

## CHEMISTRY M.S. PROGRAM REQUIREMENTS AND GUIDELINES

**Introduction:** The M.S. in Chemistry is a research-intensive degree resulting in a written thesis. Students who earn this degree will be prepared for research and laboratory science intensive careers with the chemical industry, in academics or in government.

The M.S. program in Chemistry has certain clear, objective, and well-defined quantitative requirements with definite deadlines. These are indicated in this document. This document provides guidelines and recommendations, but specific requirements and deadlines will be determined in consultation with the thesis advisor and advisory committee.

**Annual Review:** A yearly review of each graduate student's progress will be conducted by the Graduate Education Committee (GEC). Each student will fill out a GEC progress report form at the end of spring semester. The GEC will review the progress of each student and will determine whether he/she has made satisfactory progress on the requirements as defined below, and will also make recommendations to the student and advisory committee regarding any pending requirements.

### 1. Proficiencies

Students must demonstrate proficiency in at least 3 chemistry subject areas. New students will take the five proficiency exams (organic, inorganic, physical, analytical, and biochemistry) the week prior to the beginning of their first semester on campus. If they do not pass three exams at the 50%tile or higher level, they must take a course(s) in the area(s) they choose to show proficiency. The selection of courses will be decided in discussion with the GEC and will depend upon the student's interests and their score on the exam(s), among other factors. A grade of B or higher in the course(s) will satisfy the proficiency requirement. If a B or higher is not obtained, the student may retake the exam(s) in late January. If the grade(s) or proficiency exam score(s) are not achieved, the student will take an additional course(s) spring semester. Again, a course grade of a B or higher is required, or if this is not achieved, the student will be able to take the exam(s) a third and final time, in late May. If the student does not demonstrate proficiency in three areas through this process, as defined above, the student will not continue in the program. Students who enter spring semester may defer starting the exams until the following fall so that they are on the same schedule as the new cohort.

### 2. Coursework

The coursework that a graduate student takes is dependent upon their research area, the degree they are pursuing, and the need to cover deficiencies as determined from the proficiency exams. At least 30 semester credits are required for the M.S., of which 18 credits must be lecture-based courses (e.g. six courses usually worth 3 credits each at the 500 level; some 400 level courses can be used).

Specific requirements:

- Students must successfully complete CHMY 501 Teaching University Chemistry and CHMY 640 Introductory Graduate Seminar in the first Fall Semester registered. Students must successfully complete CHMY 650 in the first two Spring Semesters registered.
- All graduate students will register for CHMY 630 Seminar every semester. Attending departmental research seminars is integral to a student's education and allows the student a chance to learn about areas of science outside of their research area. Attendance of these seminars is mandatory unless excused by the faculty member responsible for organizing the seminar. The method of grading this class is the choice of the faculty member organizing the seminar.

- Twenty (20) of the 36 total credits must be in Chemistry (a Graduate School requirement). Seminar, research and thesis credits at the 500 and 600-level and approved transfer credits can be included in this total. A 400-level Chemistry course can also be included if it is not a requirement for any B.S. Chemistry degree. The Department and student's committee may require more than the minimum Graduate School requirements.
- Students must complete 18 credits in letter-grade courses. At least 9 of the 18 credits must be in 500-level letter-grade Chemistry courses. Six of these 9 credits must be in 500-level letter-grade Chemistry courses outside the student's research specialty area, as determined by the advisory committee. The remaining 9 of the 18 credits may be in traditional letter-grade courses within or outside the Department of Chemistry when approved by the student's committee.

The student should consult with his or her thesis advisor and advisory committee for recommendations regarding coursework.

Students must maintain a B average in courses taken for graduate credit at The University of Montana; no grade below C (2.0) will be accepted toward any degree requirement. Satisfactory progress in seminars and graduate level research is also expected. The graduate school automatically places a student on academic probation if the cumulative grade point average falls below 3.0. If the cumulative grade point average is not improved to better than a 3.0 within one academic year of being placed on probation, the student will be dismissed from the program.

Graduate School regulations allow the repeat of up to six semester credits to raise the grades obtained, upon approval of department chair. Students should be aware that the repetition of "F" grades counts within this limit and that the approval of the department chair can be expected only in the case of compelling extenuating circumstances. The continuation of the student in a given program is subject to periodic review by the departmental faculty.

There are no options on grading procedures in courses taken for graduate credit. Traditional letter grades must be obtained in all courses except research (graded N, Continuation), thesis (graded N, Continuation) and seminar (graded Pass/Fail) courses. Continuation grades are converted to letter grades at the end of a student's program.

The student must satisfy all other coursework requirements of the Graduate School of The University of Montana. The student must consult the Graduate School requirements. For instance, the Graduate School requires that of the completed credits submitted in the M.S. degree application, after subtracting a maximum of ten combined research and/or thesis credits, one-half of the remaining credits must be at the 500 or 600-level. Thus, if a student has completed 10 or more research/thesis credits,  $(30 - 10)/2 = 10$  credits must be at the 500 or 600-level. Generally speaking, if a student completes the requirements of the Chemistry Department and their thesis committee, the Graduate School requirements will most probably be met. The student must confirm this in discussions with the Graduate Education Committee, their thesis director and the Graduate School.

Transfer of Graduate Credit: Up to 9 credits of course work for the M.S. degree may be transfer credits. Graduate School policy allows for the transfer of graduate credits taken elsewhere only with the Department's recommendation and after satisfactory work at UM has been demonstrated. Credits with grades other than A or B, thesis or correspondence credits, extension credits outside the Montana university system, or credits earned at institutions not offering graduate degrees in the discipline of the course are not transferable. In the Department of Chemistry, the student's advisory committee must initiate the recommendation for transfer of credits. The advisory committee should be organized as soon as possible if credit transfer is desired. The advisory committee will take in consideration the student's background and

professional goals along with the performance on the incoming proficiency exams in making the recommendation.

### **3. Advisory Committee**

Not later than the second semester of graduate study, students should select a thesis advisor and become active in research (doing research and attending group meetings). In consultation with their thesis advisor, the student should select an advisory committee that reflects their area of study. The advisory committee is comprised of three members that include the thesis advisor, one additional member from the Department of Chemistry and Biochemistry who will serve as examination chair and one external member who is a qualified UM faculty member or adjunct from a program or unit other than the Department of Chemistry and Biochemistry. The student should consult with the advisor and select an advisory committee that reflects the student's area of study. Students should have their first committee meeting early in the third semester and every semester thereafter.

### **4. Seminar**

All graduate students will enroll in and successfully complete CHMY 650 Graduate Chemistry Seminar during the first two Spring Semesters registered. In the second Spring Semester registered, all students will give a seminar as part of CHMY 650 on a topic that is not directly related to their dissertation research. The topic will be decided in consultation with the faculty member of record for CHMY 650 that semester and the thesis advisor. The faculty member of record for the course will define other requirements of CHMY 650 in a given semester.

### **5. Application for Graduation**

At least one semester before the Master's degree is to be awarded, the student must submit to the Graduate School three copies of the Application for Graduation Form and a graduation fee. The Graduate School will conduct a degree audit and send two copies of this form back to the graduate program (one departmental copy and one student copy) early in the graduating semester. The department and student should note any problems and rectify them at least two weeks prior to the end of the final semester by using a Graduation Amendment Form. If the student fails to meet the original graduation date as requested on the form, the student may request the application be reactivated for the following semester by notifying the Graduate School one semester prior to the revised completion date.

### **6. Thesis and Thesis Defense**

Students are required to submit an Electronic Thesis, Dissertation and Professional Paper (ETDP) that describes their empirical or scholarly research and findings. The ETDP for the M.S. degree consists of a thesis that is based on original research. The topic of the thesis is one of the first subjects of discussion between the student and research advisor. After reaching agreement with the research advisor, the student brings a thesis proposal to the thesis committee for approval; this occurs by the third semester of the student's program.

The ETDP will have a front section, including a title page, abstract, acknowledgements, and table of contents, a body section that contains an introduction, literature review, materials and methods, results, discussion and conclusions, and a back section that contains references and appendices. The document is prepared using a word processor, converted to pdf format with relevant multimedia objects embedded. ETDPs may contain supplemental files, hypertext links, audiovisuals and other interactive features. The ETDP will in most cases be available to anyone who can browse the World Wide Web. Wide dissemination of research results and scholarly

inquiry are encouraged, but the advisor and advisory committee can request limited access where there are legitimate patent or publishing issues. The student should arrange for submission of the draft and final versions of their EDTP with their thesis advisor. The style of the EDTP text must follow the formal recommendations in the latest edition of *Form and Style: Theses, Reports, Term Papers* by W.S. Campbell and Stephen V. Ballou or *A Manual for Writers of Term Papers, Theses and Dissertations* by Kate L. Turabian (copies are available in the UM Bookstore). The following requirements are supplementary to the above-mentioned material:

- Literature references are to be collected in a bibliography at the end of the thesis (not as footnotes and not at the end of chapters).
- Entries in the bibliography may be in alphabetical order or in order of citation in the text.
- The form of each bibliographic entry and the manner of citing the reference in the text of the thesis may follow the style of any major journal in the area of the student's thesis. The principal methods of citing references are listed on pp. 106-107 of the *ACS Style Guide*, James S. Dodd, Editor. A copy is available in the chemistry office.
- The student must consult with his or her advisor concerning preferred bibliographical style, particularly regarding the omission or inclusion of article titles.

In addition, students should refer to the UM Graduate School guidelines, which are available on the Graduate School web site. When preparing the Approval Page, Copyright Notice and Abstract for the EDTP, students should use the templates provided by the Graduate School.

The Graduate School and the Department of Chemistry and Biochemistry have established several deadlines and procedures relative to the thesis defense. At least 36 days before the thesis defense, the candidate must submit unbound committee drafts or electronic copies (with prior committee approval) of the thesis to his/her advisor. If approved by the research advisor, drafts are then submitted to the other members of the advisory committee at least 10 days before the thesis defense for their comments regarding the revision. One week prior to the defense, the committee chair must electronically submit the thesis. Instructions for submitting the draft are available from the Graduate School. This submission indicates that the document is defensible and all members of your committee have agreed it is ready for defense. The document should be correctly formatted using the Graduate School formatting guidelines. The Graduate School will review your document for formatting and content and will e-mail you any revision notes.

The thesis defense is an oral examination of the student's knowledge and a defense of the thesis. This examination is held no later than 3 weeks before the end of the semester in which the degree is to be granted. It must be preceded by the preliminary approval of the thesis by the advisory committee and the Graduate School as well as the completion of all other requirements for the degree, including any set by the advisory committee.

The time and place of a public seminar and the defense are arranged with the advisory committee and must be published and announced to the Department. If the seminar and examination period are scheduled in one session, then three hours must be allowed. The thesis defense begins with a seminar (less than one hour) that the student gives on the thesis topic. This is followed by a question and answer session that is open to the public; guests may ask questions upon recognition by the examination chair. If the seminar is given as a general departmental seminar, it need not immediately precede questioning by the committee. After the public session the examination chair closes the session to all except the candidate, the

committee, and interested UM faculty. Those present are then allowed by the examination chair to closely question the candidate on his or her general chemical knowledge and on the thesis. Finally the committee members discuss privately the student's performance and vote upon the outcome, which will be one of the following: (1) The candidate passes, and the thesis is accepted as presented. (2) The student passes, but minor revisions are required in the thesis. (3) The student fails and/or major revision is required in the thesis. The committee result is a pass if no more than one member dissents. If the student fails, he/she may make the necessary revisions and defend a second time. At least thirty days must elapse between examinations. A public seminar is not required for the second thesis defense.

If the student passes the thesis defense, the committee chair will submit the final thesis electronically to the Graduate School. The committee chair will submit the document only after it has met all of the following criteria: 1. reviewed and approved for defense by the Graduate School, 2. successfully defended, 3. all revisions are completed .

Prior to the final graduation deadline, the following items must be submitted to the Graduate School (the Graduate School staff will obtain the Dean's signature on items where appropriate):

- **Certificate of Approval Form** signed by you and your chair or co-chairs. The chair or co-chairs must have the approval of **ALL** your committee members in order for your document to be certified. The Graduate School staff will obtain the Dean's signature.
- **Completion Document** - The "Department" copy of your Graduation Application signed on the back by your chair or co-chairs under **Final Degree Requirements**.
- Any course or research credit grade changes needed for degree. The Graduate School is responsible for changing thesis credit grades (599) to CR once your PDF and one hard copy paper are received

Once approved, the EDTP must also be submitted to the Mansfield Library submittal [site](#). In addition, one bound thesis copy is given to the Department for its library. A bound copy should also be provided to the research advisor. It is a courtesy to provide bound copies to members of the advisory committee.

The following outline summarizes deadlines relating to the thesis defense and graduation.

- Submit thesis draft to research advisor – 36 days before the thesis defense.
- Submit approved (by research advisor) draft to the committee – 10 days before the thesis defense.
- Advisor submits approved (by thesis committee) EDTP draft to the Graduate School – 7 days before thesis defense.
- Announce time and place of thesis defense to chemistry faculty – in a timely manner before the thesis defense.
- Thesis defense – 3 weeks before the end of the semester in which the student expects to graduate.
- Submit approved EDTP to Graduate School and Mansfield Library–before the final graduate deadline.