



**Michigan
Technological**
University

Graduate Student Handbook

Department of Chemical Engineering

2019-2020

Department of Chemical Engineering - Graduate Student Handbook
Table of Contents

1.	Chemical Engineering Department Information and Resources	5
1.1.	Department Mission and Vision	5
1.2.	Department Structure.....	5
1.3.	Building, Office, and Laboratory Access	7
1.4.	Email, Computers, & Privacy.....	7
1.5.	Access to Photocopiers, Printers, & Supplies	8
1.6.	Safety	8
1.7.	Departmental Seminars	9
1.8.	Department Mentoring Program.....	10
1.9.	Work-Related Travel	10
1.10.	Closeout Procedure.....	11
2.	Common Elements for MS/PhD Degrees.....	12
2.1.	Common Coursework	12
2.2.	Responsible Conduct of Research.....	12
2.3.	Individual Development Plans	12
2.4.	Graduate Certificates	13
2.5.	Co-ops	13
2.6.	Research Mode	14
2.7.	Preparing for Graduation.....	14
3.	MS Degree Requirements.....	15
3.1.	MS Graduate Learning Objectives	15
3.2.	MS Graduate Learning Objectives - Baseline Criteria for Evaluation	16
3.3.	MS Degree Coursework	17
3.4.	Master's (MS) Thesis Defense.....	17
3.5.	MS Timelines.....	17
4.	PhD Degree Requirements.....	21
4.1.	PhD Graduate Learning Objectives.....	21
4.2.	PhD Graduate Learning Objectives - Baseline Criteria for Evaluation.....	22
4.3.	PhD Degree Coursework.....	23

4.4.	PhD Qualifying Examinations	23
4.5.	PhD Proposal Defense.....	23
4.6.	Doctoral (PhD) Dissertation Defense	24
4.7.	PhD Timeline	25
5.	Advisors.....	28
5.1.	Coursework MS Advisor.....	28
5.2.	Research Advisors – Selection Process	28
5.3.	Research Advisory Committee.....	29
5.4.	Changing Advisors or Committee Members.....	29
6.	Financial Support and Assistantships.....	31
6.1.	Types of Support	31
6.2.	Procedure and Schedule for Awarding Support	32
6.3.	Work Expectations	32
6.4.	Timely Written Feedback: Teaching and Research Evaluations	33
6.5.	Resigning a GTA/GRA Position	34
6.6.	Absence Policy	34
7.	Information for Graduate Students with an MTU Bachelor’s Degree	35
7.1.	Accelerated MS	35
7.2.	Senior Rule	35
7.3.	Example Course Schedules	36
8.	Department and University Policies	39
8.1.	Student Responsibility	39
8.2.	Continuous Enrollment & Residency Requirements	39
8.3.	Academic Standing, Probation, Withdrawal and Dismissal	39
8.4.	Academic Integrity & Plagiarism.....	41
8.5.	Grievance Procedures.....	42
8.6.	International Students	43
8.7.	Accommodations for Students with Disabilities.....	43
9.	Professional Development Opportunities and Support Services	44
9.1.	Graduate Student Government	44
9.2.	The J.R. Van Pelt and Opie Library	44
9.3.	The Center for Teaching and Learning.....	44

9.4.	The Multiliteracies Center	44
9.5.	Career Services.....	44
10.	Forms	45

1. Chemical Engineering Department Information and Resources

Welcome to the Department of Chemical Engineering as a new graduate student! The CM faculty and staff are proud to welcome you to our academic family. This handbook has been compiled to provide you with information on the program, assist you in your adjustment to graduate school, and detail the requirements for obtaining an advanced degree (MS or PhD) in Chemical Engineering at Michigan Tech. Beyond the resources provided in this handbook, we also recommend that you refer to the [MTU Graduate School Website](#) and the [Department of Chemical Engineering Graduate Website](#) for additional helpful information and resources.

1.1. Department Mission and Vision

The **mission** of the Department of Chemical Engineering is to provide a high-quality educational experience that will prepare graduates to assume leadership positions within chemical and other associated industries. We foster and encourage the pursuit of new knowledge and innovative scholarship in chemical sciences and engineering. We teach in modern classrooms and carry out research in state-of-the-art laboratory facilities. We provide leadership to the chemical engineering profession through scholarship, teaching, and service.

The **vision** of the department is to be a nationally recognized chemical engineering program with research strengths in applied thermodynamics, bioprocessing and biochemical engineering, mineral processing, polymers, process safety, process systems engineering, and surface science/catalysis.

1.2. Department Structure

Title	Name	Email Address
CM Department Chair	Dr. Pradeep Agrawal	pkagrawa@mtu.edu
CM Graduate Program Chair	Dr. Rebecca Ong	rgong1@mtu.edu
CM Graduate Student Government Representatives	Sarvada Chipkar	shchipka@mtu.edu
	Vinay Boghara	vboghara@mtu.edu

Table 1. CM Department Staff with Responsibilities Relevant to the Graduate Program

Title	Name	Description of Responsibilities Relevant to the Graduate Program
Department Coordinator	Alexis Snell aesnell@mtu.edu	Department operations, finance, policies, and procedures
Graduate Administrative Aide	Taana Blom taana@mtu.edu	Assists with graduate program administration and assessment
Office Assistant	Laura Wiinikka llwiinik@mtu.edu	Assists with ordering keys and assigning/booking rooms

Master Machinist	Jerry Norkol jnorkol@mtu.edu	Assists with construction, installation, and repair of laboratory equipment; in charge of ordering gas cylinders for the department
Research Associate	Steve Wisniewski sgwisnie@mtu.edu	Assists with construction, installation, and repair of laboratory equipment; manages equipment inventory; point of contact for safety training

Table 2. CM Graduate Faculty and Research Areas

Research Faculty	Research Areas												
	Advanced Materials Processing	Catalysis	Bioengineering	Energy	Environmental Engineering	Metals & Mineral Processing	Particulate Processing	Polymers	Process Control	Process Design/Optimization	Safety in Chemical Processes	Separations	Surface Chemistry
Agrawal, Pradeep													
Caneba, Gerard													
Co, Tomas													
Da Costa, Andre													
Eisele, Tim													
Heldt, Caryn													
Kawatra, Komar S.													
King, Julie													
Minerick, Adrienne													
Morrison, Faith													
Mullins, Michael													
Ong, Rebecca													
Pan, Lei													
Rogers, Tony													
Sandell, John													
Shonnard, David													

1.3. Building, Office, and Laboratory Access

Office Space: Offices are assigned to graduate students depending on availability, with priority given to funded GTAs and GRAs.

After Hours Building Access: After-hours access to the Chemical Sciences & Engineering building is available using your HuskyCard. Entrance is through the west entrance (on the MEEM side) of the building.

Keys: Office and teaching laboratory keys are assigned by the department coordinator. Laboratory keys for students on research projects are requested by research supervisors. Keys must not be loaned or given to others or duplicated *under any circumstances*. Lending or duplicating keys is grounds for dismissal. Lost keys need to be reported to supervisors *as soon as they are noticed to be missing*. Public safety charges a \$100 fee for lost keys or those that are not returned when no longer needed. Payment is required from the student who was assigned the key.

Building Safety and Security: Do not leave office and laboratory doors unlocked when no one is present. For safety, laboratory and fire doors (double doors at entrances) must not be propped open. Do not store items in hallways or stairwells.

1.4. Email, Computers, & Privacy

Email: Email is the department's primary communication tool with graduate students regarding issues such as financial support, graduate program obligations and responsibilities, semester timelines and deadlines, etc. **You are expected to be responsive to departmental emails at all times.**

Computer Access: A limited number of computers are available for graduate students, and are preferentially assigned to GTAs and GRAs. Research advisors are expected to provide computers for research use. Common use computers are available in the university library. Information Technology staff will assign you a username and password during orientation. You need to change your password when you first log in. This username and password provide access to University Computers, MyMichiganTech, Banweb, Gmail/Google Drive, and Canvas. Do not give out your password to anyone under any circumstances.

Travel: Traveling with university laptop computers needs to follow university policy. Note that taking a university computer to certain countries may require special permission.

Software Installation & Problems: Questions or problems with university computers and requests for software should be directed to IT. They can be contacted at the first floor library help desk or it-help@mtu.edu. Software requests on research computers need to go through your research advisor.

Privacy: Students should pay particular attention to Michigan Tech computer use policies regarding copyrights, privacy, passwords, and hacking. These can be found at http://www.it.mtu.edu/OIT/documents/computer_use_policy.pdf.

Be aware of possible phishing attacks. These are emails or phone calls that inspire a sense of urgency and may seem to come from someone you know but seem strange, or are supposedly from the official sources such as the police, IRS, or immigration services. Double-check the email address. If the address is suspicious, mark it as spam in Gmail, and report it to IT. Always get a second opinion if you are unsure. **Never** give out your personal information by email. **Never** respond to a suspicious email request or send anyone money or credit card/bank account information in response to a phone or email request.

1.5. Access to Photocopiers, Printers, & Supplies

Photocopiers, laser printers, and office supplies are available in ChemSci 203 for CM graduate students to use *for research and teaching purposes only*. Departmental resources are limited, so making efficient use of resources, such as using double-sided printing and copying are appreciated. Please print only work-related material.

Note that there are important national laws regarding photocopying copyrighted materials. If you have a question about copyright law please inquire in the library or see <http://www.admin.mtu.edu/admin/procman/ch13/ch13p10.htm>.

1.6. Safety

Safety is a high priority for the Department of Chemical Engineering. All graduate students are required to take a course on laboratory safety (CM5310) and to go through annual university and department safety training.

Everyone in the department is expected to contribute to our safety culture. If you observe unsafe practices, please suggest changes to the person conducting those practices, whether they are a supervisor, peer, or subordinate. Report any observed unsafe conditions or practices immediately to the responsible party (laboratory instructor, research advisor, department coordinator, etc.). If someone suggests that something you are doing is unsafe, please listen to their concerns and then respond immediately by adjusting your work practices. Discuss with your advisor and/or the department safety chair (Dr. Andre Da Costa) if you are unsure of the proper response.

General departmental laboratory policies include:

- Unsupervised laboratory work will not normally be permitted for safety reasons.
- **Laboratory maintenance is the responsibility of the person using the work area.** This includes washing glassware, wiping bench tops, cleaning spills, labeling samples, and returning tools to their proper place when not in use.

- **NEVER** enter another laboratory or "borrow" tools, equipment, or supplies from another laboratory without the prior approval of your research advisor and the faculty (or staff) member in charge of the laboratory and item in question.
- Unattended laboratory experiments that could result in a hazard if something goes wrong (ventilation fails, power goes out, water lines become disconnected) need to have a notice posted on the laboratory door informing what to do in an emergency. Speak with your research advisor to see whether they have a copy of this form, and if they do not, contact Steve Wisniewski to obtain a form and assistance in filling it out.
- A [job safety assessment](#) should be completed before beginning any novel laboratory experiment. This document identifies potential hazards associated with the process. It is important to help you guard against laboratory accidents and to be prepared to respond in the event an incident does occur.
- **Be aware that ChemSci fume hoods often are not operational outside of normal work hours or on weekends.** To request ventilation outside of normal hours, contact the ChemSci building Facilities Mechanic. The CM office staff can direct you to this person.
- **In the event of an incident:** *When in doubt, call 911, and as soon as possible notify your research supervisor.* If you cannot reach them, contact department office staff. Stay on the phone with 911 until released by dispatch. Even if the incident requires evacuation, you are required to remain in the vicinity of the building as a point of contact for emergency personnel. All incidents and injuries requiring medical treatment must be [reported to MTU EHS](#). If you need to undergo medical treatment due to injuries resulting from work, the attending physician will need to fill out a [Return to Work](#) form. Be sure to bring this with you if possible. Note that Portage Health Express Care is generally not helpful about filling out this form, and, depending on the urgency, it is better to go to an actual doctor or the emergency room for treatment.
- Failure to observe laboratory policies may result in restricted access to the CM laboratories or complete loss of laboratory privileges.

Please refer to the [Chemical Engineering Safety Website](#) and [MTU Environmental Health & Safety \(EHS\) Website](#) for more resources. The EHS website contains links to University documentation, such as the University Chemical Hygiene plan, hazardous waste pickup requests, the SDS database, and access to your University safety training modules and records.

1.7. Departmental Seminars

The department offers periodic seminars during the Fall and Spring semesters. These are typically on Fridays at 1:00 pm. Attendance is highly encouraged and you are expected to attend if you do not have other required responsibilities (classes or teaching) at that time. Please pay attention to email announcements regarding seminar offerings.

1.8. Department Mentoring Program

Incoming graduate students are required to choose a graduate student mentor during their first week on campus. Mentors can be chosen based on your research interests, other areas of mutual interest, and/or your home country. First, ask your potential mentor if they are willing to serve as a mentor, once you find someone who agrees, sign up with the Graduate Assistant.

Mentors are expected to answer any questions incoming graduate students have and facilitate a smooth transition into the Chemical Engineering Department, MTU, and community life.

Mentors help steer the mentees in the right direction to succeed and enjoy graduate school.

Mentees are expected to ask any questions that they have to help make a successful transition.

Mentors and mentees are expected to initially meet weekly and then less often as there is less need. You may be asked to mentor incoming graduate students during later stages of your program.

1.9. Work-Related Travel

During the course of your time at Michigan Tech, you may have the opportunity to travel for conferences, training, research, etc. If your travel is covered by the University, you will likely need to submit forms related to travel authorization and expenses. Information regarding work-related travel is included below.

Vehicle Rental: Vehicles can be rented from [Husky Motors](#) by students for all University-related travel, but must be billed to a department account. In order to reserve a vehicle, you are required to be 18 years of age, have a valid driver's license, and a Fleet Commander account. Rental of a Husky Motors passenger or cargo van requires [van certification training](#) (\$25.00). [Personal vehicles](#) can be used for transportation and reimbursed at a university determined mileage rate. [Zipcars](#) are available on campus for personal use.

International Travel: All work-related international travel requires [written approval](#). Note that transportation of MTU laptops may be restricted for certain countries. If travel is being charged to a federally sponsored project, it is required that a U.S. airline be used.

Cash Advances and Travel Reimbursements: Some travel expenses can be placed on a university purchasing card (airline tickets, hotel rooms), while some cannot (gasoline for personal vehicles, food/meals, sales tax). Your research advisor should have a purchasing card (P-card) that can cover expenses. For items that cannot be purchased on a P-card, you can either request a [cash advance](#) or submit a [travel reimbursement](#) following the trip. Travel reimbursements must be **submitted within two weeks of the work-related travel**. Expenses should be itemized by the day they were incurred. Copies of receipts must be included. Note that different forms are used for day-trips and overnight stays. You must have a valid university account number when submitting reimbursements. Generally, this will be provided by the research advisor who is sponsoring the travel.

<http://www.mtu.edu/fso/financial/travel/reporting/index.html>

Travel Grants: The Graduate Student Government (GSG) administers a [travel grant awards program](#) for students to attend professional and scholarly conferences. These funds are intended to be supplemental, and are not sufficient to cover the full cost of attendance. ***They are also not intended to support students who have funds available from other sources.*** Refer to the GSG website for more information.

1.10. Closeout Procedure

When you leave the department, you are responsible to submit the [Submit the Graduate student workspace cleanout form](#) (MyMichiganTech) and CM Graduate Student Closeout Procedure and Checklist (see section 10, pg. 45), which will require completing the following tasks, as applicable:

- Remove personal files from department computers
- Clean computer, desk, and surrounding office space
- Discard supplies, papers and other unwanted personal items in assigned spaces
- Turn in all assigned office, teaching, and laboratory keys to Public Safety
- *Research-active students:* Coordinate with research supervisor about appropriate disposal/storage/transfer of personal data, chemicals, samples, and equipment

2. Common Elements for MS/PhD Degrees

2.1. Common Coursework

Six core courses (15 cr.) are required for all CM degree programs. These can be completed in a single academic year (note: full-time graduate status is 9 credits).

Fall

- CM5100 – Applied Mathematics for Chemical Engineers (3 credits)
- CM5200 – Advanced Thermodynamics (3 credits)
- CM5310 – Laboratory Safety (1 credit)
- CM5500 – Theory and Methods of Research (2 credits)

Spring

- CM5300 – Advanced Transport Phenomena (3 credits)
- CM5400 – Advanced Kinetics/Reactor Design (3 credits)

All students are also required to take an Advanced Responsible Conduct of Research course (see section 2.2, pg. 12).

2.2. Responsible Conduct of Research

[Responsible Conduct of Research \(RCR\) Training](#) is an important aspect of being an effective scholar, and is mandatory whether a Masters or Doctoral degree candidate. Basic training must be completed within the first two semesters at MTU or a registration hold will be placed on the student's account. **Advanced training must be completed by the end of the third semester.** Students may not graduate or enter research mode if RCR training is not complete.

Coursework MS students may take an [online course](#). Research MS and PhD students must take a course offered through MTU. (Only a single course is required regardless of the number of credits). These courses are offered through various departments and a list is available on the [MTU Graduate School website](#). It is recommended that you discuss RCR options with your research advisor before enrolling.

2.3. Individual Development Plans

Individual Development Plans (IDPs) are designed to help students reflect on what they want to get out of their graduate education, think of short-term and long-term goals, and explore their interests and career paths. It is important to discuss this information with your advisor so that they are best equipped to help direct you toward opportunities that align with your goals, and to prevent misunderstandings. The IDP is a living planning document and can be modified as needed over time.

While not required, we recommend all research-active graduate students fill out an IDP and go through this document with their advisors. Please take the initiative if your advisor does not

propose to conduct an IDP with you. The Graduate School has compiled a number of options for [IDP templates](#).

It is also recommended that each research-active student undertake a self-reflection that can be conducted at the end of each semester. This can be considered part of an individual development plan. Example student self-evaluation forms used by CM faculty are available (see section 10, pg. 45), or your advisor may have their own preferred format.

2.4. Graduate Certificates

Graduate students (MS or PhD) can elect to obtain a graduate certificate at the same time they complete their graduate degree. Certificates require fewer credits, are more limited in scope compared to an MS degree, and are often interdisciplinary. A list of currently offered graduate certificates is available [online](#). Elective courses on the certificate list can be double-counted toward both the certificate and the graduate degree.

If you choose to complete a graduate certificate, you need to complete a [certificate degree schedule](#) before you graduate. This can be submitted as soon as you complete the required coursework.

2.5. Co-ops

Prior to completion of your degree, graduate students with good academic standing (see section 8.3, pg. 39) are eligible to go on a co-op (cooperative education experience) at a company to earn academic credit and obtain work experience. **Co-ops for credit are expected to be relevant to chemical engineering.**

- Up to 6 credits of CM-relevant co-op credit (UN5000, UN5002, UN5003, or UN5004) can be applied to degree electives.
- Full-time status can be maintained with 1 co-op credit.
- While on co-op, graduate students can enroll in online courses offered through MTU for elective credit, provided they meet the previously-specified course requirements.

International students can enroll for co-op through curricular practical training (CPT), provided they meet the following requirements:

- Must have F-1 status
- Must have been enrolled full-time for at least one full academic year
- Must be authorized by Career Services and International Programs and Services before beginning the co-op

If you are considering going on co-op, we strongly recommend reviewing the information on the Career Services and IPS websites before you apply.

- <https://www.mtu.edu/career/students/jobs-intern/co-ops/>
- <https://www.mtu.edu/career/students/advising/international/>

- <https://www.mtu.edu/international/students/resources/employment/cpt/index.html>

2.6. Research Mode

[Research mode](#) allows students to register for credits at a reduced rate. The intent is that all academic courses have been completed. Once the following criteria have been met, students can submit the Petition to Enter Research Mode form to the Graduate School. Students must submit a [Degree Schedule form](#) before they are allowed to enter research mode.

Master’s candidates—Must complete all 15 credits of core CM courses as well as the 30 credits required for their degree.

Doctoral candidates—Must satisfactorily complete both their qualifying and dissertation proposal exams, as well as all 15 credits of core CM courses.

- **PhD students who did not complete their MS degree at Michigan Tech** will need to complete a minimum of 18 credits at the 3000 level or above prior to entering Research Mode (any combination of course work and research credits). These are students who have a master’s degree from another institution.
- **PhD students lacking a MS degree** (those pursuing a PhD direct from a BS degree) will need to complete a minimum of 20 credits (any combination of course work and research credits) at the 3000 level or above before entering Research Mode.

2.7. Preparing for Graduation

Ultimately, you, not the department or your advisor, are responsible for ensuring that all your required forms and requirements are completed by the necessary deadlines. Please familiarize yourself with the deadlines, dissertation submission policies, and necessary graduation forms via the [Graduate School’s website](#). Also refer to the degree timelines that list key milestones (MS: section 3.5, pg. 17, and PhD: section 4.7, pg. 25). A personalized checklist and timeline are available through [MyMichiganTech](#). Please refer to this frequently during your program.

Coursework MS Elective Evaluation: As part of our graduate assessment program, the CM department requires an elective communication evaluation form (see section 10, pg. 45) from all coursework MS students the semester that they graduate. Coursework MS students are responsible to obtain the form from the CM Graduate Assistant, contact an instructor who taught one of their elective courses (preferably one they were enrolled in during the previous year and that contained a significant oral and/or written communication component), request the instructor fill out the form, and then once completed, return the form to the CM Graduate Assistant. Students will not be approved for graduation until this form is submitted.

Closeout Procedures: As stated previously (see section 1.10, pg. 11), all graduating students must follow closeout procedures, and fill out the [Graduate student workspace cleanout form](#) and CM Graduate Student Closeout Procedure and Checklist (see section 10, pg. 45).

3. MS Degree Requirements

3.1. MS Graduate Learning Objectives

Following completion of an MS in Chemical Engineering, we expect that students will demonstrate the following learning outcomes. Most graduate student assessments are linked to these learning objectives. These are slightly different for the MS coursework and MS thesis options and are detailed below.

MS Research (Thesis) Option Graduate Learning Objectives:

1. Demonstrate subject knowledge
 - Core chemical engineering topics
 - Research field topics
2. Demonstrate professional skills
 - Written communication
 - Oral communication
 - Data presentation
 - Organization and planning
3. Demonstrate responsible and ethical conduct
 - Professional behavior
 - Ethical behavior
 - Safe work practices
4. Demonstrate research skills
 - Critical analysis of research
 - Method application and experimental design
 - Data analysis and interpretation
5. Make an original contribution to the discipline
 - Originality and independence

The MS Coursework Graduate Learning Objectives for our program are:

1. Demonstrate subject knowledge
 - Core chemical engineering topics
 - Elective, subject-specific topics
2. Demonstrate professional skills
 - Written communication
 - Oral communication
 - Data presentation
 - Organization and planning
3. Demonstrate responsible and ethical conduct
 - Professional behavior
 - Ethical behavior
 - Safe work practices

Details on the baseline expectations for these learning objectives are on the following page.

3.2. MS Graduate Learning Objectives - Baseline Criteria for Evaluation

MS Graduate Learning Objectives	Satisfactory Level of MS Performance
GLO1 - Demonstrate subject knowledge	
Core chemical engineering topics	<ul style="list-style-type: none"> • Demonstrates the ability to learn and apply new content related to the core CM topics • Able to accurately solve quantitative and conceptual problems with occasional mistakes • Able to propose and conduct projects relevant to the core CM disciplines
Research field/Elective topics	<ul style="list-style-type: none"> • Demonstrates a solid understanding of existing literature, scientific concepts, and experimental strategies • Able to synthesize and summarize information from diverse sources
GLO2 - Demonstrate professional skills	
Written communication	<ul style="list-style-type: none"> • Writing is mostly clear and well-organized, and level of writing is appropriate to the audience • Mostly accurate use of grammar, mechanics, spelling and punctuation
Oral communication	<ul style="list-style-type: none"> • Presentation is clear, professional, engaging, and at the level of their audience's understanding • Able to concisely describe their project, why it is important, what their data shows, and what it means • Speed, mannerisms, language, and eye contact are appropriate and not distracting • Supporting materials (poster, slides, etc.) are well organized, legible, and contain few typos
Data presentation	<ul style="list-style-type: none"> • Figures and tables are legible, well-organized, relevant and decipherable in terms of their meaning
Organization and planning	<ul style="list-style-type: none"> • Keeps their work spaces organized and respects the space/equipment/resource needs of others • Able to design a schedule and research plan, and stay focused on a task to achieve a desired outcome
GLO3 - Demonstrate responsible & ethical conduct	
Professional behavior	<ul style="list-style-type: none"> • Collaborates well during team activities (listening, leadership, negotiation, training) • Able to balance the demands of different responsibilities and effectively manages their time • Arrives to scheduled events on time and fully prepared to participate
Ethical behavior	<ul style="list-style-type: none"> • Properly cites and references prior work during written and oral presentations • Properly records, maintains, and reports research data, neither adding false data nor omitting inconvenient data
Safe work practices	<ul style="list-style-type: none"> • Prepares proper safety documentation before beginning a new experiment and follows safe work practices • Responds quickly to rectify deficiencies in work practices and promotes safe work practices to others
GLO4 – Demonstrate research skills	
Critical analysis of research	<ul style="list-style-type: none"> • Able to summarize key points from and identify strengths and weaknesses in their own and other's research
Method application and experimental design	<ul style="list-style-type: none"> • Applies existing methods and designs experiments to answer research questions • Understands when it is appropriate to use certain techniques
Data analysis and interpretation	<ul style="list-style-type: none"> • Recognizes which data is clearly relevant to their research, and reports and interprets the meaning accurately • Correctly and creatively applies statistics, analytical and computational tools to analyze data, where appropriate
GLO5 – Make original contribution to the discipline	
Originality and independence	<ul style="list-style-type: none"> • Able to independently learn and apply new content • Self-motivated and capable of thinking of next steps required for a project to proceed

3.3. MS Degree Coursework

MS students take at minimum 30 credits, or two years of coursework. In addition to the 15 credits of core classes, students take an additional 15 credits of electives. For the research MS option, elective courses are chosen jointly by the student, their advisor, and their research advisory committee.

- At most 12 credits at 3000-4000 level
- For the research option, between 6-10 research credits (CM5990) are required

3.4. Master's (MS) Thesis Defense

For the research MS (thesis option), students must prepare a written thesis and an oral presentation of their completed research for evaluation by their research advisory committee. The [Degree Schedule form](#) must be completed and approved before a defense is scheduled.

The written thesis must be formatted in accordance with the [Graduate School instructions](#). It is recommended that you try to follow the formatting rules as early as possible in the writing process to avoid significant time spent making changes later.

At least two weeks prior to the oral examination, students must:

- Schedule their examination using the Graduate School Pre-defense form.
- Submit a draft thesis to the Graduate School.
- Distribute the thesis to their research advisory committee.

Students are responsible to coordinate with the CM Graduate Assistant to schedule the room for the defense, print off and bring the **CM Graduate Assessment Forms** (see section 10, pg. 45) and [Report of Final Oral Examination](#) to their oral defense for their committee members to fill out, and return these forms to the Graduate Assistant.

Following the defense, the MS candidate is responsible to incorporate all corrections and suggestions from the advisory committee into the final thesis. Students must report the results of the oral examination and submit a final thesis to the Graduate School prior to completing their degrees.

3.5. MS Timelines

The Master of Science in Chemical Engineering can typically be completed in 2-3 years ([Figure 1](#)) and must be completed within 5 years.

Task	Year 1		Year 2		Year 3	
	F	S	F	S	F	S
Choose a research advisor	←	→				
Choose advisory committee	←	→	←	→		
Complete coursework			←	→		
Thesis and oral defense					←	→

Figure 1. Typical timelines for completion of a MS in Chemical Engineering.

The Current Students area of [MyMichiganTech](#) lists a degree completion timeline and a personalized list of all tasks you will need to complete prior to being awarded your degree. It is recommended that you check this list every few months to ensure that you are not missing any important deadlines. The Graduate School has also compiled [timelines for MS](#) that link to required forms that need to be completed at specific times. We recommend you consult these periodically throughout your program. Ultimately it is **you**, not your research advisor or the department, that is driving completion of your degree.

The tables below show the coursework schedule (**Table 3**) and department/graduate school deadlines (**Table 4**) for professional (coursework) MS. A typical coursework MS takes two years to complete.

Table 3. Example Coursework MS schedule.**

Fall Y1 (9 credits)	Spring Y1 (9 credits)	Fall Y2 (9 credits)	Spring Y2 (9 credits)
CM5100 (3)	CM5300 (3)	Elective (3)	Elective (3)
CM5200 (3)	CM5400 (3)	Elective (3)	Elective (3)
CM5310 (1)	Elective (3)	Elective (3)	Elective (3)
CM5500 (2)			

**For an example schedule for Accelerated MS students, refer to section 7.1 pg. 35

Table 4. Typical milestones in a Coursework MS program and typical timeframes in which they are completed.

Deadline	Form/Item	Submit to
Second or third semester	Complete Advanced Responsible Conduct of Research (RCR) Training (see section 2.2, pg. 12)	N/A
Semester before planned completion	Submit MS Degree Schedule	Graduate School
	Submit Certificate Degree Schedule(s)	Graduate School
Final semester	Find an elective instructor to fill out the Coursework MS Student – Elective Competency Form (see section 10, pg. 45)	CM Graduate Assistant
	Submit Commencement Application Form	Graduate School
	Submit Degree Completion Form	Graduate School
By the end of final exam week, the final semester	Submit Verification of Final Degree Requirements	Graduate School

Before you leave campus	Submit Graduate student workspace cleanout form	MyMichiganTech
	Submit Graduate student closeout procedure and checklist (see section 10, pg. 45)	CM Graduate Assistant
	Complete Exit Survey	-

A research MS typically takes 2-3 years to complete. MS Research milestones, with a typical range of times to completion, and required forms are listed below ([Table 5](#)).

Table 5. Typical milestones in a **Research MS program** and typical timeframes in which they are completed.

Expected Timeline	What	Submit form to
First or second semester	Choose a research advisor using the Advisor and Committee Recommendation Form	Graduate School
Second or third semester	Choose a committee using the Advisor and Committee Recommendation Form	Graduate School
	Complete required coursework and Advanced RCR training (see section 2.2, pg. 12)	-
Between second and fourth semesters	Submit MS degree schedule and Certificate degree schedules (if applicable)	Graduate School
	Enter research mode by submitting the Petition to Enter Research Mode	Graduate School
Final Semester (generally between 4 th -6 th)	Schedule oral defense date	-
	Submit Commencement Application Form	Graduate School
	Submit Degree Completion Form	Graduate School
Two weeks before defense date	Submit the Pre-defense form Submit your thesis to Graduate School and Advisory Committee	Graduate School Advisory Committee
Before the defense	Fill out the headers for the MS Graduate Student – Thesis and Oral Defense Evaluation Form (one per committee member) (see section 10, pg. 45) and	-

Expected Timeline	What	Submit form to
	the Report on Final Oral Examination Form (one total), and print off for the committee.	
Day of the defense	Defend your thesis and have the committee fill out the remainder of the forms mentioned above.	Graduate School CM Graduate Assistant
By Graduate School Semester Deadline <i>(often the Friday before Finals Week)</i>	Make all technical and formatting corrections to the thesis and submit the Approval of a dissertation, thesis, or report form .	Graduate School
	Within one week of submitting the form, submit your thesis to Digital Commons and ProQuest .	-
Before you leave campus	Submit Graduate student workspace cleanout form	MyMichiganTech
	Submit Graduate student closeout procedure and checklist (see section 10, pg. 45)	CM Graduate Assistant
	Complete Exit Survey	-

4. PhD Degree Requirements

The Doctor of Philosophy in Chemical Engineering can typically be completed in 3-6 years, depending on whether the student already has a research MS and the area of study, and must be completed within 8 years.

4.1. PhD Graduate Learning Objectives

Following completion of an PhD in Chemical Engineering, we expect that students will demonstrate the following learning outcomes. Most graduate student assessments are linked to these learning objectives.

PhD Graduate Learning Objectives:

1. Demonstrate advanced knowledge
 - Core chemical engineering topics
 - Research field topics
2. Demonstrate professional skills
 - Written communication
 - Oral communication
 - Data presentation
 - Organization and planning
3. Demonstrate responsible and ethical conduct
 - Professional behavior
 - Ethical behavior
 - Safe work practices
4. Demonstrate advanced research skills
 - Critical analysis of research
 - Method development and experimental design
 - Data analysis and interpretation
5. Make an original and substantial contribution to the discipline
 - Identification of knowledge gaps and research opportunities
 - Originality and independence
 - Understand broader context and impacts of their research

Details on the baseline expectations for each of these learning objectives are included on the following page.

4.2. PhD Graduate Learning Objectives - Baseline Criteria for Evaluation

Graduate Learning Objectives		Satisfactory Level of PhD Performance
GLO1 - Demonstrate advanced knowledge		
Core chemical engineering topics	<ul style="list-style-type: none"> • Demonstrates the ability to learn and apply new content related to the core CM topics • Able to accurately solve quantitative and conceptual problems with occasional mistakes 	
Research field topics	<ul style="list-style-type: none"> • Demonstrates a solid understanding of existing literature, scientific concepts, and experimental strategies • Able to synthesize and summarize information from diverse sources 	
GLO2 - Demonstrate professional skills		
Written communication	<ul style="list-style-type: none"> • Writing is mostly clear and well-organized, and level of writing is appropriate to the audience • Mostly accurate use of grammar, mechanics, spelling, and punctuation 	
Oral communication	<ul style="list-style-type: none"> • Presentation is clear, professional, engaging, and at the level of their audience's understanding • Able to concisely describe their project, why it is important, what their data shows, and what it means • Speed, mannerisms, language, and eye contact are appropriate and not distracting • Supporting materials (poster, slides, etc.) are well-organized, legible, and contain few typos 	
Data presentation	<ul style="list-style-type: none"> • Figures and tables are legible, well-organized, relevant and decipherable in terms of their meaning 	
Organization and planning	<ul style="list-style-type: none"> • Keeps their work spaces organized and respects the space/equipment/resource needs of others • Able to design a schedule and research plan, and stay focused on a task to achieve a desired outcome 	
GLO3 - Demonstrate responsible & ethical conduct		
Professional behavior	<ul style="list-style-type: none"> • Collaborates well during team activities (listening, leadership, negotiation, training) • Able to balance the demands of different responsibilities and effectively manages their time • Arrives to scheduled events on time and fully prepared to participate 	
Ethical behavior	<ul style="list-style-type: none"> • Properly cites and references prior work during written and oral presentations • Properly records, maintains, and reports research data, neither adding false data nor omitting inconvenient data 	
Safe work practices	<ul style="list-style-type: none"> • Prepares proper safety documentation before beginning a new experiment and follows safe work practices • Responds quickly to rectify deficiencies in work practices and promotes safe work practices to others 	
GLO4 – Demonstrate advanced research skills		
Critical analysis of research	<ul style="list-style-type: none"> • Able to summarize key points from and identify strengths and weaknesses in their own and other's research 	
Method development and experimental design	<ul style="list-style-type: none"> • Effectively uses equipment/resources, and applies existing methods and to answer research questions • Develops creative approaches (experiments) and methods to answer questions or solve problems 	
Data analysis and interpretation	<ul style="list-style-type: none"> • Recognizes which data is clearly relevant to their research, and reports and interprets the meaning accurately • Correctly and creatively applies statistics, analytical and computational tools to analyze data, where appropriate 	
GLO5 – Make original & substantial contribution to the discipline		
Identification of knowledge gaps and research opportunities	<ul style="list-style-type: none"> • Able to identify knowledge gaps in their research field and propose hypotheses and experimental plans to address those gaps 	
Originality and independence	<ul style="list-style-type: none"> • Able to independently learn and apply new content and takes initiative in proposing new ideas or methods • Self-motivated and capable of thinking of next steps required for a project to proceed 	
Understand broader context and impacts of their research	<ul style="list-style-type: none"> • Able to define how their individual research fits within the broader research community, and can identify and describe potential positive direct and indirect impacts on the scientific community and society 	

4.3. PhD Degree Coursework

Students who already have an MS in Chemical Engineering require a minimum of 30 credits to obtain a PhD degree. Students who obtained their MS at MTU do not need to retake the core courses when advancing to a PhD. Students who transfer in with an MS in Chemical Engineering will be evaluated on an individual basis by the Graduate Committee and Department Chair in terms of the feasibility of waiving core course requirements.

Students without an MS (proceeding directly from a BS in Chemical Engineering) require a minimum of 60 credits to obtain a PhD degree.

All credits beyond the 15 credits of core CM courses can be any combination of elective courses and research credits (CM6990). These are chosen jointly by the student, their advisor, and their research advisory committee. Courses should be comparable to technical electives and have relevance to the student's degree.

4.4. PhD Qualifying Examinations

Students who do not achieve a letter grade of "A" in the courses of Transport (CM5300), Kinetics (CM5400), and/or Thermodynamics (CM5200), will be required to pass a written qualifying exam in the respective course.

Qualifying exams are offered in May, on different days of the same week. They are typically 2-4 hours long. Exams are rated pass/fail, which is based on the exam author's determination. The exam author is typically the previous year's course instructor. If failed, the qualifying exam can be retaken once, and this second attempt must occur within one month of the first attempt.

Sign-up sheets for the qualifiers are typically posted in the CM department office (ChemSci 203) in March or April. If you feel you *may* need to take the qualifier, it is recommended to sign up and contact the course instructor for possible study materials. You may always remove your name from the sign-up list later.

4.5. PhD Proposal Defense

The Research Proposal Examination is taken after the Qualifying Exam has been passed, often by the end of the second year of the program. It is administered by the student's Advisory Committee for the purpose of reviewing and evaluating the student's proposed plan for research.

Once a student has identified a research problem in consultation with their research advisor, has become familiar with the related literature, and has devised a plan for research, the proposal defense should be scheduled. A paper describing the proposed research should be distributed to the Advisory Committee two weeks prior to the scheduled exam. The student should prepare a 40-minute talk outlining both the problem and the proposed research.

methods. The remainder of the exam will be devoted to questions and answers related to the proposed research.

Students are responsible to coordinate with the CM Graduate Assistant to schedule the room for the defense, print off and bring the **PhD Graduate Student - Research Proposal Defense Evaluation** Forms (see section 10, pg. 45) and [Report on Research Proposal Examination Form](#) to their oral defense, and, once signed by their advisory committee, return these forms to the Graduate Assistant. The Report on Research Proposal Examination is filed with the Graduate School upon successful completion of the examination.

4.6. Doctoral (PhD) Dissertation Defense

Students must prepare a written dissertation and oral presentation of their completed research for evaluation by their research advisory committee. At least two academic semesters must have passed from the completion of the proposal defense to the dissertation defense. The [Degree Schedule Form](#) must be completed and approved before the defense is scheduled.

The written thesis must be formatted in accordance with the [Graduate School instructions](#). It is recommended that you try to follow the formatting rules as early as possible in the writing process to avoid significant time spent making changes later.

At least two weeks prior to the oral examination, students must:

- Schedule their examination using the Graduate School Pre-defense form.
- Submit a draft dissertation to the Graduate School.
- Distribute the dissertation to their research advisory committee.

Students must coordinate with the CM Graduate Assistant to schedule the room for the defense, print off and bring the **PhD Graduate Student – Dissertation and Oral Defense Evaluation Form** (see section 10, pg. 45) and [Report of Final Oral Examination form](#) to their oral defense for their committee members to fill out, and return these forms to the Graduate Assistant.

Following the defense, the PhD candidate is responsible to incorporate all corrections and suggestions from the advisory committee into the final dissertation. Students must report the results of the oral examination and submit a final dissertation to the Graduate School prior to completing their degrees.

4.7. PhD Timeline

The PhD can typically be completed in 3-6 years (**Figure 2**), depending on the area of study, and must be completed within 8 years. Three years is a reasonable estimate for the time to completion for students who already have a MS degree in Chemical Engineering and prior research experience. For students without an MS or research experience, 4-6 years to completion is typical. Doctoral degrees are unique to the individual and do not have a firm timeline that must be followed. The minimum amount of time required will be the time needed to take all required courses and complete research activities.

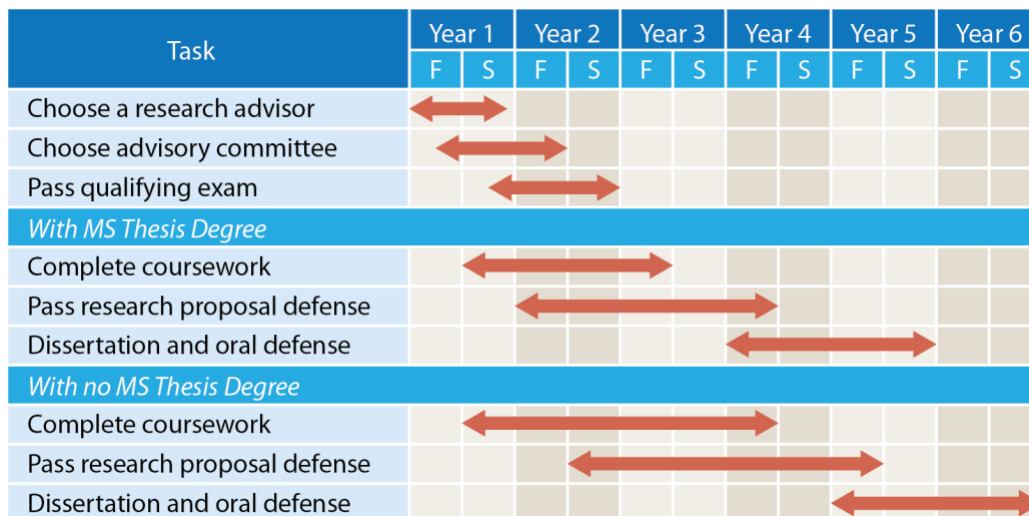


Figure 2. Typical timelines for completion of a PhD in Chemical Engineering.

The Current Students area of [MyMichiganTech](#) lists a degree completion timeline and a personalized list of all tasks you will need to complete prior to being awarded your degree. It is recommended that you check this list every few months to ensure that you are not missing any important deadlines. The Graduate School has compiled [timelines for PhD](#) that link to required forms that need to be completed at specific times. We recommend you consult these periodically throughout your program. Ultimately it is **you**, not your research advisor or department, that is driving completion of your degree.

The table below (**Table 6**) shows some typical milestones, times to completion and required forms.

Table 6. Typical milestones in a PhD program and typical timeframes in which they are completed.

Expected Timeline	What	Submit form to
First or second semester	Choose a research advisor using the Advisor and Committee Recommendation Form	Graduate School
Second or third semester	Choose a committee using the Advisor and Committee Recommendation Form	Graduate School
Between second and fourth semesters	Pass qualifying exam(s)	-
	Submit MS degree schedule and Certificate degree schedules (if applicable)	Graduate School
	Enter research mode by submitting the Petition to Enter Research Mode	Graduate School
Between third and fifth semesters	Complete required coursework and Advanced RCR training (see section 2.2, pg. 12)	-
Between fourth and sixth semesters	Schedule proposal defense date with your committee and write the document.	-
Two weeks before proposal defense	Submit your written document to your Advisory Committee.	-
Before your proposal defense	Fill out the headers for the PhD Graduate Student – Research Proposal Defense Evaluation Form (one per committee member) (see section 10, pg. 45) and the Report on Research Proposal Examination Form (one total), and print off for the committee.	-
Day of the defense	Defend your thesis and have the committee fill out the remainder of the forms mentioned above.	CM Graduate Assistant
After passing the proposal defense	Submit PhD Degree Schedule and Certificate Degree Schedule(s) , if applicable	Graduate School
<i>one week before the semester you wish to enter research mode</i>	Submit the Petition to Enter Research Mode	Graduate School

Expected Timeline	What	Submit form to
Final Semester (generally between 6 th -12 th)**	Schedule final oral defense date	-
	Submit Commencement Application Form	Graduate School
	Submit Degree Completion Form	Graduate School
Two weeks before final defense date	Submit the Pre-defense form Submit your thesis to Graduate School and Advisory Committee	Graduate School Advisory Committee
Before the defense	Fill out the headers for the PhD Graduate Student – Dissertation and Oral Defense Evaluation Form (one per committee member) (see section 10, pg. 45) and the Report on Final Oral Examination Form (one total), and print off for the committee.	-
Day of the defense	Defend your thesis and have the committee fill out the remainder of the forms mentioned above.	Graduate School CM Graduate Assistant
By Graduate School Semester Deadline <i>(often the Friday before Finals Week)</i>	Make all technical and formatting corrections to the dissertation and submit the Approval of a dissertation, thesis, or report form .	Graduate School
	Within one week of submitting the form, submit your dissertation to Digital Commons and ProQuest .	-
Before you leave campus	Submit Graduate student workspace cleanout form	MyMichiganTech
	Submit Graduate student closeout procedure and checklist (see section 10, pg. 45)	CM Graduate Assistant
	Complete Survey of Earned Doctorates	-
	Complete Exit Survey	-

**Three years is a reasonable estimate for the time to completion for students who already have a MS degree in Chemical Engineering and prior research experience. For students without an MS and research experience, 4-6 years to completion is typical.

5. Advisors

Every graduate student in the CM department is required to have an academic/research advisor. The purpose of an academic advisor is to oversee academic progress and help guide coursework selection. For those students pursuing research MS or PhD, the advisor serves as a research mentor and chair of the graduate committee for the thesis or dissertation research.

It is recommended that new students come up with a list of courses they might be interested in, and consult with their advisor by the 7th week of the first semester to create a degree schedule that meets the student's needs.

5.1. Coursework MS Advisor

For students pursuing a professional MS (coursework option), the default advisor is the Graduate Committee Chair, however students may choose another advisor (in which case the [Advisor and Committee Recommendation Form](#) should be filled out – see below).

5.2. Research Advisors – Selection Process

Students pursuing a research MS (thesis option) or a PhD are initially assigned a temporary academic advisor (usually the CM department chair or graduate committee chair), but are required to find a research advisor to oversee their academic and research activities. The research advisor must be a member of the Chemical Engineering Department and Graduate Faculty, but non-departmental faculty can serve as co-advisors.

You should meet with several faculty members before selecting an advisor. When making an appointment with a faculty member, first do your homework – learn about the faculty member's interests and projects, search for and read their recent publications, and come up with a list of questions. Allow enough time for a meaningful discussion. Indicate your research interests, background, and how the faculty member will benefit from supervising you. Establish mutual interest in working together. Explain your financial needs and explore avenues for meeting these needs. It is in your advisor's best interest to help you find the financial and academic support that you need.

Ultimately, selection of a research advisor is by mutual consent of the graduate student and the faculty member, and this choice must be submitted to the CM Department and Graduate School through the [Advisor and Committee Recommendation Form](#). The research advisor should be selected as soon as possible, either before the student comes to MTU or during Fall of the first year.

In some cases, particularly if your thesis/dissertation research is highly interdisciplinary, you may wish to be co-advised by two faculty members. This decision should be made by mutual agreement of all parties involved.

5.3. Research Advisory Committee

Students who are pursuing a research MS (thesis option) or a PhD are required to form a research advisory committee. The purpose of the committee is to ensure the quality and technical accuracy of the thesis/dissertation. In general, the primary research advisor will act as chair of the Advisory Committee. Both MS and PhD Advisory Committees are *required* to have at least one member who is external to the CM department, though some students may choose to have more than one.

For the MS program the advisory committee consists of, at minimum, 3 members:

- Primary research advisor (CM department)
- CM graduate faculty
- External (non-CM) member, occasionally external to the University

For the PhD program the advisory committee consists of, at minimum, 4 members:

- Primary research advisor (CM department)
- CM graduate faculty
- External (non-CM) faculty member, occasionally external to the University
- CM *or* external (non-CM) graduate faculty

Contact several faculty members who you might be interested in having on your committee and meet with them. Come prepared with a short description of your research project and be ready to answer questions. Once you have met with everyone, sit down and discuss your options with your advisor. They may give you recommendations, but ultimately it is up to you to determine who you most want to advise and mentor you on your research during your graduate program.

Once the committee is formed, the [Advisor and Committee Recommendation Form](#) must be filed with the Graduate School.

5.4. Changing Advisors or Committee Members

Before initiating the process to change your graduate advisor, please consider all the options listed on the [Graduate School's website](#) for how to address difficulties in the student-advisor relationship.

Once you have decided to change your graduate advisor, you must follow the steps listed below.

1. Meet with the CM Graduate Chair to initiate the process to change advisors. If meeting with the graduate program director is not feasible or appropriate, meet with the CM Department Chair or Dean of the College of Engineering.
2. Discuss the following with the graduate program director (or Chair/Dean) and, if appropriate, the current advisor:

- Whether additional resources within or outside the department (such as the Ombuds office) could help resolve the situation.
 - The impact of the change of advisor on your time to complete the degree. Coursework, qualifying exam(s), and the research proposal examination are all factors that could be impacted with a change in advisor.
 - Your current and future funding.
 - Research already conducted. Whether this will be incorporated into the dissertation, thesis, or report, and if so, how.
 - Impact on immigration status (if any). Consult International Programs and Services (IPS), if necessary.
 - Record the agreement from the discussions in writing, including indications of agreement from all affected faculty advisors, and provide copies to the student, the graduate program director, and all affected faculty advisors.
3. File an updated [Advisor and Committee Recommendation Form](#) for approval by the Graduate School.
 4. If the student and the graduate program director are unable to reach agreement on the advisor change, contact the Assistant Dean of the Graduate School to determine additional steps to resolve the situation.

Withdrawal of Committee Members: In some cases, committee members may choose to withdraw from your committee. If this happens, you will need to find a replacement if the number of committee members drops below the required number (see section 5.3, pg. 29). Once a new member is chosen, fill out an updated [Advisor and Committee Recommendation Form](#) and submit to the Graduate School.

6. Financial Support and Assistantships

6.1. Types of Support

Teaching Assistantships: Teaching assistantships are offered to qualified applicants, and are *typically reserved for PhD students*. Graduate teaching assistants (GTAs) work with the faculty and conduct laboratory sections and student assessments. First-year PhD students are generally supported as GTAs if positions are available. A typical GTA package includes tuition, fees, and a stipend. Stipends are adjusted periodically to ensure that they are competitive.

Research Assistantships: Research assistantships are offered to qualified applicants based on the availability of external funding. These are made at the prerogative of the faculty member who received the funding. Students are encouraged to contact graduate faculty in research areas they are interested in to discuss possible research projects and the availability of funding. Research funding may be available for PhD or MS students. Graduate research assistants (GRAs) are not assigned to teaching duties. The stipend and benefits are the same as those for GTAs.

Doctoral Finishing Fellowships: The Graduate School offers a limited number of competitive Finishing Fellowships for one or two semesters to PhD students in residence who are close to finishing their dissertations. It is important to communicate a clear and realistic plan for finishing that semester, and to have a strong publication record, which will require advanced planning. For more information, please review the [Graduate School website](#).

Other PhD Funding Opportunities:

- [DeVlieg Foundation Fellowships](#): The DeVlieg Foundation Fellowship program provides graduate support for PhD students in engineering, wildlife, and biology at MTU. Applicants must be a U.S. citizen or permanent resident.
- [Portage Health Foundation Graduate Assistantships](#): PhD students who are participating in health-related research, and in research mode at the time of application, can apply for a PHF graduate assistantship. Preference is given to students who will complete their degree during the funding period.

Other MS/PhD Funding Opportunities:

- [King/Chavez/Parks Fellowship](#): The Michigan King/Chavez/Parks Fellowship program provides grants to support graduate education (MS or PhD) for students from under-represented groups who commit to going into a career in post-secondary education. Applicants must be a U.S. citizen and Michigan resident.
- [GEM Graduate Fellowships](#): Competitive graduate fellowships are available for MS and PhD underrepresented students in engineering. Applicants must be a U.S. citizen or permanent resident. More details are available at their website:

- [Other Fellowships](#): The graduate school also provides links to a number of other competitively awarded fellowships. Securing prestigious awards provides time for concentration on one's research and writing.
- [Summer Youth Programs](#): Students may find employment as counselors or instructors in various summer youth/outreach programs offered by the university. See the [web page](#) or contact the Educational Opportunity Office on campus for more information.

6.2. Procedure and Schedule for Awarding Support

The CM Program endeavors to support all students needing financial support using a combination of external and internal funding. However, this may not be possible for every student, particularly those engaged in the professional (coursework) MS program. The Graduate Research Committee makes support recommendations simultaneously with decisions on admission. Department (internal) funding is generally reserved for PhD students, however individual faculty members may have external support available for MS students to conduct research.

Decisions on financial support and contract offers for the coming academic year are made every spring semester. However, some funding opportunities may become available at other times during the year.

Reappointments to graduate teaching assistant (GTA) positions are subject to review by the Graduate Chair in consultation with the graduate research committee and faculty mentors.

Graduate research assistants (GRAs) are selected based on the decision of the faculty advisor providing the financial support.

6.3. Work Expectations

Graduate students are encouraged to be in the building during normal working hours (i.e. from 8:00AM- 5:00PM., Monday-Friday). Working during these normal hours enables you to better interact with your research advisor, other faculty, and fellow students. In the event of an emergency, it also makes it more likely that other people will be in the building to provide aid.

Continued funding of a graduate student through assistantships depends upon:

- Performing well in courses
- Adequately completing GTA/GRA duties
- Fulfilling all thesis/dissertation requirements
- Maintaining effective communication with the Graduate School, department, advisor, and course instructors

Failure to meet these expectations or prolonged absences, e.g., expected vacation, leaving town, etc.) for reasons other than hardship (see section 6.6, pg. 34) may result in the

suspension or termination of financial support . In all cases, you should talk to your research advisor or director of the graduate program to determine what is acceptable.

Teaching Assistantships (GTAs): GTAs are assigned course-related duties, which are specified by the course instructor, but may include grading, teaching a laboratory, developing assignments, designing tutorials, holding review sessions, giving lectures while the instructor is traveling, and proctoring exams. The standard level of effort expected is 20 hours per week, though this may vary from week to week. If you feel that your workload is too heavy to allow you to complete your other responsibilities (coursework, research, etc.), please speak with your course instructor as soon as possible.

New GTAs are required by the University to go through the [GTA orientation](#) before they begin their TA position. Additionally, international students must take an English Language Assessment (see section 8.6, pg. 43).

Research Assistantships (GRAs): GRAs have no course-related duties, but are provided financial support to conduct research. The minimum level of effort expected is generally 20 hours per week, but your level of effort will depend on your research advisor's expectations. You should be sure to clarify this before you begin working. As your research may or may not be related to your thesis/dissertation topic, additional time to conduct thesis/dissertation specific research is generally required to attain your degree. In the event GRA funding runs out, students will be notified in writing two months in advance.

6.4. Timely Written Feedback: Teaching and Research Evaluations

Graduate Teaching Assistants (GTAs): GTAs are evaluated at the end of the semester by their instructor using the department Graduate Teaching Evaluation Form (see section 10, pg. 45). The instructor is to review this evaluation form in person with the GTA. This process is designed to assist the GTA in improving their teaching ability. However, *if performance is exceptionally poor, this is likely to influence future funding decisions*. It is highly recommended you review the form with your instructor at the beginning of the semester to ensure that you both understand how you will be evaluated. Following completion of the evaluation, copies of the form are filed with the department and provided to the student, instructor, graduate program director, and Department Chair.

Graduate Students Engaged in Research: All graduate programs at the university provide constructive written feedback to students who are completing a report, thesis, or dissertation, at least annually. This formal process ensures that both students and advisors are aware of the student's academic progress and plans for the future. The goal of this process is to facilitate continuous improvement and completion of the student's degree program.

The Chemical Engineering Department requires completion of our Graduate Research Assistant Evaluation Form (see section 10, pg. 45) at the end of each semester, which can assist students to more rapidly self-correct and assist with research grade assignment. This form must be

completed for any MS or PhD student involved in research, regardless of the source (or lack) of funding. To save time, the research evaluation can be conducted at the same time as the student self-reflection (see section 2.3, pg. 12). Following completion, copies of the evaluation form are filed with the department and provided to the student, advisor, graduate program director, and Department Chair.

If a “Q” grade is assigned due to deficiencies identified in a student’s performance, written feedback will be provided twice yearly using the Plan to Correct Inadequate Research Progress Form (see section 10, pg. 45). This plan will specifically address the area(s) of deficiency, include a timeline and milestones for making up the deficiency, and list consequences for continued unsatisfactory performance. These actions will generally be warranted if a student’s performance puts research funding or continuance of a research program in jeopardy.

6.5. Resigning a GTA/GRA Position

Students who find they must resign their GTA/GRA position during the year should make every effort to **inform the Graduate Chair and the appropriate supervisor as soon as possible**, but at least two weeks prior to the start of the semester. Students who are scheduled to teach during the summer sessions should inform the Graduate Chair and the appropriate teaching supervisor at least five weeks prior to summer semester if they need to relinquish their assignment.

6.6. Absence Policy

Students receiving financial support through the University (teaching assistantship, research assistantship, and/or fellowship) are entitled to staff holidays and, unless otherwise specified by their advisor, are allowed two weeks of vacation per year. *Please note that the Thanksgiving and Spring breaks, the breaks between academic terms, and the summer semester are not automatically considered holidays or time off.*

In the case of GRAs, excused absences must be arranged with the faculty advisor. GTAs require the approval of the course instructor and/or their advisor, and may not take personal time off during an academic term or finals week when they have teaching responsibilities. Travel to attend conferences or other work-related activities is allowed, but must be approved by the course instructor.

7. Information for Graduate Students with an MTU Bachelor's Degree

7.1. Accelerated MS

Students who intend to obtain both their BS and MS from Michigan Tech can apply for the Accelerated MS program. This program allows you to complete either a coursework or a thesis MS in one additional year beyond the bachelor's degree.

- You may apply any time after attaining junior-standing and before earning your BS degree. (Enrolled graduate students may not retroactively apply.)
- Up to 6 undergraduate engineering credits at the 3000 level or higher can be double-counted toward both the BS and MS degrees. *These courses must be specified on the MS degree schedule that is submitted the semester prior to graduation with the MS degree.*
- Accelerated MS students must take all 15 credits of core CM courses required for CM graduate degrees.
- An additional 15 credits of technical courses or research credits are required for the Accelerated MS. The same rules for credits apply for the Accelerated MS as for the standard MS degree (see 3.1, pg. 15).
- Students may pursue either a coursework or a research Accelerated MS. For the research option, graduate research credits should not be taken prior to completion of the undergraduate degree.

More details on the Accelerated MS program can be found at the [Department Website](#).

7.2. Senior Rule

The senior rule allows students who are finishing their undergraduate degree at MTU within the next 12 months to take courses during that time that could apply to a graduate degree at MTU.

- For the MS in Chemical Engineering, the senior rule can be applied to 6 credits.
- These courses are not double-counted – they only apply to the MS degree.
- Students must submit the [Senior Rule Form](#) to the Registrar's office by Wednesday of Week 2 the semester they are graduating.
- The decision is final once the senior rule form has been approved. Those courses can no longer be applied to the BS degree.

- Undergraduate students enrolled in 6 credits or more of 5000 or 6000 level courses in a semester can only enroll in a maximum of 16 of those credits total.
- Senior rule credits may not exceed 1/3 of the required non-research course credits for the MS degree.
- Senior rule courses are not eligible for undergraduate financial aid – i.e. they don't count toward full-time or part-time status in financial aid considerations.
- You do not need to have applied to an MTU graduate program before submitting the senior rule form.
- Senior rule classes are covered by undergraduate tuition - you do not need to pay graduate student tuition rates for these courses.

7.3. Example Course Schedules

Students generally decide to pursue an Accelerated MS either their second-to-last or last year in their BS program. Because of this, example degree schedules for the Coursework ([Table 7](#)) and Research ([Table 8](#)) Accelerated MS programs only include the last year of the BS and the first year of the MS. A [full example degree schedule](#) is available online.

Degree schedules should be planned in consultation with the undergraduate advisor and graduate chair to ensure efficient completion of both degrees.

Table 7: An example Coursework Accelerated MS course schedule.

Fall (Final Year of BS)			
Category	Course	Title	Credits
BS	CM4110	Unit Operations Lab	3
BS	CM4310	Process Safety/Environment	3
BS	CM4855	ChE Proc Analysis and Design I	3
Co-Counted	TBD	Free or Technical Elective (3000-6000 level)	3
Senior Rule	CM5100 or TBD	Applied Math for Chem Eng OR MS Elective (3000-6000 level)	3
BS	-	Other?	3
Total			15-18
Spring (Final Year of BS)			
Category	Course	Title	Credits
BS	CM4120	Chemical Plant Operations Lab	3
BS	CM4860	ChE Proc Analysis and Design Lab II	2
BS	CM4861	ChE Design Lab II	1
Co-Counted	TBD	Free or Technical Elective (3000-6000 level)	3
Senior Rule	CM5300 or CM5400 or TBD	Advanced Transport Phenomena OR Advanced Reactive Systems Analysis OR MS Elective (3000-6000 level)	3
BS	-	Other?	3
BS	-	Other?	3
Total			12-18
Fall (MS)			
Category	Course	Title	Credits
MS	CM5200	Advanced Thermodynamics	3
MS	CM5310	Laboratory Safety	1
MS	CM5500	Theory/Methods of Research	2
MS	TBD	Elective (5000-6000 level)	3
Total			9
Spring (MS)			
Category	Course	Title	Credits
MS	CM5300 or CM5400	Advanced Transport Phenomena OR Advanced Reactive Systems Analysis	3
MS	CM5400 or TBD	Advanced Reactive Systems Analysis OR Elective (5000-6000 level)	3
MS	TBD	Elective (5000-6000 level)	3
Total			9

Table 8: An example Research Accelerated MS course schedule.

Fall (Final Year of BS)			
Category	Course	Title	Credits
BS	CM4110	Unit Operations Lab	3
BS	CM4310	Process Safety/Environment	3
BS	CM4855	ChE Proc Analysis and Design I	3
Co-Counted	TBD	Free or Technical Elective (3000-6000 level)	3
Senior Rule	CM5100	Applied Math for Chem Eng	3
BS	-	Other?	3
Total			15-18
Spring (Final Year of BS)			
Category	Course	Title	Credits
BS	CM4120	Chemical Plant Operations Lab	3
BS	CM4860	ChE Proc Analysis and Design Lab II	2
BS	CM4861	ChE Design Lab II	1
Co-Counted	TBD	Free or Technical Elective (3000-6000 level)	3
Senior Rule	CM5300 or CM5400	Advanced Transport Phenomena OR Advanced Reactive Systems Analysis	3
BS	-	Other?	3
BS	-	Other?	3
Total			12-18
Fall (MS)			
Category	Course	Title	Credits
MS	CM5200	Advanced Thermodynamics	3
MS	CM5310	Laboratory Safety	1
MS	CM5500	Theory/Methods of Research	2
MS	CM5990	MS Research	3
Total			9
Spring (MS)			
Category	Course	Title	Credits
MS	CM5300 or CM5400	Advanced Transport Phenomena OR Advanced Reactive Systems Analysis	3
MS	CM5990	MS Research	3-5
MS	TBD	Responsible Conduct of Research (RCR) Course	1-3
Total			9

8. Department and University Policies

8.1. Student Responsibility

It is the responsibility of each CM graduate student to:

- Be aware of the recommended timeline for completion of their degree and ensure completion of necessary tasks within that timeline (MS: see section 3.5, pg. 17; PhD: see section 4.7, pg. 25).
- Initiate and respond to communication with the CM department and their academic advisor about all aspects of their graduate program.
- Be familiar with and follow CM department policies as outlined in this handbook, and Graduate School policies as detailed on their website.
- Ensure that all forms that are required for continuation and completion of their degree program are completed and authorized in a timely fashion, and filed with CM administrative staff, graduate school, etc.
- Maintain their office and laboratory space and manage their assigned keys.

8.2. Continuous Enrollment & Residency Requirements

Students who wish to remain active in the graduate program must be enrolled *every academic fall and spring semester* in 1) academic courses, 2) research credits, OR 3) in one of two courses offered by the graduate school to address special circumstances ([UN5951](#) or [UN5953](#)).* Nine credits are required for full-time status in fall and spring semesters. Graduate students (both domestic and international) are not required to register for classes during summer session, however if full-time status is needed for employment or a fellowship, 1 credit counts as full-time during summer semester.

Students who do not maintain active status enrollment (through one or more of the three course options above) will have to apply for re-admission to regain active status. Students may request a waiver of continuous enrollment. However, waivers of continuous enrollment will be strictly limited to one term except in the most serious situations. For more information, contact the Graduate School.

**Contact the Graduate School regarding these courses. Please note that tuition for these courses may not be waived and these courses may not be paid from departmental or sponsored accounts.*

8.3. Academic Standing, Probation, Withdrawal and Dismissal

[According to the Graduate School](#), graduate students must maintain *at least a 3.0 cumulative grade-point average in the courses required for a graduate degree*. The Graduate School allows

up to six credits total of BC/C to count toward a degree. An interpretation of how grades correspond to expectations for graduate work is listed in [Table 9](#).

Table 9: Graduate level interpretation of academic grades

Grade	Level of Progress
A	Excellent and good graduate work
AB	Acceptable graduate work
B	Marginally acceptable graduate work
BC	Unacceptable graduate work
C	Unacceptable graduate work (all requirements completed)
F	Unacceptable graduate work (all requirements not completed)

In addition to the graduate school requirements, the Department of Chemical Engineering requires an average grade point of 3.0 for CM courses. A grade of “B” or better is *required* in the following six core CM courses:

- CM5100 – Applied Mathematics for Chemical Engineers
- CM5200 – Advanced Thermodynamics
- CM5300 – Advanced Transport Phenomena
- CM5310 – Laboratory Safety
- CM5400 – Advanced Kinetics/Reactor Design
- CM5500 – Theory and Methods of Research

Students who do not obtain a “B” in these courses will be required to repeat them and obtain the required grade before they can be awarded their degree. It is highly recommended that if you feel you are not doing well in a course, that you speak as soon as possible with the course instructor and your academic/research advisor to try to develop a plan to improve your performance. If you fail a course, a general good practice is to plan to take the undergraduate version of the course (either for credit or audited) before retaking the graduate version of the class. Be sure to discuss this with your advisor. If you wish to audit, you must obtain approval of the course instructor and follow their guidelines for expectations for homework/project/exam participation.

Research credits are required for an MS (report or thesis options) or PhD in Chemical Engineering. **Good academic standing requires grades of “P” for research credits.** Failure to make adequate performance, as determined by your advisor, will result in a “Q” grade.

Probation: Students who fail to maintain a 3.0 GPA or who receive a “Q” grade in research credits will be placed on academic probation. If you are given a “Q” research grade, your research advisor is required to meet with you that semester to give you feedback and help

develop a plan and timelines for improvement using the Plan to Correct Inadequate Research Progress Form (see section 6.4, pg. 33 and section 10, pg. 45). This form will be filled out each semester a “Q” grade is assigned.

Students who successfully raise their GPA above a 3.0 and receive “P” grades in their research credits the semester following probation, will be returned to good academic standing and removed from probation.

Suspension: Students who are on probation for two sequential semesters will be placed on academic suspension and will not be allowed to enroll in courses the following semester. Students suspended for poor research performance will need to review their probationary plan, identify deficiencies in the plan and their progress, and revise and develop a new research plan for the returning semester with benchmarks and deadlines for satisfactory progress. This plan must be approved by the research advisor.

Students who bring their grade point above a 3.0 and achieve research grades of “P” will be moved from suspension back to probation the following semester. Progression from probation to good academic standing will proceed as indicated in the previous section.

Dismissal: Students will be dismissed from the program who:

- Fail to improve following two semesters on suspension
- Fail a single qualifying exam (Transport, Kinetics, or Thermodynamics) twice (PhD only)
- Fail to pass a proposal defense twice (PhD only)
- Fail to pass the final thesis (MS research) or dissertation (PhD) defense

Response to Suspension and Dismissal: Students may either appeal as described in the [Graduate Appeals of Suspension or Dismissal](#) policy, or leave campus. Those who leave campus must follow closeout procedures (see section 1.10, pg. 11).

8.4. Academic Integrity & Plagiarism

The University and the CM Department expect all students to maintain the highest level of academic and scientific integrity in all aspects of their studies, from classwork to exams to research. If you are unsure of or have specific questions about assignments, projects, examinations, etc., please ASK your instructor or research advisor.

Detailed information is available on Michigan Tech's [academic integrity policy and procedures](#). This includes definitions of plagiarism, cheating, fabrication, and facilitating academic dishonesty. Plagiarism includes not only replication of exact wording, but also paraphrasing, using images, or representing another’s ideas as your own, without proper citation. All graduate students should carefully read this policy.

8.5. Grievance Procedures

Defining Grievance Cause: Faculty or students with concerns or complaints about the behavior of other faculty or students in professional situations or in interpersonal relationships should follow the grievance procedures described below. Note that questions of plagiarism should be taken to the Dean of Students, and sexual discrimination and sexual harassment issues should be taken to the [University Title IX Coordinator](#).

These procedures are designed to protect the rights and privacy of both faculty and students and to equitably adjudicate conflicts among faculty and students.

General Guidelines for Grievances: Students should avoid discussing their complaints with colleagues. Students who believe they have been subjected to discrimination based on sex or sexual harassment, suspect that an unfounded discrimination complaint may be filed against them, or have been threatened with the filing of such a complaint should notify the Affirmative Action Officer as soon as possible.

Student-Initiated Grievances: Students have the right to fair and equal treatment by administrators and to expect professional behavior from faculty and other students. Professional behavior includes such matters as a respect for expertise, individual beliefs, and personal privacy.

Students should be aware that the campus provides an ombudsperson. One of the functions of the [ombudsperson](#) is to process student complaints. Students who have complaints about administrators, faculty, or other students should first discuss their complaints with the person concerned, if possible. If the complaint cannot be resolved in this way, they should discuss the complaint with the Graduate Committee Chair. The Graduate Committee Chair will attempt to resolve the problem through discussions with relevant parties. If resolution is not possible, the complaint will be referred to the CM Department Chair. If the complaint concerns the Graduate Committee Chair, it should be referred to the CM Department Chair. If the complaint concerns the CM Department Chair and resolution is not possible within the department, the complaint should be referred to the Dean of the Graduate School.

Title IX: Title IX of the Education Amendments of 1972 is a Federal civil rights law that prohibits discrimination on the basis of sex in educational programs and activities that receive Federal funds. It states:

“No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

Under Title IX, discrimination on the basis of sex can include gender discrimination, pregnant and parenting discrimination, sexual harassment or sexual violence, such as rape, dating violence, domestic violence, stalking, sexual assault, sexual battery, and sexual coercion.

To officially report an incident of gender discrimination, sexual harassment, or sexual assault/violence, you may contact the Title IX Coordinator at titleix@mtu.edu, 906-487-3310, 306 Administration Building or [Public Safety and Police Services](#) at 906-487-2216. If you are a student, you may also choose to report to [the Office of Academic and Community Conduct](#).

8.6. International Students

Upon arrival on campus all international students must register with the Office of International Programs and Services, located in room 200 of the Administration Building. All matters concerning employment and visa renewals are handled through this office. Changes in I-20 forms are handled in the Graduate School.

In order to be visa compliant, international students must register as full-time students (see section 8.2 pg. 39) during Fall and Spring semesters. Full-time enrollment is not required during summer unless required by employment or a fellowship. Questions regarding I-20 forms, visa status, and full-time student status may be directed to the Graduate School.

All international students who are provided GTA positions and whose native language is not English must take an [English Language Assessment](#). The assessment takes place in the Michigan Tech Testing Center, Center for Teaching and Learning, Van Pelt and Opie Library 226. Visit the Testing Center to schedule a time to take the assessment or contact them at 906-487-1001, techttesting-l@mtu.edu.

Additionally, all international graduate students are invited to participate in the weekly [International Graduate Student Communication and Cultural Center \(IGSC3\)](#). This is a free service designed to improve communication skills.

8.7. Accommodations for Students with Disabilities

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA) (<http://www.mtu.edu/equity/access-disability/ada/>). If any student has a disability and needs a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, Coordinator for Student Disability Services (7-1494). For other concerns about discrimination, contact your advisor, Department Chair, or the Affirmative Action Office (x7- 3310).

9. Professional Development Opportunities and Support Services

9.1. Graduate Student Government

The [Graduate Student Government](#) (GSG) of Michigan Tech represents the professional, intellectual, and academic concerns of graduate students to the various governing bodies of the university and acts as advocate for graduate students. GSG Representatives work with the CM Department Chair to provide programming for CM graduate students, faculty, and staff. You are encouraged to consider volunteering to serve as a CM representative to the GSG.

9.2. The J.R. Van Pelt and Opie Library

Along with a growing collection of textual and electronic resources, the [J. R. Van Pelt and Opie Library](#) is connected to [MELCAT & ILLIAD](#), so that students may retrieve sources from other institutions. The library also provides research and instructional [support](#) for all students. This modern and well-lit library has several [group study rooms](#), computers, printing and photocopying areas, a café, [University Archives and Historic records](#), and other [amenities](#).

9.3. The Center for Teaching and Learning

The William G. Jackson Center for Teaching and Learning holds [events and workshops](#) to support Michigan Tech in the continuous improvement of teaching and learning at all instructional levels. The CTL also holds the required [orientation sessions](#) for new GTAs and special [pedagogy workshops](#) for GTAs. It is highly recommended that you attend their events if you are a GTA or plan to teach in the future. You can also contact them if you have specific questions about Canvas, teaching technology, or pedagogy.

9.4. The Multiliteracies Center

The [MTU Multiliteracies Center](#) has coaches who can help with communicating across a wide array of cultures, disciplines, and methods of expression, including written, visual, and spoken forms. Communication is an important component of your graduate education, regardless of your degree program. If you need help with improving your oral, written, or visual communication skills, or just need some feedback on a particular project or assignment, we recommend that you consider making an appointment with a MTMC coach.

9.5. Career Services

[Career Services](#) offers various events and activities that can help you secure a future job. Pay particular attention for events targeted at graduate students, which are offered periodically during the year.

10. Forms

Department specific forms mentioned in the handbook can be provided on request from the CM Graduate Assistant.

Semester/Annual Evaluations

- **GTAs:** Graduate Teaching Assistant Evaluation Form
- **MS Researchers:** Research MS Student – Research Performance Evaluation Form
- **PhD Researchers:** Research PhD Student – Research Performance Evaluation Form
- **Self-Reflections:** Examples of Graduate and Undergraduate Student Self-Reflection Forms

Forms for Special Events

- **MS Thesis Defense:** MS Graduate Student - Thesis and Defense
- **PhD Proposal Defense:** PhD Graduate Student - Research Proposal
- **PhD Dissertation Defense:** PhD Graduate Student - Dissertation and Defense
- **In the Event of a Q Grade:** Plan to Correct Inadequate Research Progress Form

Forms Required Prior to Graduation

- **Graduation - MS Coursework:** Coursework MS Graduate Student - Elective Competency
- **Graduation - MS/PhD:** Graduate Student Closeout Procedure and Checklist