

GRADUATE STUDENT HANDBOOK

DEPARTMENT OF CHEMISTRY

M.S. in Chemistry

Ph.D. in Chemistry

MICHIGAN TECHNOLOGICAL UNIVERSITY

2020-2021

Graduate Student Handbook

Table of Contents

I.	General Information	1
	A. Department Structure	1
	B. General Information	1
II.	Assistantship and Support Policies	2
	A. Application for and Continuation of Support	2
	B. Graduate Teaching Assistantships	2
	C. Graduate Research Assistantships	3
	D. Funding of Self-Supporting Students	3
	E. Vacation/Leave Policy	3
	F. Professional Travel Funding	4
III.	Academic Policies	4
	A. Academic Integrity	4
	B. Graduate Program Committee (GPC)	4
	C. Advisor Selection	5
	D. Process for Changing Advisor	5
	E. Academic Standing, Progress to Degree, and Evaluations	6
	F. Policy on Timely Written Feedback	6
	G. Individual Development Plan	7
IV.	Degree Program Requirements and Timelines	7
	A. M.S. Degree (Thesis Option) Requirements	7
	B. M.S. Degree (Coursework Option) Requirements	9
	C. Accelerated MS Degree Requirements	9
	D. Ph.D. Degree Requirements and Timelines	10
V.	Description of Exams and Milestones	12
	A. Placement Exam	12
	B. Advising for Course Selection	13
	C. Ph.D. Advisory Committee	14
	D. Guidelines for the Year 2 Qualifying Exam (QuE)	14
	E. Original Research Proposal (ORP)	16
VI.	Work-Internship (Co-op) Policy	19
VII.	APPENDICES	20

Research Advisor Selection Form.....	21
Original Research Proposal Topic Approval Form.....	22
Rubric for Ph.D. Student Evaluations (QuE, ORP, Thesis Defense)	23
Individual Evaluation of Ph.D. Graduate Student Outcomes: Qualifying Exam- Written & Oral.....	24
Evaluation Committee Summary of Ph.D. Graduate Student Outcomes	26
Individual Evaluation of Ph.D. Graduate Student Outcomes: Original Research Proposal- Written & Oral.....	27
Individual Evaluation of Ph.D. Graduate Student Outcomes: Ph.D. Dissertation and Defense.....	29
Rubric for MS Student Evaluations (Thesis and Defense).....	31
Individual Evaluation of MS Graduate Student Outcomes: MS Thesis and Defense.....	32
Graduate Student Research Progress & Evaluation.....	34
Department of Chemistry Graduate Student Leave Request Form.....	36

GRADUATE STUDENT HANDBOOK

DEPARTMENT OF CHEMISTRY

The following information outlines the requirements and procedures for obtaining an advanced MS or Ph.D. degree in the Department of Chemistry.

I. General Information

A. Department Structure

The Department of Chemistry is a diverse community of faculty, professional staff, students, and scholars working together to further the mission of the department and the University. We are committed to excellence in research and education in chemistry, particularly in medicinal/biochemistry, environmental chemistry, computational chemistry, and materials chemistry. The Chemistry Department Faculty and Staff directory can be found on the [Department of Chemistry website](#).

Graduate academic responsibilities in the department are handled by the department chair and the Graduate Programs Committee.

B. General Information

Desk assignment: Each graduate student is assigned a desk and a desktop computer.

Computers: Chem. Sci. room 717 is an open computer lab. Questions and problems with computers should be directed to the chemistry IT liaison or the Information Technology (IT) help desk located on the first floor in the library, via phone at 7-1111, or via email it-help@mtu.edu.

Keys: Requests for new keys or replacements for lost keys should be made to the faculty member's department coordinator. Lost keys need to be reported to supervisors as soon as they are noticed to be missing. Keys must not be passed on to anyone else or duplicated under ANY circumstances. Lending or duplication of keys is grounds for dismissal. A \$100 fee is assessed for any key lost/replaced or not returned to public safety when no longer needed.

Building access: A student's *Husky Card* is used for after-hours access to the Chem. Sci. building via the west entrance. Requests for building access should be made to the department coordinator.

Restricted area access: Husky Card swipe access to equipment rooms or restricted areas should be made to Dean Seppala. Specific training may be required before access is given.

Safety: All students are required to have a safety form on file in the chemistry office before working in any research lab and are responsible for following all safety policies and reporting any potential or realized safety issues. [University Safety Manual](#) is available online.

For safety reasons, visitors are not permitted in research and instructional labs unless the department chair has granted written permission; this includes spouses and children. Children age 12 and under who are not enrolled in a Michigan Tech class or program are not allowed in laboratories at any time.

Annual online safety training is mandatory for ALL employees and will be communicated to you via email when assigned.

Email: Email is the department's primary communication method with graduate students. You are responsible for checking your official Michigan Tech email regularly and responding to departmental requests in a prompt manner.

Mail Service: Mail is delivered and picked daily to the department around 10:30 a.m. Graduate Student mailboxes are located Chem. Sci. 609, which can be accessed through the main office Chem. Sci. 607. Mail service to the department should be for professional purposes only.

Photocopier/printer and office supplies: Use of the department photocopier/printer and office supplies should be for teaching and research only. Please see one of the office staff for office supplies and the photocopier access code. Note that it is illegal to photocopy copyrighted materials beyond specific limits. If you have a question about copyright law, please contact the library or review the [link](#) to learn more about copyright law.

II. Assistantship and Support Policies

A. Application for and Continuation of Support

- The application for admission is also an application for a Graduate Teaching Assistantship. Such support is generally available for up to five years (Ph.D. degree). Support beyond this time frame is not guaranteed. Support includes stipend and tuition (up to nine credits). Additional fees such as the student activity fee, as well as health insurance, are the student's responsibility.
- Continued departmental support is contingent on satisfactory progress to degree, including but not limited to course work, research, satisfactory performance of the duties of your assistantship, following all safety policies, and English proficiency.
- Departmental support decisions are made by the Department Chair based on recommendations by the GPC and a review of student performance, including teaching, research, and conduct. The decision of the Chair is final.
- Summer departmental support, usually offered at a half-time level, is subject to availability of funds and the student's satisfactory progress as detailed above.

B. Graduate Teaching Assistantships

Graduate teaching assistants (GTAs) should expect to devote 20 hours per week to their teaching obligations, including office hours set aside to help individual students. Office hours should be a minimum of two hours per week. Teaching assistants are required to follow all applicable university employee policies. The Laboratory Supervisor is the immediate supervisor of GTAs. Vacations may not be planned during fall or spring semesters, including finals week.

C. Graduate Research Assistantships

Graduate Research Assistantships (GRAs) are awarded, with the Department Chair's approval, by the funded principal investigator (PI), who is also usually the GRA's immediate supervisor and research advisor.

Graduate students supported by graduate research assistantships are expected to work 20 hours per week on the research project from which the stipend and tuition are paid. GRAs are required to follow all applicable university employee policies.

D. Funding of Self-Supporting Students

Self-supporting students are admitted with the expectation that they are able to financially support themselves for the full term of their degree program. Self-supported students seeking departmental funding at any time must communicate their wishes in writing to the GPC, so decisions about fund availability, faculty needs, and teaching assignments are adequately distributed and reflect departmental needs. There is no guarantee of funding for self-supporting students as the department accepts such students expecting that no support is required. Note that research assistantships are at the discretion of the research advisor.

E. Vacation/Leave Policy

The department supports the health and well-being of its students, including occasional breaks from their studies. Graduate Students receiving financial aid through the University (teaching assistantship, research assistantship, fellowship) are entitled to staff holidays* and two weeks of annual paid vacation. It is student's responsibility to follow the guidelines below prior to scheduling or leaving for vacation.

- Students planning to be away from campus for more than a few days must complete the Student Leave Request Form (see Appendix) to ensure prior approval and that all necessary parties are aware (office, advisor, teaching supervisor) of the absence. This includes self-supported students.
- GTAs must not plan vacations while classes are in session. In addition, students must allow enough time to account for travel delays (weather, visa issues, etc.) when planning their return to campus.
- Students should work out the details of their responsibilities with their supervisors/advisors, including the timing and duration of absences. If research-related travel to meetings or conferences is unavoidable while classes are in session, it is the student's responsibility to discuss this with his or her teaching supervisor and arrange for coverage of the missed classes. A Student Leave Request Form must be completed and approved prior to travel.
- Students who plan to be away for more than two weeks in either Track A or Track B will generally not be eligible for summer departmental support.
- Students needing long term leave should consult with the advisor, the department chair, the GPC, and the Graduate School.

* If not overlapping with the paid vacation, when classes are in recess (semester breaks, winter holidays, Winter Carnival, spring break), it is expected that graduate students will make use of these quiet times to pursue progress in their studies and research (lab work, reading, publications). Taking some time off, in consultation with your advisor, is reasonable. Leaving your studies for the duration of all class recesses is not reasonable and may adversely affect your progress to degree and future offers of financial support. *Communication with your advisor is essential.*

F. Professional Travel Funding

Subject to the availability of funds and at the discretion of the department chair, the chemistry department will pay registration fees (up to a reasonable limit), and some travel expenses for graduate students **who present their work** at professional meetings. **Important Note:** *Students should confirm the level of funding support they will receive from the department before finalizing their travel plans.*

Before you travel:

- Submit a copy of your abstract, signed by your advisor, to the Graduate Assistant.
- Attach a page of information about the meeting.
- Include a statement on how the meeting will benefit your research and professional development.
- Notify your teaching/ lab supervisor (if applicable) as soon as you submit the abstract and register to attend, follow their instructions for covering your instructional responsibilities, and submit a Student Leave Request Form for approval.

III. Academic Policies

A. Academic Integrity

The University and the 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, as appropriate to the situation.

A detailed booklet describing Michigan Tech's academic integrity policy and procedures, including definitions of plagiarism, cheating, fabrication, and facilitating academic dishonesty, is available from the Dean of Students office or on the [University Senate website](#). All graduate students should carefully read this policy. Graduate Students must view the [orientation](#) as well as [responsible conduct of research](#) training website.

Michigan Tech strives to promote an atmosphere of honesty and integrity and requires all research to be carried out in a manner reflective of these principles. For more information, [please review Scientific Misconduct Procedures here](#).

A. Graduate Program Committee (GPC)

GPC is a committee consisting of faculty members. The mission of the committee is to maintain the program's rules (their handbook), oversee the progress of students in the program, and run the admission process.

B. Advisor Selection

The [selection of the research advisor](#) is one of the most important choices facing new students. All first-year graduate students must choose a major area and a research advisor by the end of their first semester.

The Research Advisor Selection Form is available from the Graduate Programs Assistant. This list has names of faculty members who have an opening in their research group in the current academic year.

1. Research Advisor Selection Form is available in the Appendix. During academic advising (review of placement scores) student and the Graduate Program Committee (acting advisor) will determine which faculty are to be interviewed based on available openings, student research interests, and needs of the department.
2. Student must interview faculty of interest, gather their signatures on the Advisor Selection Form, and use the interview process to identify the research advisor.
3. The graduate programs director will, based on both student and faculty preference lists and other factors (such as the faculty member's current, desired and optimum group size, his/her grant funding, the status of students currently in the group, similar factors for the student's second choice, etc.), assign each student to one of his/her preferred faculty.
4. Each student must submit Graduate Advisor Selection Form from MyMichiganTech profile to the graduate school by the designated date.

C. Process for Changing Advisor

Before initiating the process to change your Research 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 Graduate Programs Director to initiate the process to change advisor. In case of conflict of interest, meet with the department chair.
2. Discuss with the Graduate Programs Director (or Department Chair):
 - 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, and 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 programs 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 programs 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.

D. Academic Standing, Progress to Degree, and Evaluations

The Graduate School mandates that all graduate students receive regular evaluations regarding their progress toward degree no less than once per year. The Chemistry Department has their own procedures which satisfy this requirement.

Student academic progress is reviewed by the Graduate Program Committee (GPC). This evaluation takes into consideration the demonstration of foundational competencies (via placement exam or earning a grade of B or higher in assigned foundation courses), coursework progress, grade point average (GPA), proficiency requirements, and acceptance to a research laboratory. After two semesters, the GPC judges a student to be in good academic standing if the student has:

1. Demonstrated foundational competencies (via placement exam or earning a grade of B or higher in assigned foundation courses), with a minimum overall GPA for all courses of 3.0.
2. Taken discipline specific graduate level courses.
3. Joined a research group.
4. Shown proficiency in teaching as indicated by supervisor (if applicable).
5. Earned excellent research evaluations.

Failure to meet these criteria will result in the student being placed on a probationary status. Student will have at most one semester to satisfy all first-year requirements. Students who fail to maintain good academic standing can be terminated from the graduate program.

E. Policy on Timely Written Feedback

The chemistry department provides constructive written feedback to graduate students who are completing a report, thesis, or dissertation through two primary processes to help ensure that both students and advisors are aware of the student's academic progress and plans for the future.

First, all graduate students engaged in research are required to submit a Research Progress & Evaluation form (see the Graduate Student Research Progress & Evaluation form in the Appendix) at the end of each semester. This form is meant to be filled out by both the student and research advisor and discussed between them at a meeting that should be a two-way discussion of the overall progress toward degree, student development over the prior year; and to set research, performance, and development goals for the next year. The completed form should be signed by the student and advisor and submitted to the GPC through the Graduate Assistant. If deficiencies are identified in a student's performance, written feedback will be provided twice yearly by the student's advisory committee, specifically addressing the area(s) of deficiency, timeline for making up the deficiency, and consequences for continued unsatisfactory performance.

The second process of providing timely written feedback to students is coincident with the Graduate Learning Outcome (GLO) assessment. In particular, after a student completes the Qualifying Exam and the Original Research Proposal, the examining committees will provide copies of the GLO evaluation forms (see Appendix for the Graduate Learning Outcome rubrics and GLO forms) to the advisor and a summary form to the student. Advisors are encouraged to meet with the students to review the feedback.

F. Individual Development Plan

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 a living planning document and should be modified as needed. The IDP is a tool to help identify goals, opportunities, and potential hurdles and discuss these with a student's advisor.

An IDP is a useful tool to help a graduate student and advisor:

- Reflect and develop a strategy for graduate education
- Manage their expectations and maintain a positive working relationship
- Minimize misunderstandings and conflicts

IV. Degree Program Requirements and Timelines

A. M.S. Degree (Thesis Option) Requirements

- A minimum of 30 credits beyond the bachelor's degree are required for a master's degree.
 - Twenty (20) Course Credits:
 - CH 5130 Prof Dev: Chemical Safety (1 credit)
 - CH 5900 Chemistry Graduate Seminar (1 credit)
 - Minimum 12 credits of 5000 levels or higher.
 - Maximum 6 credits of 3000 to 4000 level (with a maximum of three credits of fundamental undergraduate courses assigned based on the Placement Exams).
 - Ten (10) Research Credits.
- M.S. thesis
- Presentation of research in a seminar followed by an oral defense.
- Proof of mastery of chemistry concepts through passing placement exams and department courses.
- **Timeline for degree completion.** All work must be completed within the specified time frame starting from the first enrollment in the degree program or earliest course listed on the degree schedule, whichever is earliest. Expected timeline for master's degree is 4-6 semesters. Any time extension beyond 6 semesters (3 calendar years) has to be approved by the department chair upon recommendation of the GPC. Master's degree must be completed within five (5) calendar years.

What:	When:
Provide proof of health insurance or obtain a University policy	Every Year
Register for courses, Pay your bill Confirm enrollment	Every Semester
Select an advisor by submitting Advisor and Committee Recommendation Form	By end of first academic semester
Responsible Conduct of Research (RCR)	BASIC by end of first academic year ADVANCED by end of fourth semester
Select an Advisory Committee by submitting Advisor and Committee Recommendation Form	During second semester.
Master's Degree Schedule Form	Due prior to moving to Research Mode or semester prior to defense.
Dissertation/Thesis Workshop	Well in advance of planned defense. As scheduled by the Graduate School.
Commencement Application Form	Semester of planned degree completion
Pre-Defense Form	Two weeks prior to oral defense. Coordinate with Chemistry Department Graduate Assistant for room scheduling, advertising, and review of procedures. Submit with draft copy of dissertation to graduate school & advisory committee
Report on Final Oral Examination Form	Day of defense Bring form to defense. Complete for advisory committee signatures following oral defense
Approval of Dissertation, Thesis, Report Form	Complete all revisions, obtain advisory committee approvals, submit form to graduate school WITHIN ONE WEEK submit dissertation, thesis, report to Digital Commons & ProQuest
Workspace Cleanout Form	Before graduating/leaving campus
Exit Survey	Before completing degree

B. M.S. Degree (Coursework Option) Requirements

- A minimum of 30 credits with a maximum of 12 credits at the 3000 to 4000 level.
- See graduate programs director for additional requirements and details.

Timeline M.S. (Coursework Option)

What:	When:
Provide proof of health insurance or obtain a University policy	Every Year
Register for courses, Pay your bill Confirm enrollment	Every Semester
Responsible Conduct of Research (RCR)	BASIC by end of first academic year ADVANCED by end of fourth semester
Master's Degree Schedule Form	Due semester before final semester.
Workspace Cleanout Form	Before graduating/leaving campus
Exit Survey	Before completing degree

C. Accelerated MS Degree Requirements

- A minimum of 30 credits beyond the bachelor's degree are required for an Accelerated MS degree.
 - Twenty (20) Course Credits:
 - CH 5130 Prof Dev: Chemical Safety (1 credit)
 - CH 5900 Chemistry Graduate Seminar (1 credit)
 - Minimum 12 credits of 5000 levels or higher.
 - Maximum 6 credits of 3000 to 4000 level (with a maximum of three credits of fundamental undergraduate courses assigned based on the Placement Exams).
 - Minimum of six (6) Research Credits.
 - Research Report (MS thesis)
 - Presentation of research in a seminar followed by an oral defense.
 - Proof of mastery of chemistry concepts through passing placement exams and department courses.

Maximum can be double counted to both BS and Acc. MS degree.

Maximum one-third of the required non-research course credits can be Senior Ruled.

See this [LINK](#) for information.

D. Ph.D. Degree Requirements and Timelines

Credit Requirements:

- A minimum of 60 credits beyond the bachelor's degree are required.

Course Credit Requirements:

- A minimum of twenty (20) Course Credits:
 - CH 5130 Prof Dev: Chemical Safety (1 credit).
 - CH 5900 Chemistry Graduate Seminar (1 credit).
 - Minimum 12 credits of 5000 levels or higher.
 - Maximum 6 credits of 3000 to 4000 level (with a maximum of three credits of fundamental undergraduate courses assigned based on the Placement Exams).

Students are also required to take Advanced RCR course before the end of second year. Please see the list of [pre-approved courses for advanced training here](#). Advanced RCR course credits do not count towards the degree course credit requirements.

Note: The following credits are not allowable to count toward graduation according to Graduate School requirements:

- Courses numbered below the 3000 level
- Audited courses
- Continuous enrollment courses (ex: UN 5951, UN 5953)
- Non-research courses taken on a pass/fail basis
- Credits applied toward another degree (with limited exceptions; see the Graduate School web site for details)

In addition, the Chemistry Department requires a grade of B or better for a course to count toward graduate degree requirements. Up to 6 credits with BC or C grades may count upon recommendation of the GPC and approval by the Department Chair.

Research Credit Requirements:

- A minimum of thirty (30) Research Credits.
- Additional ten (10) credits that can be Course Credits and/or Research Credits.

Required Milestones:

- Qualifying Examination (see details below).
- Original Research Proposal (see details below).
- Ph.D. Dissertation.
- Oral Defense of Ph.D. Research.

Timeline for degree completion:

All work must be completed within the specified time frame starting from the first enrollment in the degree program or earliest course listed on the degree schedule, whichever is earliest. Any time extension beyond 10 semesters (5 calendar years) has to be approved by the Department Chair upon recommendation of the GPC. Ph.D. degree must be completed within eight (8) calendar years.

NOTE: For students joining with a master's degree, thirty credits beyond the master's degree are required for a Ph.D. Upon successful passing of placement exams and degree review, the GPC, in

consultation with the primary graduate advisor, may waive some course credit requirements. However, CH5130 and CH5900 are required course credits for all graduate students.

Timeline to Ph.D. completion

What:	When:
Provide proof of health insurance or obtain a University policy	Every year
Register for courses, Pay your bill Confirm enrollment	Every semester
Selecting advisor by submitting Advisor and Committee Recommendation Form	By end of first academic semester
Responsible Conduct of Research (RCR)	BASIC by end of first academic year ADVANCED by end of fourth semester
Select an Advisory Committee by submitting Advisor and Committee Recommendation Form	Fourth semester (prior to Qualifying Examination)
Qualifying Examination	During fourth semester After completion of oral presentation submit Report on Qualifying Examination to chemistry with the appropriate signatures
Original Research Proposal Examination	Fifth or sixth semester After completion of oral presentation submit Report on Research Proposal Examination to the chemistry department Graduate Assistant with advisory committee signatures
Doctoral Degree Schedule	Semester coursework is complete or semester before petition to enter Research Mode
Petition to Enter Research Mode	One week prior to the first day of classes in the semester student plans to enter Research Mode
Dissertation/Thesis Workshop	Well in advance of planned defense. As scheduled by the Graduate School.

Commencement Application Form	Semester of planned degree completion
Pre-Defense Form	Two weeks prior to oral defense. Coordinate with Chemistry Department Graduate Assistant for room scheduling, advertising, and review of procedures. Submit with draft copy of dissertation to graduate school & advisory committee
Report on Final Oral Examination	Day of defense Bring form to defense. Complete for advisory committee signatures following oral defense
Approval of Dissertation, Thesis, Report	Complete all revisions, obtain advisory committee approvals, submit form to graduate school Within one week submit dissertation, thesis, report to Digital Commons & ProQuest
Workspace Cleanout Form	Before graduating/leaving campus
Survey of Earned Doctorate Exit Survey	Before completing degree

V. Description of Exams and Milestones

A. Placement Exam

This policy applies to incoming students to the M.S. and Ph.D. programs.¹

Ph.D. or thesis M.S. are research-oriented degrees. The aim of the placement exam is to determine the most suitable courses for a person which will help them achieve the best results within our Graduate Program. All incoming M.S. and P.D. program students are required to take American Chemical Society (ACS) standardized tests in ***two subject areas*** (see below). Demonstration of proficiency for each subject area is defined as a score in no less than the 50th percentile. A photocopy of the completed cover sheet will be given to the student to use in course registration. The original cover sheet and exam results will be kept in the student's file.

Students that do not demonstrate adequate proficiency based on the placement exam, will be required to earn a grade of B or better in the appropriate undergraduate foundation course, which must be taken in the first year of graduate study.

Descriptions of the placement exams:

¹ This procedure does not generally apply to Michigan Tech undergraduates in the Accelerated M.S. degree program since they are earning a Michigan Tech undergraduate degree in Chemistry.

1) *Physical Chemistry Placement Exam*

Placement Exam questions in physical chemistry consist of problems that generally fall into three subject areas: thermodynamics, chemical kinetics and elementary quantum mechanics. The student should be able to manipulate, solve and apply differential and algebraic equations, provide straightforward derivations, and occasionally explain significant physical techniques or theories.

2) *Inorganic Chemistry Placement Exam*

The placement examination in inorganic chemistry will contain questions designed to test a student's knowledge of inorganic chemistry at the undergraduate level of an ACS accredited program. Such programs usually include courses in inorganic chemistry at the freshman/sophomore and junior/senior levels; the content of these courses normally span both descriptive chemistry and physical principles and methods.

3) *Organic Chemistry Placement Exam*

The organic chemistry placement examination is designed to verify that each student has retained a basic knowledge and understanding of the organic chemistry of functional groups, as well as synthetic methods, reaction mechanisms, and spectroscopic methods of characterization.

4) *Biological Chemistry Placement Exam*

The biological chemistry placement examination is designed to verify that each student has retained a basic knowledge and understanding of molecular aspects of biological structures, equilibria, energetics, and reactions. It will cover three general subject areas: Biological structures and interactions; Biological reactions; Biological Equilibria and thermodynamics.

5) *Analytical Chemistry Placement Exam*

The analytical chemistry placement exam includes quantitative analysis (errors in chemical analysis, statistical data treatment, and evaluation, chemical equilibria, classical methods of analysis including gravimetric methods of analysis, and titration methods in analytical chemistry) and instrumental analysis (kinetics and separations {gas chromatography, liquid chromatography and other miscellaneous separation methods}, electrochemical method, spectrochemical analysis {molecular absorption spectrometry, molecular fluorescence spectrometry, atomic spectroscopy and mass spectrometry}).

B. Advising for Course Selection

Performance on the placement examinations and review of the student's undergraduate and graduate transcript will be used by the GPC to guide course selection during the first year of graduate study. Grades and research needs will guide later course selections.

Within the first semester, a member of the GPC will act as a student's advisor. Starting second semester, students should also consult their research advisor in conjunction with the GPC for approval of courses. Student performance review will be held with GPC at the end of each calendar year to ensure progress and make funding recommendations.

C. Ph.D. Advisory Committee

Students form their Ph.D. Advisory Committee in the 4th academic semester before their Qualifying Examination (QuE). The Ph.D. Advisory Committee shall consist of (i) the primary research advisor who serves as the Committee Chair, (ii) two members of the Chemistry Graduate Faculty, one of which should be from the student's research area and the other from another research area, and (iii) one member of the Graduate Faculty external to Chemistry, according to Graduate School stipulations. The student shall submit a completed Advisor and Committee Recommendation Form listing recommended advisory committee members to the Graduate Program Director by the end of the fourth semester.

D. Guidelines for the Year 2 Qualifying Exam (QuE)

Goal: to examine the student's knowledge of chemistry (fundamental concepts), knowledge of the research background, understanding of applicable research methods, and critical insight into the method selection and data analysis.

Qualifying Exam Committee: The Qualifying Examination (QuE) Committee will consist of Ph.D. Advisory Committee members (see section VI. D. below) with exception of the primary research advisor. For QuE Committee, the primary research advisor will be substituted by a member of the Graduate Programs Committee, who will also emcee the oral presentation and the QuE Committee oral examination portions of the exam.

Guidelines for Written Report:

- 5-10 pages, single-spaced, with 1-inch margins inclusive of any figures, tables, and graphs (references excluded)
- Font: 12-point font, Times New Roman, or 11-point Helvetica or Arial
- All graphics and charts must be of publishable quality, and the entire document must be of professional quality visually and in the clarity of the language.
- The report format should be similar to an ACS journal style [includes introduction, objectives, approaches and methods, data and data analysis (if applicable), conclusions, and future perspectives].

Abstract: Introduce the research, identify project objectives, reflect on the methods, and include results and conclusion.

Introduction: Provide an in-depth description of the prior research that is relevant to the project. Highlight the pitfalls or state the problem that is (will be) addressed through the conducted study. Use appropriate citations throughout. If needed, include project-describing figure. A copy of relevant graphs or pictures from a reference, with proper citation, can be used.

Materials and Methods: Identify all materials and methods that were used. Provide a brief explanation of the relevant techniques and state the basis for method selection (use references accordingly).

Results and Discussion: Present your data. Explain findings and discuss how your results contribute to addressing the pitfalls/problems identified in the introduction. Use appropriate

figures, schemes, tables to summarize your data. Provide sufficient explanation for the reader to understand the results you have observed. Highlight if method optimization of development was (is necessary).

Conclusions and Future Perspectives: Summarize your project objective and research outcomes. Mention what additional work has to be done to complete the studies.

Guidelines for Oral Presentation

- 20-25 minute presentation addressing the information contained in the written report.

Guidelines for Oral Examination

The Oral Examination by the QuE Committee includes testing the candidate's knowledge of fundamental concepts in chemistry (bonding, energies, pKa, chemical mechanisms, etc.) and in the field of research; understanding of methods used and method selection; understanding and critical analysis of published data and data acquired. Advisors should be mindful that this is part of an examination and therefore should refrain from answering questions from the committee members and let the student answer.

Qualifying Exam (QuE) Evaluation Criteria

1) *Written Document Evaluation Criteria.*

Criteria that might be used to accomplish this are (in no particular order):

- Quality of communicating research objective and merit
- Quality of images, tables, other graphics
- Adequate selection of graphical support
- Adequate reflection of the literature background
- Adequate use of citations
- Quality of communicating research goal, research plan, methods, key experiments or instrumental analysis, data analysis, molecular modeling methods, etc.
- Level of critical insight into the proposed work such as understanding of limitations of the approach, experimental methods, analytical tools, or potential broader implications of a successful or failed project to other fields.

2) *Oral Presentation Evaluation Criteria.*

The Evaluation of the Oral Presentation should be based on how well the student met the objectives of this Exam Part. Examples of Specific Criteria that might be used to accomplish this are (in no particular order):

- Overall quality of presentation including background overview, communication of the content, organization, slide quality, graphics quality, use of captions and citations, student narrative, etc.
- Quality of research design with experimental plans, understanding of the research methods and the significance of the data obtained to move the project forward.
- Demonstration of a broader impact

3) *Committee Examination*

The Examination Committee is expected to ask an appropriate number of questions with a suitable range and depth within student's research and the nearest academic discipline.

QuE Committee Evaluation

The Examination Committee discusses the student's effectiveness at accomplishing the objectives for Parts 1-3 of the Qualifying Exam based on the following criteria:

- A breadth and depth of knowledge related to their research project
- A breadth and depth of knowledge in their nearest Academic Discipline
- The ability to analyze data or extrapolate from data or form hypotheses
- The ability to defend their ideas or analyses in an oral defense

Each Examination Committee member will independently evaluate student's performance using the evaluation form for Qualifying Exam Graduate Learning Outcomes (GLOs) and the Rubric for Ph.D. Student Evaluations (see Appendix). All forms must be collected and passed to the graduate program assistant. The Graduate Assistant will provide a copy of Assessment Summary to the student. Advisors are encouraged to discuss the outcome and the assessment with the student.

Each committee member will independently assign an overall determination of Pass, Provisional Pass, or Fail. The committee will also come to a consensus for its overall determination of Pass, Provisional Pass, or Fail, which will determine the student's overall Qualifying Exam outcome.

- Provisional Pass will require student to address all committee requirements in a timely manner.
- In case of a Fail grade, student is allowed to retake the Exam in the following semester. Failure to Pass QuE on a second attempt will be considered as evidence of not making satisfactory progress toward the degree.

E. Original Research Proposal (ORP)

The goal of this examination is to give students experience in developing an original idea and presenting it to the scientific community. **The topic should not be closely related to the student's current and previous research projects** but represent new ideas and techniques developed by the student from his/her reading, research, and coursework. The topic of the original research proposal and the written summary must be approved by the advisor and the Advisory Committee. The title and summary of the original research proposal should be submitted to graduate assistant along with a summary explaining how this proposals goal are distinct when compared to goals of the graduate research. The written proposal is to be submitted to the advisory committee at least two weeks prior to the presentation.

Goal: to examine the student's ability to identify the gaps in a research area not closely related to current research and to propose new research directions/projects.

Guidelines for Written Report:

- up to 15 pages, double-spaced, with 1-inch margins inclusive of any figures, tables, and graphs. The title page, abstract, and references (bibliography) are not included in the page count.
- Font: 12-point font, Times New Roman, or 11-point Helvetica or Arial
- All graphics and charts must be of publishable quality, and the entire document must be of professional quality visually and in the clarity of the language.
- The report format should be similar to an ACS journal style and should include abstract, introduction, objectives/hypothesis, approaches and methods, outcomes and alternative strategies. The report should also summarize the expected impact of the proposed research.

Abstract: Introduce the research, identify project objectives, reflect on the methods, and include potential outcomes and impacts.

Introduction:

- 1) Opening part:
 - a. Provide an in-depth description of the prior research that is relevant to the project. Use appropriate citations throughout. If needed, include project-describing figure. A copy of relevant graphs or pictures from a reference, with proper citation, can be used.
 - b. Establish the gap in the knowledge base or critical need that must be addressed.
- 2) Second part:
 - a. Formulate your long-term goal.
 - b. Formulate objectives of this research proposal
 - c. Introduce the working hypothesis
 - d. Provide the rationale for the proposed research – formulate what broad impact your research will have.
 - e. Address why you are well prepared to undertake the proposed study.

Specific Aims, Goals, and Objectives: Highlight what specific steps you will take to achieve the objective of the research proposal. Consider providing a brief overview of what specific questions will be answered.

Expected Outcomes: Provide a brief overview of the outcomes from the proposed research. Elaborate on broader impacts.

Research Plan:

- 1) Present the studies that you plan to do. Provide enough technical detail on how the hypothesis will be tested. What experiments will be done to obtain the data. How data will be analyzed, summarized.
- 2) Provide a brief summary of the expected outcomes – how the obtained data will contribute to achieving the overall objectives of the proposal.

References: provide a thorough bibliography in ACS format.

Guidelines for Oral Presentation:

- 30-40 minutes
- Present the information in the Written Report.
- Use graphics appropriately to address all aspects of the written report - Open to the public

Guidelines for Oral Examination:

The Oral Examination, which follows the presentation, includes testing the knowledge of fundamental concepts of chemistry and the overall understanding of the field of the proposed research; understanding of methods proposed to obtain the data; understanding and critical analysis of analysis outcomes.

Original Research Proposal (ORP) Evaluation Committee

The ORP Examination Committee will consist of student's Ph.D. Advisory Committee.

VI. Work-Internship (Co-op) Policy

Many of our graduate students take internships which consist of leaving Michigan Tech for one semester to intern at a company. Graduate students can benefit from experience in laboratories outside Michigan Tech. Some students are fortunate enough to be offered employment at the company where they interned. It is necessary to have a formal procedure to streamline this process. It is suggested that the following statements may be useful as a guide for this process. A leave can be granted in specific circumstances.

The basic framework consists of the following criteria:

1. Students wishing to engage in an internship experience must first discuss this with their primary research advisor. A student should not accept an internship experience without prior approval of their primary research advisor. ***The advisor must grant approval before positions are sought or applied for.*** These experiences are only possible with the permission of the professor, the Graduate Programs Committee and the Department Chair. The process is initiated by the student discussing the matter with their mentor and then providing the application materials described below.
2. Internships will be granted for one semester only.
3. Internship experiences must involve some sort of chemical work, either in synthesis and characterization or theoretical work.
4. Students will only be allowed one internship experience.
5. An internship should not be granted in the final year of research prior to dissertation defense.

Application Materials:

The Graduate Programs Committee will require the following information from the advisor and student before a recommendation will be made to the Department Chair:

1. The advisor must provide a cover letter indicating how they have initiated and (co)developed the internship.
2. The student must submit a letter to the Graduate Programs Committee explaining how the experience benefits his or her research and career goals, and detailing a timeline to completion of the degree program.

The complete set of information provided to the Graduate Programs Committee and the recommendation of the Graduate Programs Committee will be forwarded to the Department Chair who will make the final decision. Additional stipulations may be defined by the Graduate Programs Committee or the student's primary research advisor.

Co-op or internship experiences can affect a student's insurance status, financial aid eligibility, graduate school standing, and visa status. *It is the student's responsibility to comply with all university requirements regarding a co-op or internship.*

VII. APPENDICES

Research Advisor Selection Form.....	21
Original Research Proposal Topic Approval Form	22
Rubric for Ph.D. Student Evaluations (QuE, ORP, Dissertation and Defense)	23
Individual Evaluation of Ph.D. Graduate Student Outcomes: Qualifying Exam- Written & Oral	24
Evaluation Committee Summary of Ph.D. Graduate Student Outcomes.....	26
Individual Evaluation of Ph.D. Graduate Student Outcomes: Original Research Proposal- Written & Oral	27
Individual Evaluation of Ph.D. Graduate Student Outcomes: Ph.D. Dissertation and Defense ...	29
Rubric for M.S. Student Evaluations (Thesis and Defense)	31
Individual Evaluation of M.S. Graduate Student Outcomes: M.S. Thesis and Defense.....	32
Graduate Student Research Progress & Evaluation	34
Department of Chemistry Graduate Student Leave Request Form.....	36

Research Advisor Selection Form

Interview	Area	Faculty Name	Title	Email	Office	Faculty Signature
	Analytical	Liu, Haiying	Professor	hyliu	402E	
	Analytical/Atm	Mazzoleni, Lynn	Associate Professor	lrmazzol	402D	
	Analytical/Env	Green, Sarah A	Professor	sgreen	GLRC	
	Biochemistry	Dam, Tarun K	Associate Professor	tkdam	510C	
	Biochemistry	Thompson, Marty	Associate Professor	thompson	510B	
	Biochemistry	Tiwari, Ashutosh	Associate Professor	tiwari	402B	
	Chem Ed	Charlesworth, Paul	Associate Professor	pcharles	708A	
	Computational	Christov, Christo	Associate Professor	christov	717	
	Computational	Valenzano-Slough, Loredana	Associate Professor	lvalenza	701A	
	Computational	Karabancheva-Christova, Tatyana	Associate Professor	tatyanak	706C	
	Inorganic	Luck, Rudy L	Associate Professor	rluck	701B	
	Organic	Bi, Lanrong	Associate Professor	lanrong	620A	
	Organic	Fang, Shiyue	Professor	shifang	620C	
	Organic	Tanasova, Marina	Assistant Professor	mtanasova	620B	
	Physical Chemistry	Perrine, Kathryn	Assistant Professor	kaperrine	704	
	Polymer	Heiden, Patricia A	Professor	paheiden	415	

Student Name: _____

Advisor of Interest: _____

Original Research Proposal Topic Approval Form

Original Research Proposal (ORP) examination assesses student skills to develop an original research idea. *The ORP topic should not be closely related to the student's current and previous research projects* but represent new ideas and techniques developed by the student from his/her reading, research, and coursework. The ORP topic should be reviewed and approved by the Advisor and the student's Advisory Committee.

Student Name: _____

Semester/year: _____

ORP Topic: _____

Justification of Differences from research:

Advisory committee member	Signature	Date

Rubric for Ph.D. Student Evaluations (QuE, ORP, Thesis Defense)

The following evaluation criteria are being used to assess Ph.D. student performance in major qualifying examination. Based on these criteria, individual evaluations forms (provided below) are filled up by each committee member for formal assessment of examination.

	Departmental Objectives	Deficient	Marginal	Satisfactory	Excellent
GLO1: Demonstrate Mastery of Chemistry	Synthesizes existing knowledge	<ul style="list-style-type: none"> Does not understand basic concepts or conventions; Misinterprets or misuses sources. 	<ul style="list-style-type: none"> Displays a basic understanding of the field. 	<ul style="list-style-type: none"> Displays a solid understanding of the field; Adequate exploration of interesting issues and connections. 	<ul style="list-style-type: none"> Demonstrates thorough mastery as well as creativity in drawing upon multiple sources; Demonstrates a deep understanding of relevant literature.
GLO2: Demonstrate Advanced Research Skills	Understands the application of methodologies and techniques	<ul style="list-style-type: none"> Misapplies or uses nonstandard techniques without adequate rationalization. 	<ul style="list-style-type: none"> Applies standard techniques; Does not recognize limitations in data/techniques were applicable. 	<ul style="list-style-type: none"> Uses appropriate, theory, methods and techniques; Appropriately explains limitations of data/techniques were applicable. 	<ul style="list-style-type: none"> Suggests and utilizes improvements to standard methods and techniques; Limitations are thoroughly and competently discussed.
	Critically analyzes and evaluates their own findings and those of others	<ul style="list-style-type: none"> Does not recognize improbable results. 	<ul style="list-style-type: none"> Relies on others to suggest data that are relevant to solving a problem; Literature review is adequate but not critical. 	<ul style="list-style-type: none"> Identifies weaknesses in own work but discussion is not comprehensive. 	<ul style="list-style-type: none"> Provides critical evaluation of previous works; Identifies and corrects weaknesses or flaws in referenced work;
GLO3: Make an Original and Substantial Contribution to the Discipline	Think originally & independently to develop concepts & methodologies	<ul style="list-style-type: none"> Fails to put their research into suitable context to show it advances existing science; Fails to apply proper methods. 	<ul style="list-style-type: none"> Inadequately puts research into a suitable context to show it advances existing science; Inadequate use or analysis of available methods. 	<ul style="list-style-type: none"> Demonstrates how research fits into and advances existing science; Appropriate use or analysis of available methods. 	<ul style="list-style-type: none"> Demonstrates a completely original idea or new method to apply or interpret data from existing methods; Shows how the idea or method can lead to new discoveries or significantly advance science.
GLO4: Demonstrate Professional Skills	Displays effective written and oral communication skills	<ul style="list-style-type: none"> Writing or presentation has frequent spelling and grammatical errors; Does not grasp intent of questions. 	<ul style="list-style-type: none"> Writing or presentation is adequate; Illustrations are technically correct, and appropriate; Understanding of concepts adequate but incomplete. 	<ul style="list-style-type: none"> Writing or presentation is well organized and effective; Illustrations are appropriate and effective; Understanding of concepts is satisfactory. 	<ul style="list-style-type: none"> Writing or presentation is concise, elegant, and engaging; Technical content and graphic design of illustrations are well planned/executed; Thoroughly understands concepts.
GLO5: Demonstrate Responsible Conduct in Research	Safe lab practices; Proper attribution of credit in writing and research.	<ul style="list-style-type: none"> Failed Lab Safety Course Fails to attribute credit in writing, illustrations, or joint research. 	<ul style="list-style-type: none"> Passed Lab Safety Course Insufficient attribution of credit in writing, use of illustrations, or joint research. 	<ul style="list-style-type: none"> Passed Lab Safety Course Appropriate attribution in writing and use of figures and joint research efforts. 	<ul style="list-style-type: none"> Passed Lab Safety Course Full attribution in writing and use of figures, illustrations, and joint research.

Individual Evaluation of Ph.D. Graduate Student Outcomes:
Qualifying Exam- Written & Oral

Student's Name: _____ **Semester / Year:** _____

Examiner's Name: _____

GLO1: Mastery of Chemistry: Demonstrates broad knowledge of chemistry

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

Comments: _____

GLO2: Research Skills:

a) Understands the application of methodologies and techniques

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

b) Understands the limitations of data/techniques where applicable

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

c) Critically analyzes and evaluates their own findings and those of others

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

Comments: _____

GLO4: Professional Skills:

Written Communication

a) The report provides an effective overview of the prior research relevant to the project

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

b) The report clearly states the objectives of the research project and the approach

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

c) The report clearly presents and interprets experimental data

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

d) The report Abstract, Conclusions, and Future Perspectives are well-written and appropriate

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

Oral Communication

a) The presentation components are well-organized and work together to communicate the topic

Deficient Marginal Satisfactory Excellent

b) The presentation includes relevant background to put the research plan into context and shows how the project advances the disciplinary knowledge

Deficient Marginal Satisfactory Excellent

c) The content and presentation demonstrate understanding and insight into the research topic

Deficient Marginal Satisfactory Excellent

d) All graphics, captions, units in the slides are visible to the audience and support the talk

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO5: Responsible Conduct in Research: The use of citations, figures, illustrations, and joint research contributions were appropriately documented

Deficient Marginal Satisfactory Excellent

Comments: _____

Summary of the Student’s Major Strengths and Weaknesses:

Overall Determination: **Pass** **Provisional Pass** **Fail**

Examiner’s Signature: _____

Evaluation Committee Summary of Ph.D. Graduate Student Outcomes

Student's Name: _____ Semester / Year: _____

Please check one: Qualifying Exam Original Research Proposal

Committee Decisions

GLO1: Mastery of Chemistry: Demonstrates broad knowledge of chemistry

Deficient Marginal Satisfactory Excellent

GLO2: Demonstration of advanced research skills

Deficient Marginal Satisfactory Excellent

GLO4: Demonstration of professional skills (effective **written** communication)

Deficient Marginal Satisfactory Excellent

GLO4: Demonstration of professional skills (effective **oral** communication)

Deficient Marginal Satisfactory Excellent

GLO5: Demonstration of responsible conduct of research

Deficient Marginal Satisfactory Excellent

Overall Determination: **Pass** **Provisional Pass** **Fail**

Consensus Comments of the Committee:

**Individual Evaluation of Ph.D. Graduate Student Outcomes: Original
Research Proposal- Written & Oral**

Student's Name: _____ **Semester / Year:** _____

Examiner's Name: _____

GLO1: Mastery of Chemistry: Demonstrates broad knowledge in chemistry

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO2: Research Skills:

a) Understands the application of methodologies and techniques

Deficient Marginal Satisfactory Excellent

b) Understands the limitations of data/techniques where applicable

Deficient Marginal Satisfactory Excellent

c) Critically analyzes and evaluates their own findings and those of others

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO4: Professional Skills:

Written Communication

a) The proposal provided an effective overview of the prior research relevant to the project

Deficient Marginal Satisfactory Excellent

b) The proposal clearly states the objectives and merit of the proposed research

Deficient Marginal Satisfactory Excellent

c) The proposal clearly presents and justifies the originality of the proposed research

Deficient Marginal Satisfactory Excellent

Oral Communication

a) The presentation components are organized and work together to communicate the topic

Deficient Marginal Satisfactory Excellent

b) The presentation effectively presents the relevant research to put the original ideas in context and to show the novelty and merit of the original idea

Deficient Marginal Satisfactory Excellent

c) All graphics, captions, and units in the slides are visible to the audience and support the talk

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO5: Responsible Conduct in Research: The use of citations, figures, illustrations, and joint research contributions were appropriately documented

Deficient Marginal Satisfactory Excellent

Comments: _____

Summary of the Student’s Major Strengths and Weaknesses:

Overall Determination: **Pass** **Provisional Pass** **Fail**

Examiner’s Signature: _____

*Individual Evaluation of Ph.D. Graduate Student Outcomes: Ph.D.
Dissertation and Defense*

Student's Name: _____ Semester / Year: _____

Examiner's Name: _____

GLO1: Mastery of Chemistry: Demonstrates in-depth knowledge of the primary chemistry area

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO2: Research Skills:

a) Understands the merits and limitations of methodologies and techniques

Deficient Marginal Satisfactory Excellent

b) Understands the limitations of data where applicable

Deficient Marginal Satisfactory Excellent

c) Critically analyzes and evaluates their own findings and those of others

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO3: Contribution: Makes an original and substantial contribution to the discipline

Deficient Marginal Satisfactory Excellent

GLO4: Professional Skills:

Written Communication

a) The dissertation provided an effective presentation of the prior research relevant to the project

Deficient Marginal Satisfactory Excellent

b) The dissertation clearly states objectives, accomplishments, and weaknesses of the research

Deficient Marginal Satisfactory Excellent

c) The dissertation clearly presents and justifies the originality of the research

Deficient Marginal Satisfactory Excellent

d) The dissertation Conclusions and Future Perspectives are appropriate

Deficient Marginal Satisfactory Excellent

Oral Communication

a) The presentation effectively and professionally communicates the topic and its significance

Deficient Marginal Satisfactory Excellent

b) The presentation effectively presents the dissertation research in context to show its originality and appropriateness in approach

Deficient Marginal Satisfactory Excellent

c) The presentation demonstrates deep understanding and insight into the research topic and how the research contributes to the advancement of knowledge

Deficient Marginal Satisfactory Excellent

Comments: _____

GLO5: Responsible Conduct in Research: The use of citations, figures, illustrations, and joint research contributions were appropriately documented

Deficient Marginal Satisfactory Excellent

Comments: _____

Summary of the Student's Major Strengths and Weaknesses:

Overall Determination: Pass Provisional Pass Fail

Examiner's Signature: _____

Rubric for MS Student Evaluations (Thesis and Defense)

The following evaluation criteria are being used to assess MS student performance in major qualifying examination. Based on these criteria, individual evaluations forms (provided below) are filled up by each committee member for formal assessment of examination.

	Departmental Objectives	Deficient	Marginal	Satisfactory	Excellent
GLO1: Demonstrate Proficiency in Chemistry	Is proficient with existing knowledge	<ul style="list-style-type: none"> Does not understand basic concepts or conventions; Misinterprets or misuses sources. 	<ul style="list-style-type: none"> Displays a basic understanding of the field. 	<ul style="list-style-type: none"> Displays an understanding of the field; Adequate exploration of interesting issues and connections. 	<ul style="list-style-type: none"> Demonstrates proficiency as well as creativity in drawing upon multiple sources.
GLO2: Demonstrate Research Skills	Understands the application of methodologies and techniques	<ul style="list-style-type: none"> Misapplies or uses non-standard techniques without adequate rationalization. 	<ul style="list-style-type: none"> Applies standard techniques; Does not recognize limitations in data/techniques were applicable. 	<ul style="list-style-type: none"> Uses appropriate, theory, methods and techniques; Appropriately explains limitations of data/techniques were applicable. 	<ul style="list-style-type: none"> Suggests and utilizes improvements to standard methods and techniques; Limitations are competently discussed.
	Critically analyzes and evaluates their own findings and those of others	<ul style="list-style-type: none"> Does not recognize improbable results. 	<ul style="list-style-type: none"> Relies on others to suggest data that are relevant to solving a problem; Literature review is adequate but not critical. 	<ul style="list-style-type: none"> Identifies weaknesses in own work but discussion is not comprehensive. 	<ul style="list-style-type: none"> Provides critical evaluation of previous works; Identifies and corrects weaknesses or flaws in referenced work.
GLO3: Make a Contribution to the Discipline	Think originally to develop concepts & methodologies; identify new opportunities	<ul style="list-style-type: none"> No independent research; Question or problem is trivial, weak, unoriginal, or previously solved. 	<ul style="list-style-type: none"> Demonstrates competence but is not very original or significant; Displays little creativity, imagination, or insight. 	<ul style="list-style-type: none"> Argument is strong, comprehensive, and coherent; Has some original ideas, insights, and observations. 	<ul style="list-style-type: none"> Has a compelling question or problem; Project is original, ambitious, creative, and thoughtful; Asks or addresses new / important questions.
GLO4: Demonstrate Professional Skills	Displays effective written communication skills	<ul style="list-style-type: none"> Writing is disorganized, has frequent spelling and grammatical errors; Illustrations are poorly selected or illegible. 	<ul style="list-style-type: none"> Writing is adequate; Structure and organization are weak, but sufficient; Illustrations are legible, technically correct, and appropriate. 	<ul style="list-style-type: none"> Well written and organized. 	<ul style="list-style-type: none"> Concise, elegant, engaging; Technical content and graphic design of illustrations are well planned/executed.
	Displays effective oral communication skills	<ul style="list-style-type: none"> Disorganized or unable to articulate an argument; Does not grasp intent of questions. 	<ul style="list-style-type: none"> Clear and coherent, partially understands or addresses questions, responses may have some gaps in logic or inconsistencies. 	<ul style="list-style-type: none"> Clear & coherent; Engages appropriate audiences; Grasps intent. 	<ul style="list-style-type: none"> Compelling, persuasive, and accessible to multiple audiences; Articulate addresses questions.
GLO5: Demonstrate Responsible Conduct in Research	Understands safe lab practices; gives proper attribution of credit in writing and research.	<ul style="list-style-type: none"> Failed Safety Course; Fails to properly attribute credit in writing, illustrations, or joint research. 	<ul style="list-style-type: none"> Passed Lab Safety Course; Insufficient attribution of credit in writing, use of illustrations, or joint research. 	<ul style="list-style-type: none"> Passed Lab Safety Course; Attribution in writing and use of figures and joint research efforts. 	<ul style="list-style-type: none"> Passed Lab Safety Course; Full attribution in writing and use of figures, illustrations, and joint research.

**Individual Evaluation of MS Graduate Student Outcomes: MS
Thesis and Defense**

Student's Name: _____ **Semester / Year:** _____

Examiner's Name: _____

GLO1: Proficiency in Chemistry: Demonstrates broad knowledge of chemistry

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

Comments: _____

GLO2: Research Skills:

a) Understands the merits and limitations of methodologies and techniques

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

b) Understands the limitations of data where applicable

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

c) Critically analyzes and evaluates their own findings and those of others

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

Comments:

GLO3: Contribution: Makes a contribution to the discipline

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

GLO4: Professional Skills:

Written Communication

a) The thesis provided an effective presentation of the prior research relevant to the project

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

b) The thesis clearly states objectives, accomplishments, and weaknesses of the research

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

c) The thesis clearly presents and justifies the research findings

Deficient	Marginal	Satisfactory	Excellent
-----------	----------	--------------	-----------

d) The thesis Conclusions and Future Perspectives are appropriate

Deficient Marginal Satisfactory Excellent

Oral Communication

d) The presentation effectively and professionally communicates the topic and its significance

Deficient Marginal Satisfactory Excellent

e) The presentation effectively presents the thesis research in context to show its originality and appropriateness in approach

Deficient Marginal Satisfactory Excellent

f) The presentation demonstrates proficient understanding and insight into the research topic and how the research contributes to the advancement of knowledge

Deficient Marginal Satisfactory Excellent

GLO5: Responsible Conduct in Research: The use of citations, figures, illustrations, and joint research contributions were appropriately documented

Deficient Marginal Satisfactory Excellent

Comments: _____

Summary of the Student’s Major Strengths and Weaknesses:

Overall Determination: **Pass** **Provisional Pass** **Fail**

Examiner’s Signature: _____

Graduate Student Research Progress & Evaluation

Student's Name: _____ **Semester / Year:** _____

Advisor's Name: _____ **Program Start Date:** _____

GLO1: What classes/training did you take/complete this year?

GLO2 and GLO3: Please list your most important research accomplishments from the past 4 -6 months (please note works in progress, if applicable).

GLO4: Please list your recent oral presentations or posters with the class/conference name, location and date (please indicate poster or presentation).

GLO4: Please list your recent publications, reports or other written documents (please indicate the status of publications: in preparation, submitted, in revision, or published).

GLO1 – GLO4: Please list your research goals for the next 4 - 6 months.

Timeline to Completion: When do you expect to complete your degree program?

Do you feel that you are making adequate progress toward your goals? Why or why not?

-----Advisor Evaluation Only Below This Line -----

GLO1 – GLO4: Please summarize the student’s major research progress strengths and weaknesses:

GLO1 – GLO4: Please summarize your recommendations for student’s next steps

Progress towards Degree: Deficient Marginal Satisfactory Excellent

Advisor’s Signature: _____

Department of Chemistry Graduate Student Leave Request Form

Date:

I _____, am planning to take time off from my studies, research, and (if any) assistantship responsibilities in accordance with chemistry department graduate program policies.

My leave start date is: _____

My leave end date is: _____

(The date you will be back on campus for work and study.)

If traveling:

I am traveling to: _____.

Is this international travel? Circle: Yes No

What is the best way to contact you if necessary when you are gone? Provide contact information below: (email, telephone, address, etc.):

- I understand that it is my responsibility to ensure that I have adequate access to any communications from any university department or office while I am on leave.
- I understand that *this form is for departmental use only* and is **not** provided to any other university office, and that it is my responsibility to be aware of and comply with all university, graduate school, and departmental requirements and deadlines (enrollment, registration, bill payment, etc.) that may occur while I am on leave.
- If I am an international student who plans to travel away from campus, I understand that *this form is for departmental use only* and is **not** provided to the IPS office, and that it is my responsibility to consult with the IPS office regarding any requirements relating to my student visa status while I am away from campus.
- I understand that it is my responsibility to ensure that I will be back on campus no later than the date provided above, and that late returns for any reason, including unforeseen travel difficulties, may be considered an unauthorized absence and a factor in future support decisions.
- I have discussed my plans to be away from campus with my advisor and if applicable, my GTA supervisor (see comments below).

Student Signature

Student Name (Print)

Date

Advisor Signature

Advisor Name (Print)

Date

GTA Supervisor Signature

GTA Supervisor Name (Print)

Date

Department Chair signature required for international travel:

Dept. Chair Signature

Chair Name (Print)

Date

Comments: