that is paid (or reduced) through assistantship appointments or fellowships.

(3.2) Research and Selection of Advisor

Carrying out novel, creative research is a key activity in becoming a Ph.D. This research will be carried out in association with a faculty research advisor. Research advisor selection takes place in September and October of the student's first year in the graduate program. Faculty members will present a description of their available research projects to the students. From these presentations, graduate students identify five projects that interest them and arrange a meeting with the faculty members who direct those projects. Students are also encouraged to meet with the graduate students currently working on the projects of interest. About two weeks after the presentations, students submit their five top project choices to the departmental secretary on the [Research Project Selection Form](#). A selection committee then matches students to advisors based on students' preferences and availability of research funding.

Once the advisor has been assigned, both the student and advisor have responsibilities to ensure a productive relationship. The responsibilities of the research advisor, as described in [Guidelines for Graduate Student Advising and Mentoring Relationships](#), include

- Ensuring that graduate students receive information about requirements and policies of the graduate program
- Advising graduate students on developing a program plan, including appropriate coursework, research or creative activity, and on available resources
- Advising graduate students on the selection of a thesis or dissertation topic with realistic prospects for successful completion within an appropriate time frame and on the formation of a guidance committee
- Providing training and oversight in creative activities, research rigor, theoretical and technical aspects of the thesis or dissertation research, and in professional integrity

- Encouraging graduate students to stay abreast of the literature and cutting-edge ideas in the field
- Helping graduate students to develop professional skills in writing reports, papers, and grant proposals, making professional presentations, establishing professional networks, interviewing, and evaluating manuscripts and papers
- Providing regular feedback on the progress of graduate students toward degree completion, including feedback on research or creative activities, coursework, and teaching, and constructive criticism if the progress does not meet expectations
- Helping graduate students develop into successful professionals and colleagues, including encouraging students to participate and disseminate results of research or creative activities in the appropriate scholarly or public forums
- Facilitating career development, including advising graduate students on appropriate job and career options, as well as on the preparation of application materials for appropriate fellowship, scholarship, and other relevant opportunities
- Writing letters of reference for appropriate fellowship, scholarship, award, and job opportunities
- Providing for supervision and advising of graduate students when the faculty advisor is on leave or extended absence

Change of Advisor: A doctoral candidate in good standing that desires to change advisors may consult with the Graduate Coordinator of the relevant program and/or the Department Chair. If an agreement is reached that a change of advisors is justified, all efforts will be made to by the department to assist in making this change. However, it is the student's responsibility to arrange for a new advisor. Once a new advisor is identified, any modifications to the Guidance Committee and Doctoral Degree Program must be approved as described below.

(3.3) Qualifying Examination

Students must pass the Ph.D. Qualifying Exam before being admitted to Ph.D. candidacy. The purpose of this exam is to determine if the student is qualified to proceed in the doctoral program and to identify any weaknesses that may exist in the student's background knowledge or skills needed to succeed in independent research. The Qualifying Exam is usually taken near the end of the spring semester during student's first year of enrollment in the Ph.D. program. For those students who enter the PhD program in the spring semester, upon consultation with the student's research advisor, students may request a delay to take the Qualifying Exam near the end of the second spring semester as ChE/MSE

802 is only offered in the fall semester.

Exam Format: A qualifying exam committee (QEC) will be appointed by the Graduate Studies Committee to administer the exam. The QEC will consist of the student's research advisor and two other departmental faculty members, at least one of who is knowledgeable in the student's academic discipline. In the case when student's research advisor has less than 50% appointment from the department, one additional departmental faculty member will be assigned to the QEC. The examination will include a written and an oral component.

The written component should be given to the graduate secretary two weeks prior to the scheduled start date of the qualifying exams. The document must include a critical literature review on a research topic agreed upon by the student and advisor. The length should be no more than 15 pages including figures, tables, and equations, excluding the bibliography. It should be double-spaced, with 12-point font. Formatting of tables, figures, references, etc. should be consistent with the [Thesis & Dissertation Formatting Guide](#).

The document should include the following sections:

- *Abstract:* The abstract should briefly (less than 300 words) summarize the contents of the paper.
- *Introduction and Background:* This section should introduce the topic and summarize the state of current knowledge of the topic, as indicated by the relevant technical literature.
- *Definition of a Significant Research Problem:* This section should clearly define an important research problem (or hypothesis) suggested by the literature review and should identify the underlying fundamental principles that govern the system's behavior.

The oral component of the exam will consist of a 30-minute presentation summarizing the literature review and its implications for research, followed by an oral examination by the QEC. This examination will test the depth of the student's knowledge of the research topic, as well as his/her general understanding of the foundations of the student's discipline. The oral examination will be open to all CHEMS faculty. However, only QEC members will participate in the questioning and the grading.

Requirement for Original Work: Although the topic of the proposal may be related to ongoing research in the advisor's research group, the student should contribute a significant amount of original content and should write the literature review in his/her own words. The student should not receive assistance or feedback from

anyone on the written presentation, with the exception of the Abstract. The advisor may provide feedback on the Abstract to ensure that the research topic selected is satisfactory. The document's cover page will include a signed certification statement that the student did not receive assistance writing or editing the document, other than the Abstract.

Students may practice their oral presentations and receive feedback prior to the qualifying exam. However, students are required to prepare their own presentation slides.

Evaluation of Student's Performance: Primary criteria considered in the evaluation are

- Depth of understanding of the research topic and its significance,
- Breadth of understanding of principles across the student's discipline,
- Ability to integrate fundamental principles in the analysis of a complex problem,
- Effectiveness of oral and written communication.

The QEC will use [CHEMS Grading Rubrics Worksheets](#) to evaluate both the oral and written presentations. In addition to facilitating consistent and objective evaluations, the rubrics will also help identify areas of relative student strength and weakness. Grades will be assigned based on a benchmark of first-year graduate students who have gone on to complete the program's Ph.D. degree. Such students would be expected to score at least weakly positive, on average, in the areas evaluated. Thus, grades of weakly positive and strongly positive indicate that the student's performance meets or exceeds minimum expectations at the Ph.D. level. Grades of strongly negative and weakly negative indicate that the candidate's performance falls below expectations of a successful Ph.D. student.

The grades for the oral and written presentations will be converted into numerical scores on a scale of 1.0 (strongly negative) to 4.0 (strongly positive). The numerical scores within each category (organization, content, and presentation) will be averaged to give an average score for that category. The following formula will then be used to calculate a composite score for the presentation.

$$\text{Composite score} = 0.6 \times (\text{average content score}) + 0.2 \times (\text{average organization score}) + 0.2 \times (\text{average presentation score})$$

For each QEC member, there will be one composite score for the oral presentation and one for the written presentation. These two composites scores will be averaged to give the overall score for the Qualifying Exam. If the overall score is 3.0

or higher, that QEC member will assign a passing grade. For a student to pass the Qualifying Exam, two of the three QEC members must assign a passing grade. In borderline cases, a discussion of the student's performance may be warranted to help clarify whether the student should pass.

Feedback Provided to Students: Individual worksheets will not be released to the student. However, the faculty advisor will provide the student with a written summary of the QEC's evaluations.

Policy on Repeat Exams: Normally only one opportunity will be given to pass the Qualifying Exam. However, a second opportunity may be offered with the approval of the QEC, Graduate Studies Committee, and departmental chair. The repeat exam should be scheduled at the earliest convenient time (e.g., in the summer semester of the first year).

In the event that a student fails the Ph.D. qualifying exam, at the discretion of their Ph.D. qualifying exam committee, the student may take the examination at most a second time. Upon failing the qualifying exam the second time, the student will be removed from the Ph.D. program. The student may continue to work towards an M.S. degree, either thesis or non-thesis.

(3.4) Formation of the Guidance Committee and Doctoral Degree Program

Doctoral Guidance Committee: Within two months (not counting summers) of passing the Qualifying Exam, the student shall form a doctoral guidance committee, with the research advisor serving as chairperson. The committee must consist of:

- at least four regular MSU faculty members (see [University definition of Regular Faculty](#) members),
- at least two members must have at least 50% appointment from the major department, and
- at least one member must be from another department.

Students wishing to request an exception to these committee membership rules should contact the graduate secretary for assistance in making the request.

Within two months (not counting summers) of passing the Qualifying Exam, the

student and advisor shall file through [GradPlan](#) a guidance committee report that includes all graduation requirements. Students may obtain approval for the course plan to be included in this report by meeting with the committee members either individually or collectively. Failure to file an approved guidance committee report by the required date will result in a hold on enrollment, which may affect the student's future pay and ability to register for courses. The composition of the guidance committee may be changed with the permission of the research advisor, the CHEMS Department Chairperson and the College of Engineering Associate Dean for Research and Graduate Studies. Although rare, it is possible for a graduate student to change research advisors, upon the approval of the CHEMS Department Chairperson and the College of Engineering Associate Dean for Research and Graduate Studies.

The committee will meet at least once each year to review the student's academic and research progress. This meeting will be recorded on the CHEMS Department Ph.D. Guidance Committee Annual Meeting Form, which is available from the CHEMS graduate secretary. The completed form will be added to the student's permanent file in the CHEMS Department.

The responsibilities of the guidance committee are described in "[Guidelines for Graduate Student Advising and Mentoring Relationships](#)" and include

- Advising graduate students on coursework, research, and/or creative activities
- Providing at least one annual feedback and guidance concerning progress toward the degree
- Administering exams in a fair and professional manner
- Reviewing the thesis or dissertation in a timely, constructive and critical manner

Doctoral Program Plan: The guidance committee must meet with the student for the purpose of formulating and approving a course program plan designed to develop the student's competence in chemical engineering/materials science engineering and related fields. The electronic form for the Doctoral Degree Program Plan is located on [student.msu.edu](#) in the GradPlan tile. This program must be submitted for approval of the guidance committee, the CHEMS Department Chairperson and the College of Engineering Associate Dean for Research and Graduate Studies by the end of the fall semester of the second year. Registration beyond the spring semester of the second year will not be permitted until this requirement has been met. Any changes in the program must likewise be submitted for approval to the guidance committee, the CHEMS Department Chairperson and the College of Engineering Associate Dean for Research and Graduate Studies. NO COURSE MAY BE ADDED OR DELETED FROM THIS

PROGRAM AFTER A GRADE (INCLUDING DF) HAS BEEN RECEIVED. This includes courses that have been dropped after the middle of the term and in which a grade of N has been received.

(3.5) Comprehensive Examination

The Doctoral Comprehensive Examination must be taken by the end of the 5th semester of enrollment in the Ph.D. program (excluding summer semesters). At the end of the fifth semester in the Ph.D. program, if the student has not taken the comprehensive exam, the Graduate Secretary will send a message to both the student and the advisor stating that if the exam is not taken by the end of the second month of the following semester, the Graduate Secretary will put a hold on the student's account. This hold will prevent the student from being paid in the subsequent semester. The examination may be taken no more than two times, no more than once per semester, and must be passed by the end of the 6th semester of enrollment in the Ph.D. program (excluding summer semesters).

The student's Final Oral Examination (Ph.D. Dissertation Defense) must take place a minimum of six months after the Comprehensive Examination has been passed.

The comprehensive examination is in the form of a research proposal defense and contains two parts:

1. **Written Proposal:** The written document is limited to a maximum of 30 double spaced pages with 1 inch margins, with a minimum of 12 point font size. Figures and tables are included in the 30-page limit. However, the bibliography is not included in the 30-page limit.
2. **Oral Examination:** The oral examination must be scheduled at least two weeks after the written proposal has been submitted to the guidance committee. The oral defense will be administered by the student's guidance committee and will cover advanced technical topics related to the student's Ph.D. thesis topic as well as the broader scope of the student's field of study.

The guidance committee will evaluate the proposal for:

1. Tentative dissertation title;
2. Statement of the problem and its significance;
3. Background, including a comprehensive review of the literature;
4. Scope of proposed work (completed, in progress, and to be accomplished);
5. Expected outcomes and engineering significance.

Prior to the examination, the student is responsible for preparing the [Record of Comprehensive Examinations form](#). Upon completion of the examination, this form must be signed by the student's committee members and the CHEMS Department Chairperson.

Passing the comprehensive examination requires satisfactory performance on both the written proposal and the oral defense of the written proposal, as determined by a unanimous vote of the guidance committee.

Should the degree requirements not be completed within the eight-year limitation, the Comprehensive Exam must be retaken. The student must be registered for the semester which the examination is taken. For students who enroll in the spring and take their comprehensive exams during the immediately following summer semester, the department can request a waiver of the requirement that the student be enrolled for at least one credit the semester of the comprehensive exam. These requests are to be directed to the Graduate School and must be endorsed by the student's department and college.

After passing the Comprehensive Exam, a student may maintain full-time status by enrolling for a minimum of 1 credit each semester.

(3.6) Ph.D. Graduation Requirements

Application for Graduation: The form "[Graduation Application](#)" can be obtained from the registrar either via the web at or in room 150 Administration Building. The form should be submitted in the first week of the semester in which the student plans to graduate. Summer graduates should submit the form by the first week of spring semester.

Dissertation Formatting: The Graduate School offers an online [Thesis/Dissertation Formatting Guide](#) and a [formatting tutorial](#) on its website. A formatted preliminary copy of the Thesis/Dissertation can be taken to the Graduate School (118 Linton Hall) any time during the semester to ensure proper formatting requirements are met.

Submit copy of dissertation to guidance committee: The candidate must submit a dissertation in accordance with the University regulations for graduate programs. Essentially error free, readable copies of the document in temporary bindings must be distributed to all members of the guidance committee at least two weeks before the final Doctoral Oral Examination.

Doctoral Candidate Information Form: To publicize doctoral defenses, the College of Engineering requires doctoral candidates to complete the web form at least two weeks before the actual date of the thesis defense. The form collects information about student's academic background, accomplishments, publications, and the PhD dissertation itself.

Final Doctoral Oral Examination: A final Doctoral Oral Examination in defense of the dissertation must be administered by the guidance committee to satisfy the requirements of the Graduate School. Students must be enrolled the semester they defend. All students defending their dissertations in the summer must register for at least one credit during that summer, regardless of their enrollment status during the preceding spring semester. The Doctoral Oral Examination must be scheduled for a date not earlier than two weeks after the dissertation and abstract have been submitted to the guidance committee members. After scheduling an examination date, the candidate should request a room from the graduate secretary and provide the secretary with the exam date, dissertation title, and abstract.

Prior to the examination, the student is responsible for preparing the [Record of Dissertation and Oral Examination form](#). Upon completion of the examination, this form must be signed by the student's committee members and the CHEMS Department Chairperson.

Submission of dissertation to The Graduate School: MSU only accepts theses and dissertations submitted electronically, as described by the web page "[Thesis and Dissertation Electronic Submissions](#)". After the final Doctoral Oral Examination, revisions and corrections recommended by the faculty advisor must be made by the student to produce a final unbound thesis manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the [Approval Form](#), obtained from the Graduate School. These materials are then submitted electronically to the graduate school, whereupon the candidate is required to complete [exit surveys*](#). Questions about doctoral exit surveys may be sent to ExitSurvey@grd.msu.edu.

Candidates must also show evidence that a manuscript based on their Ph.D. research has been submitted to an appropriate journal for publication. Students are responsible for all dissertation preparation and expenses. Departmental equipment or materials may not be used for this purpose.

The target date for the FINAL APPROVAL of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester. Submission via

ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extent of the necessary revisions and how diligent the author is when making the necessary revisions. Graduation on the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.

University Policy on Dissemination of Graduate Research: In keeping with MSU's public mission, the University requires that theses, dissertations and abstracts will become public after the conferral of the degree; embargoes can only be pursued for a limited period (see [1] below). Results that are subject to restrictions for dissemination by funding agencies (see [2] below) cannot be part of any document submitted as a thesis or dissertation to the Graduate School.

[1] Hold/embargo on publication of documents submitted to ProQuest: Students submitting a thesis/dissertation to ProQuest can request a hold/embargo of publication by ProQuest by contacting the Graduate School at msuetds.approval@grd.msu.edu. In response to the request, the Graduate School will send the student a form that needs to be completed and turned to the Graduate School prior to submission of the document to ProQuest. The form needs to be signed by the student's major professor and by the Associate Dean of the student's college. The request for the hold/embargo may be for six months, one year or two years. Requests for a period longer than six months must include a written justification for the length of the hold/embargo.

[2] Graduate student participation in a University Research Organization (URO): Graduate students involved in a URO project will receive both written documentation and a verbal explanation of any limitations or implications to their current or future academic progress prior to participating on the project. Students engaging in work for a URO project undergo a 2-step approval process before hiring: 1. consultation with a representative of the URO's office to explain the restrictions on the project, and 2. an interview with the Graduate School Dean or Dean's designee to discuss the relationship, if any, between their work as graduate students and their participation in the project.

Students must be informed that results that are subject to dissemination restrictions cannot be part of any document submitted as a thesis or dissertation. As part of their degree program, all graduate students must have research options to ensure the generation of appropriate results to fulfill the degree requirements, and to have data for professional development activities that are integral to their graduate education (e.g., presentations at conferences and research seminars).

Additional University Ph.D. Degree Guidelines

Seminars: Graduate students are required to attend departmental seminars, even if they are not registered for a seminar course. Seminars are scheduled on Thursdays at 9:10 a.m. A schedule with specific dates will be listed on the departmental web page and distributed via e-mail.

Residency Requirement: In order to establish residency, MSU requires that the Ph.D. student complete 6 credits at MSU in each of two consecutive semesters (total of 12 credits). Both coursework and research credits count toward fulfilling the requirement.

Commencement: Commencement information can be obtained from commencement.msu.edu.

Time Limitation: All work in the master's program including those courses for which credits were transferred must be completed in five (5) years; all work in the Ph.D. program including transfer credits must be completed in eight (8) calendar years of the student's first enrollment in the doctoral program. Exceeding this time limit will result in dismissal from the graduate program. Applications for extension of these time limits may be submitted by a student to the respective graduate program for approval by the Dean of Engineering and the Dean of the Graduate School.

Student Departure: Departing students are required to fill out the [Termination-Separation Checklist](#). The checklist is provided to highlight the range of issues that may need to be addressed when terminating MSU employment or otherwise separating from a department. The research advisor and graduate secretary must sign the checklist.

4. University Procedures: Academic Performance

Students should refer to the most recent edition of the [Academic Programs Catalog](#) for a complete discussion of academic standards pertaining to the graduate program. The following is a summary of current policy on academic performance.

In order to be considered full-time, students must carry the minimum number of

credits per semester as defined below:

- Master's level: 9 credits
- Doctoral level: 6 credits
- Graduate-Professional level: 12 credits

Full time status for doctoral students is defined as a minimum of 1 credit for those students who:

- Have successfully completed all comprehensive examinations and are actively engaged in dissertation research OR
- Are doing department-approved off-campus fieldwork related to preparation of their dissertation.

Annual Progress Report: As described in "[Graduate Student Rights and Responsibilities](#)," Section 2.4.8, graduate students have a right to periodic evaluations to assess their academic progress, performance, and professional potential. To this end, students are required to complete an Annual Report, including a self-evaluation using the [Graduate Reporting System](#). The faculty advisor will then prepare a written evaluation in consultation with the student. January/February is the time frame for these evaluations, and the report must be complete by March 1. Failure to meet the March 1 deadline for completing and verifying the annual report will result in a hold being placed on students' accounts. More information on Annual Reports is available [here](#).

Grade Point Average Calculations: The grade point average (GPA) will be based on all programmed work, except for collateral work or transfer credits. If a grade of less than 2.0 is received, the course may be repeated; if a grade of 2.0 or 2.5 is received, the course may be repeated only with the permission of the College of Engineering Associate Dean of Research and Graduate Studies. For repeated courses, only the second grade will be used in the GPA calculation.

Minimum GPA and Probational Status: Grades of 2.0 or higher are acceptable toward the graduate degree. However, a minimum GPA of 3.0 is required for graduation. A candidate having a GPA below 3.0 will be placed on probationary status. In such status, the candidate will not be allowed to carry more than nine credit hours per semester or take any non-competitive, special problems courses as part of the program.

Retention in Program: Should a Master's candidate's cumulative grade-point average fall below 3.0 after 16 or more credits of programmed work (not including collateral courses) have been accumulated, one semester on probationary status will

be allowed. Failure to remove the deficiency during this semester will result in dismissal of the candidate from the program.

Should a Ph.D. candidate's cumulative grade-point average fall below 3.0 after having completed half of the courses in the approved guidance committee report, OR should the student accumulate more than 3 deferred grades (identified by the DF-Deferred marker), the student may be enrolled in probational status in the doctoral degree program for one additional semester. If at the end of the additional semester the student's cumulative grade- point average is 3.0 or higher AND the student has no more than 3 deferred grades, the student may continue to enroll in the doctoral degree program. Otherwise, the student will be dismissed from the program.

Credit-Non-Credit Registration: All courses are open for Credit/Non-Credit registration. However, at least 22 credits on the master's program or equivalent must be taken on the basis of the established numerical grading system. (These 22 credits may include thesis credit, but not collateral course credit.) Collateral courses taken to fill deficiencies in the student's undergraduate background should be taken using a numerical grading system.

DF-Deferred grades: The required work must be completed and a grade reported within 6 months with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis or dissertation work.

Course Registration: Students enroll using [online enrollment](#). The student's PID and PAN are required for the enrollment process.

5. Financial Support

The CHEMS Department strives to provide financial support to all Ph.D. students and Plan A master's students. Several types of financial support are available, including fellowships, research assistantships and teaching assistantships. Continued financial support is contingent upon the student's making satisfactory progress toward completion of the degree. The department's criteria for satisfactory progress includes courses completed, the nature of the courses, grades received, passing the Ph.D. qualifying examination, and progress in completing master's thesis or Ph.D. dissertation research. Funding is also

dependent on the total number of semesters the student has been supported, availability of funds, and the needs of the department for particular services.

Fellowships: Fellowships provide financial support that is not associated with specific tasks other than making satisfactory progress toward completion of the degree. Fellowships are assigned based on availability of funds and the student's qualifications and performance.

Receipt of externally funded fellowships by students who have written their own grant applications and worth at least \$24,000 (direct costs) makes the student eligible for in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US or international institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) do not qualify the student for in-state tuition rates. For more information, consult the [Graduate School Funding Page](#).

Research Assistantships: Research assistantships are assigned by the research advisor based on criteria including the availability of research funds and the student's qualifications, interests, and past performance. Students on research assistantships perform work needed to complete a funded research project. Often, but not always, the work is related to the student's thesis/dissertation topic. Renewal of research assistantships is based on satisfactory performance and availability of funds.

Teaching Assistantships: Teaching Assistantships (TA) are assigned by the chairperson based on criteria including prior commitment to provide support, availability of other forms of support, number of semesters of previous support, and the student's knowledge of the course material, teaching ability, and interest in teaching as a career option.

Candidates for TA appointments who were either (a) required to demonstrate English proficiency as a condition for regular graduate admission or (b) received a waiver of the TOEFL or other accepted tests of English proficiency for admission, must also demonstrate that they meet a minimum standard of proficiency in spoken English before they can be assigned teaching work that involves oral communication with undergraduate students.

Those international teaching assistants (ITAs) may meet this requirement in one of the following ways:

- Presenting a TOEFL iBT speaking section score of 27 or higher.
- Receiving a score of 50 or higher on the [MSU Speaking Test](#).
- Taking an [ITA language support course](#) (AAE 451 or AAE 452) and receiving a score of 50 or higher on the [ITA Oral Interaction Test \(ITAOI\)](#).

Individual exceptions from these requirements (on a case-by-case basis in rare circumstances) will be considered by the Graduate School in consultation with the ELC upon the request of the department and with the endorsement of the Associate Dean of the College.

Tuition Waiver, Fees, and Health Insurance: Research assistantships and teaching assistantships include a tuition waiver (nine credits for fall and spring semesters and five for summer semester) matriculation and energy fees, and health insurance.

Duration of Financial Support: Ph.D. students should expect no more than 5 years of assistantship or fellowship support after admission to the Ph.D. program.

6. Work Related Policies and Procedures

The Department of Chemical Engineering and Materials Science strives to provide an excellent learning and working environment for all of its graduate assistants. It is important that graduate assistants comply with University and Department policies concerning work schedule, health and safety, and appearance of office space to help maintain this environment.

Responsibilities of the Graduate Student: The responsibilities of the graduate student, as described in the [MSU Guidelines for Graduate Student Advising and Mentoring Relationships](#), and include

1. Learning and adhering to University and academic unit rules, procedures, and policies applicable to graduate study and research or creative activities, including those outlined in *Academic Programs*, *Graduate Student Rights and Responsibilities* or *Medical Student Rights and Responsibilities*, and *Academic Freedom for Students at MSU*
2. Meeting University and academic unit requirements for degree completion
3. Forming a guidance committee that meets University requirements, as well as requirements that are outlined in the Graduate Handbook of the academic unit

4. Seeking regulatory approval for research in the early stages of thesis or dissertation work where applicable
5. Keeping the faculty advisor and guidance committee apprised on a regular basis of the progress toward completion of the thesis or dissertation

Rights and Responsibilities of Graduate Teaching Assistants: Students' rights and responsibilities as a graduate teaching assistant are found in the [Graduate Employees Union \(GEU\) Collective Bargaining Agreement](#). This contract also outlines MSU's rights and responsibilities as an employer. The graduate secretary can provide a copy of the contract.

Training and Professional Development: The Department and supervising faculty members are responsible for establishing orientation and in-service training programs for all employees (TA's). Such programs will provide training in the teaching of subject matter, an introduction to course goals, grading criteria and practices, and classroom procedures, as well as periodic classroom visitations. The department will hold teaching assistant orientation and training fall semester as part of the Department's graduate student orientation. Supervising faculty will ensure that teaching assistants are qualified in the subject matter and are trained in the course goals, grading criteria and practices, and classroom procedures. The supervising faculty will also carry out periodic classroom visitations. Employees (TA's) shall, as part of their regular duties, participate in the orientation and training.

Appointment Levels: Three levels are established for graduate students appointments. The departmental standard for promotion is as follows:

- Level 1: First year Ph.D. students and all M.S. students
- Level 2: Ph.D. students who have passed the Qualifying Examination
- Level 3: Students who have served as Teaching Assistant for six or more semesters.

Annual Evaluation: For each candidate, an evaluation of both academic progress and professional potential will be made by March 15 of each year. The Associate Dean of Engineering for Research and Graduate Studies may dismiss a student whose performance does not meet the program's acceptable standards of quality.

Work Calendar: Graduate assistants are paid for the period of August 16 to December 31 for fall semester, January 1 to May 15 for spring semester, and May 16 to August 15 for summer semester. As departmental employees, graduate assistants are expected to perform assigned duties on campus unless they have explicit permission from their supervisor to be away. This applies particularly during the final exam week and the subsequent grading period.

Vacation: University holidays include Labor Day, Thanksgiving, Christmas, and New Year's Day. In Summer (mid-May to mid-August) supported students are paid for 10-20 hours per week. Generally, however, Summer is a time to focus on research and make significant progress towards degree requirements. That requires a investment of personal time that goes beyond paid time. Students should aim to take about a day a week off during Summer, possibly in a 10-12 day block. Research advisors should approve vacation time well in advance.

Payroll Processing: Students should complete an [I-9 form](#) within three business days of date of hire, August 16, and present an original document(s) that establish identity and employment eligibility. Students may choose which identification document(s) (e.g., social- security card) to present from the list on the back of the I-9 form.

Provide copy of Social Security Card: Graduate assistants who do not have a social security card or whose card is lost, stolen or destroyed are required to apply for a card from the Social Security Administration. The local Social Security office is located at 5210 Perry Robinson Circle, Lansing, MI 48910. The phone number is 517-393-3876, and the operating hours are 9:00 a.m. to 4:00 p.m., Mon. - Fri. About eight to twelve weeks are required for processing the new card.

Enrollment Required: Paychecks will be held for graduate assistants who are not enrolled (i.e., fees paid) by the payday.

Location of Paychecks: Michigan State University now requires that all employees enroll in Direct Deposit or elect to have a PayCard. Students may enroll in direct deposit or chose to receive a Pay Card through [Enterprise Business System](#) under the employee self-service tab. More information is available from the [Office of the Controller](#).

Direct Deposit Personal Entry: Students may have paychecks automatically deposited to a bank account through the [Enterprise Business System](#) under the employee self-service tab.

W-4 Form: Tax withholdings (W-4 form) should be submitted through the [Enterprise Business System](#) under the employee self-service tab. (Exception: some international students and scholars may be limited in their access capabilities. For example, some individuals are required by federal regulations to file their paperwork and related documents in person at the [MSU Payroll Office](#).)

Parking: Graduate students with assistantships or fellowships are eligible for on-

campus parking permits. Students may apply for a parking permit online with [MSU Police](#) or in person at the Public Safety Office, 870 Red Cedar Road. Car registration and insurance must be presented when applying for a parking permit at the office. Students living in Owen Hall must show proof of residency. Students living in University Apartments must show a leasing agreement.

Office Space: Graduate assistants are assigned office space, typically during the first week of the semester.

Keys: Graduate assistants are issued office and desk keys. Lab keys are issued at the request of the faculty advisor. Keys are issued in the CHEMS department office, 2100 Engineering Building.

Office Upkeep: Students are expected to maintain a clean and orderly office space. Trash should be disposed of at recycling stations located throughout the hallways. All offices are smoke-free areas.

Labs: No drinks or food are allowed in labs. Students are expected to maintain a clean and orderly lab space.

Ergonomics: Health problems can result from continuous and prolonged use of computer keyboards. Proper posture and periodic breaks are recommended.

Department Website, Email, and Mail: Notices regarding events of general interest are posted on the [CHEMS Department homepage](#). Email is widely used to communicate with students. Hard-copy mail for graduate assistants is distributed in mailboxes assigned to graduate students in the CHEMS Office, Room 2100 Engineering Building. Graduate assistants should check the CHEMS Department home page and their assigned mailbox at least twice a week; E-mail should be checked at least daily.

Emergencies: MSU buildings have evacuation alarms that are activated by the red pull handles found in the hallways. However, these handles only activate the alarm; they do not notify the fire or public safety departments. Thus, in case of an emergency that may require evacuation, such as a fire or dangerous chemical spill, students should both **activate the alarm and also contact the Department of Public Safety (DPS) by dialing 911** on any phone. A phone for emergency use only is located in 3350 Engineering Building. No money is needed to dial **911** on pay phones. Pay phones are located in the lobby area of the Engineering Building, near 1345 EB and 1405 EB.

Non-emergency Assistance: To summon non-emergency assistance, students should notify the CHEMS Department office, 2100 Engineering Building, phone 355-5135 during business hours. If immediate attention is needed outside of business hours, notify the MSU telephone operator by dialing 0 on a MSU phone. Each lab has emergency phone numbers on its outside door.

Telephone: Personal long distance telephone calls should not be placed on departmental phones. Pay phones are located on the first floor of the Engineering Building. Business-related long distance calls may be made in the departmental office with your advisor's approval.

Purchases: Graduate assistants engaged in research may purchase apparatus, chemicals, and other supplies (transparencies, tape, etc.) for research purposes with the approval of their research advisor. These items should be purchased on campus through General Stores, Biochemistry Stores, or Chemistry Stores and charged to a research account. The research advisor can provide the account number to use.

Below are some of the common funding sources, along with the corresponding record keeper:

Account Type	Record Keeper
CHEMS Department	Jennifer
CHEMS Research Account	Kim, Brad, or Jennifer
CMSC	Jennifer

Research advisors can provide the record-keeper with contact information for particular accounts. A number of different types of purchase transactions can be carried out.

Open Orders Companies: It may be possible to purchase items not sold on campus through an "open order" company. Open order companies have special purchasing agreements with MSU. Purchases made through open orders companies do not require departmental approval if they do not exceed \$1000. A list of open order vendors is available online through [University Stores](#).

Spartan Marketplace: Open orders can be placed online via [Spartan Marketplace](#).

Spartan Marketplace can be accessed through EBS. The graduate assistant must set up a profile before they can place an order via Spartan Marketplace.

Credit Card Orders: If any item is not available via Spartan Marketplace, a credit card order may be placed. Credit card order forms may be obtained from the department secretary. Credit card orders have a limit of \$2500. Any order over \$2500 will require a quote and a purchase order to be completed by the department secretary.

Shop Orders: The College of Engineering maintains a machine shop and an electronics shop. The research advisor and departmental chairperson must approve requests for shop labor. Shop work order forms are located in the CHEMS departmental office.

Copy machine: The CHEMS copy machine must be used for department-related tasks only. Teaching assistants will be assigned a copier account number, which must be used only for the assigned course. When copying research-related material, the student's research advisor will authorize a research account number. The department copier cannot be used for thesis/dissertation copying, because of the large number of pages involved. On campus copy centers are available that have copiers better suited for high-volume jobs.

Travel: A Travel Authorization form must be completed and approved on [Concur](#), and the departmental secretary must be notified at least two days before traveling on MSU-related business, so that MSU can provide travel insurance.

Travel Abroad:

1. Check with the [MSU Travel Clinic](#). They will let you know of any health risks or immunizations.
2. Check the [Travel Smart](#) website. The department or research grant supporting TAs or RAs research are required to pay for all needed vaccinations and or medications, as determined by the MSU Travel Clinic. These costs may be included in applications for funds from the Research Enhancement or Travel Grant programs administered by the Graduate School.
3. Apply for assistance with travel funding via the [Graduate School](#). If the Graduate School provides funding, they will also provide a MEDEX emergency card.
4. Check the [International Studies and Programs](#) website for issues related to safety around the world.

CHEMS Office Hours: The CHEMS office is open from 8:00 a.m. to 5:00 p.m.

Monday - Friday. The phone number is 517-355-5135. The e-mail addresses for office staff members are available on the [department website](#).

7. Integrity and Safety in Research and Creative Activities

Safety Training

The MSU Office of [Environmental Health & Safety](#) (EHS) coordinates safety training. Graduate assistants are required to complete the following safety training:

- Chemical Hygiene and Hazardous Waste
- Lab-specific training (consult with advisor)
- Annual Departmental Safety Seminar
- Annual Hazardous Waste Refresher

Additional information on training modules is available on the [EHS web site](#).

Additional information specific to Safety in the CHEMS department can be found on the [CHEMS web site](#).

Responsible Conduct of Research (RCR)

Guidelines on ethics and research integrity are described during [Responsible Conduct of Research \(RCR\)](#) training, required for all CHEMS graduate students. In addition, each graduate student should review the document, "[Guidelines for Integrity in Research and Creative Activities](#)," and discuss its content with their research advisor. The following information is reprinted from that document.

Michigan State University considers the responsible conduct of research (RCR) as essential to all research activities associated with the University. Integrity in research and creative activities embodies a range of practices listed below:

- Honesty in proposing, performing, and reporting research
- Recognition of prior work
- Confidentiality in peer review

- Disclosure of potential conflicts of interest
- Compliance with institutional and sponsor requirements
- Protection of human subjects and humane care of animals in the conduct of research
- Collegiality in scholarly interactions and sharing of resources
- Adherence to fair and open relationships between senior scholars and their coworkers

Honesty in Proposing, Performing, and Reporting Research: The foundation underlying all research is uncompromising honesty in presenting one's own ideas in research proposals, in performing one's research, and in reporting one's data. Detailed and accurate records of primary data must be kept as unalterable documentation of one's research and must be available for scrutiny and critique. It is expected that researchers will always be truthful and explicit in disclosing what was done, how it was done, and what results were obtained. To this end, research aims, methods, and outcomes must be described in sufficient detail such that others can judge the quality of what is reported and can reproduce the data. Results from valid observations and tests that run counter to expectations must be reported along with supportive data.

Recognition of Prior Work: Research proposals, original research, and creative endeavors often build on one's own work and also on the work of others. Both published and unpublished work must always be properly credited. Reporting the work of others as if it were one's own is plagiarism. Research advisors and members of guidance committees have a unique role in guiding the independent research and creative activities of students. Information learned through private discussions or committee meetings should be respected as proprietary and accorded the same protection granted to information obtained in any peer-review process. Unintentional plagiarism can be prevented using programs such as "Ithenticate," anti-plagiarism software available on the [Ithenticate Site](#) as part of the 'Turn-It-In' package. To learn more visit the [Graduate School](#).

Confidentiality in Peer Review: Critical and impartial review by respected disciplinary peers is the foundation for important decisions in the evaluation of internal and external funding requests, allocation of resources, publication of research results, granting of awards, and in other scholarly decisions. The peer-review process involves the sharing of information for scholarly assessment on behalf of the larger disciplinary community. The integrity of this process depends on confidentiality until the information is released to the public. Therefore, the contents of research proposals, of manuscripts submitted for publication, and of other scholarly documents under review should be considered privileged information not to be shared with others, including students and staff, without

explicit permission by the authority requesting the review. Ideas and results learned through the peer-review process should not be made use of prior to their presentation in a public forum or their release through publication.

Disclosure of Potential Conflicts of Interest: There is real or perceived conflict of interest when a researcher has material or personal interest that could compromise the integrity of the scholarship. It is, therefore, imperative that potential conflicts of interest be considered and acted upon appropriately by the researcher. Some federal sponsors require the University to implement formal conflict of interest policies. It is the responsibility of all researchers to be aware of and comply with such requirements.

Compliance with Institutional and Sponsor Requirements: Investigators are granted broad freedoms in making decisions concerning their research. These decisions are, however, still guided, and in some cases limited, by the laws, regulations, and procedures that have been established by the University and sponsors of research to protect the integrity of the research process and the uses of the information developed for the common good. Although the legal agreement underlying the funding of a sponsored project is a matter between the sponsor and the University, the primary responsibility for management of a sponsored project rests with the principal investigator and his or her academic unit.

Protection of Human Subjects and Humane Care of Animals in the Conduct of Research: Research techniques should not violate established professional ethics or federal and state requirements pertaining to the health, safety, privacy, and protection of human beings, or to the welfare of animal subjects. Whereas it is the responsibility of faculty to assist students and staff in complying with such requirements, it is the responsibility of all researchers to be aware of and to comply with such requirements.

Collegiality in Scholarly Interactions and Sharing of Resources: Collegiality in scholarly interactions, including open communications and sharing of resources, facilitates progress in research and creative activities for the good of the community. At the same time, it has to be understood that scholars who first report important findings are both recognized for their discovery and afforded intellectual property rights that permit discretion in the use and sharing of their discoveries and inventions. Balancing openness and protecting the intellectual property rights of individuals and the institution will always be a challenge for the community. Once the results of research or creative activities have been published or otherwise communicated to the public, scholars are expected to share materials and information on methodologies with their colleagues according to the tradition of

their discipline. Research advisors have a particular responsibility to respect and protect the intellectual property rights of their advisees. A clear understanding must be reached during the course of the project on who will be entitled to continue what part of the overall research program after the advisee leaves for an independent position. Advisors should also strive to protect junior scholars from abuses by others who have gained knowledge of the junior scholar's results during the mentoring process, for example, as members of guidance committees.

Adherence to Fair and Open Relationships Between Senior Scholars and Their Coworkers: The relationship between senior scholars and their coworkers should be based on mutual respect, trust, honesty, fairness in the assignment of effort and credit, open communications, and accountability. The principles that will be used to establish authorship and ordering of authors on presentations of results must be communicated early and clearly to all coworkers. These principles should be determined objectively according to the standards of the discipline, with the understanding that such standards may not be the same as those used to assign credit for contributions to intellectual property. It is the responsibility of the faculty to protect the freedom to publish results of research and creative activities. The University has affirmed the right of its scholars for first publication except for "exigencies of national defense".

It is also the responsibility of the faculty to recognize and balance their dual roles as investigators and research advisors in interacting with graduate students of their group, especially when a student's efforts do not contribute directly to the completion of his or her degree requirements. Additional materials are available through MSU's [Research & Scholarly Integrity](#) website.

Misconduct in Research Scholarly Activities: Federal and University policies define misconduct to include *fabrication* (making up data and recording or reporting them), *falsification* (manipulating research materials, equipment or processes, or changing or omitting data such that the research is not accurately represented in the record), and *plagiarism* (appropriation of another person's ideas, processes, results, or words without giving appropriate credit). Serious or continuing non-compliance with government regulations pertaining to research may constitute misconduct as well. University policy also defines retaliation against whistle blowers as misconduct. Misconduct does not include honest errors or honest differences of opinion in the interpretation or judgment of data.

The University views misconduct to be the most egregious violation of standards of integrity and as grounds for disciplinary action, including the termination of employment of faculty and staff, dismissal of students, and revocation of degrees.

It is the responsibility of faculty, staff and students alike to understand the [University's policy on misconduct in research and creative activities](#), to report perceived acts of misconduct of which they have direct knowledge to the University [Research Integrity Office*](#), and to protect the rights and privacy of individuals making such reports in good faith.

RCR Training

The National Science Foundation (NSF) has established requirements for RCR training of all undergraduate students, graduate students, and post-doctoral personnel engaged in the conduct of research. In keeping with these requirements, MSU requires the following training components for graduate students, depending on program:

1. **First Year** (All graduate students) Four online training modules from [CITI Program](#): (1) Introduction to RCR; (2) Authorship; (3) Plagiarism; (4) Research Misconduct. The modules must be completed by *Dec. 31 of the first year of the graduate program*.
2. **Discussion** (All graduate students) A minimum of six hours of interpersonal discussion (one-on-one or in groups) must be completed *prior to graduation*. These can include [Graduate School RCR Workshops](#), [College of Engineering RCR Seminars](#), Departmental Courses, and Individual or Group conversations with research advisor(s). Discussion hours must be approved by research advisor(s).
3. **Second Year** (M.S. Plan A, Ph.D.) Three online modules from either [CITI Program](#) or [MSU Regulatory Training \(M\)](#): • Collaborative Research (C) • Conflicts of Interest (C) • Data Management (C) • Financial Responsibility (C) • Mentoring (C) • Peer Review (C) • IACUC Tutorial for Animal Care Training (M) • Human Research Protection/IRB Certification (M) • Rigor and Reproducibility (M, in development). The modules must be completed by *Dec. 31 of the second year of the graduate program*.
4. **Refresher** (Ph.D.) Starting third year, 3 hrs/year of Online or discussion-based training. Discussion based training may double-count with the six-hour minimum described above. Online modules must be beyond the 7 completed in years 1-2. Refresher training must be completed *between Jan 1 and Dec 31 of each year*.

All researchers are responsible for logging their RCR training on the [Research Training Tracking System](#) (RTTS) provided by the College of Engineering. RCR training records must be included in the students annual report.

8. Student Conduct and Conflict Resolution

Student Conduct: The University expects student conduct and behavior to reflect qualities of good citizenship, both in and out of the classroom. Details are given in the "[Spartan Life](#)" handbook and resource guide.

Conflict Resolution and Grievances: Conflicts involving graduate students may be handled informally or formally, depending on the preference of the involved parties. Students' rights and responsibilities, including formal grievance procedures, are described in "[Student Rights and Responsibilities at Michigan State University](#)". Procedures specific to graduate students are described in "[Graduate Student Rights and Responsibilities](#)." The CHEMS Department's Hearing Board follows specific procedures to deal with such issues, which can be found [here](#). The College of Engineering's Hearing Board procedures can be found [here](#). The [Office of the Ombudsperson](#) is a resource for additional information.

9. University Resources

The following is a list of URLs for University Resources covered in this document:

- Academic Programs Catalog: www.reg.msu.edu/AcademicPrograms/
- Annual Progress Report: www.egr.msu.edu/graduate/graduate-student-annual-reporting-requirements
- CHEMS Department: chems.msu.edu
- Collaborative Institutional Training Initiative: ora.msu.edu/train/programs/citi.html
- Commencement: commencement.msu.edu
- MS Defense Form: www.chems.msu.edu/sites/default/files/content/grad/MS_defense_form.pdf
- PHD Comprehensive Form: www.chems.msu.edu/sites/default/files/content/grad/PHD_comprehensive_form.pdf
- PHD Defense Form: www.chems.msu.edu/sites/default/files/content/grad/PHD_defense_form.pdf
- Doctoral Candidate Information: www.egr.msu.edu/graduate/doctoral-candidate-information-intro
- English Language Center elc.msu.edu
- Enterprise Business System: www.ebs.msu.edu

- Environmental Health & Safety: www.ehs.msu.edu
- Exit/Destination Survey (Doctoral): www.egr.msu.edu/doctoral/survey/
- Exit/Destination Survey (Masters): www.egr.msu.edu/masters/survey/
- GradPlan: student.msu.edu; GradPlan tile
- Graduate Employees Union (GEU) Collective Bargaining Agreement: hr.msu.edu/contracts/documents/geu-2019-2023.pdf
- Graduate School Funding: grad.msu.edu/funding/
- Graduate School: grad.msu.edu/
- Graduate Student Rights and Responsibilities: splife.studentlife.msu.edu/graduate-student-rights-and-responsibilities
- Graduate Reporting System (GRS): www.egr.msu.edu/grs/
- Graduation Application: www.reg.msu.edu/StuForms/GradApp/GradApp.asp
- Guidelines for Graduate Student Advising and Mentoring Relationships | Guidelines for Integrity in Research and Creative Activities: grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf
- International Studies and Programs: www.isp.msu.edu/information-resources/international-travel/
- Office of the Registrar: reg.msu.edu
- Ombudsperson's Office: ombud.msu.edu/
- Online Enrollment: www.reg.msu.edu/ROInfo/Enrollment.asp
- Payroll Office: ctlr.msu.edu/COPayroll/default.aspx
- Police: dpps.msu.edu
- Procedures Concerning Allegations of Misconduct In Research and Creative Activities: rio.msu.edu/sites/rio.msu.edu/files/2018-12/June_2009_Procedures.pdf
- Registrar Graduate Education: www.reg.msu.edu/AcademicPrograms/Text.asp?Section=111#s394
- Research Integrity Office: www.rio.msu.edu
- Research Training Tracking System: www.egr.msu.edu/secureresearchcourses/
- Responsibly Conduct of Research (RCR): www.egr.msu.edu/graduate/rcr
- Student Rights and Responsibilities: splife.studentlife.msu.edu/student-rights-and-responsibilities-at-michigan-state-university
- Termination-Separation Checklist: www.hr.msu.edu/ua/leaving-msu/documents/TerminationChecklist.pdf
- Thesis & Dissertation Required Paperwork and Surveys: grad.msu.edu/etd/Required-Paperwork-and-Surveys
- Thesis & Dissertation Electronic Submissions: grad.msu.edu/etd/
- Thesis/Dissertation Formatting Guide: grad.msu.edu/etd/formatting-guide
- Thesis/Dissertation Formatting Tutorial: grad.msu.edu/etd/formatting-tutorial
- Travel Clinic: travelclinic.msu.edu
- Travel Smart: grad.msu.edu/travel/
- University Stores: usd.msu.edu/university-stores/

The following are other resources not referenced in this document:

- College of Engineering: www.egr.msu.edu
- Council of Graduate Students: cogs.msu.edu/
- Office for International Students and Scholars: oiss.isp.msu.edu
- PREP program, for graduate student professional development: grad.msu.edu/prep
- Spartan Life: splife.studentlife.msu.edu
- Vice President for Research: www.msu.edu/unit/vprgs/

Previous Versions

- [CHEMS Graduate Handbook 2021](#)
- [CHEMS Graduate Handbook 2020](#)
- [CHEMS Graduate Handbook 2019](#)
- [CHEMS Graduate Handbook 2018](#)
- [CHEMS Graduate Handbook 2017](#)
- [CHEMS Graduate Handbook 2016](#)
- [CHEMS Graduate Handbook 2015](#)

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East Lansing, Michigan 48824-1226
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