

# **Graduate Program in Chemistry**

**Department of Chemistry  
University of Massachusetts Amherst**

## **Program Policies and Regulations**

Revised April 2017

## I. Doctor of Philosophy (Ph.D)

### A. Ph.D. Degree Requirements

#### 1. Complete the following graduate credit requirements

- a. Successful completion of Chem 891G: Core Course (Fall and Spring of First year)
- b. Earn a satisfactory (SAT) grade in CHEM 891F: Faculty Research Seminars (Fall of First year).  
*During the first semester (orientation week primarily), faculty who are taking graduate students will give a presentation about their research. A 'SAT' grade is obtained by attending all the Faculty Research Seminars.*
- c. Earn a satisfactory (SAT) grade in Chem 892 every semester.  
*You are required to register for the group meetings course every semester. A 'SAT' grade means that you fulfilled the requirement. Under exceptional circumstances, the Graduate Program Director (GPD), in consultation with the dissertation adviser, may wave this requirement.*
- d. Fulfill the residency requirement  
*University regulations requires that each Ph.D. spend a minimum of one continuous academic year in full-time graduate work. You can meet this requirement by (a) registering for at least nine credits are taken per semester in graduate courses (which may include doctoral dissertation) for 2 consecutive semesters (Fall/Spring or vice versa) and (b) being physically present on the campus for some part of each week for 2 consecutive semesters (Fall/Spring or vice versa). Most chemistry students satisfy this requirement in the first year of their academic program.*
- e. Fulfill the continuous enrollment requirement  
*University regulations require that graduate students maintain continuous enrollment by registering for the appropriate course credits or by paying the Continuing/Program Fee. University will withdraw students from the graduate program if they are not registered at the end of the Late Registration Period. Reinstatement requires the approval of the GPD and the payment of a fee.*
- f. Fulfill the dissertation credit requirement  
*18 credits (cumulative) of CHEM 899 are required for the Ph.D.*
- g. Maintain a grade-point average of 3.0 or higher
- h. Fulfill any course requirements as recommended by the graduate program, advisor and the dissertation committee.

#### 2. Have a research adviser by the end of the student's second semester in the program and thereafter.

2.1—Advisers: Potential advisers must be members of the graduate faculty in Chemistry. A small number of faculty from related departments have adjunct faculty status and may be candidates as advisers. Students should consult with the GPD before they approach adjunct faculty as possible choices. Faculty interested in taking graduate students will present their research in the Faculty Research Seminars.

**Doctor of Philosophy Degree Requirements**

---

2.2—Rotation: Graduate student rotate with three different research groups during the first semester. The duration of each rotation ~ 1 month and start dates at for each rotation will be announced at the beginning of the semester. The format of the rotation is determined by the faculty member any may include attending group meetings, visiting with graduate students in the lab, having individual meetings with the faculty member, and limited research-related activities.

The three lab rotations will be determined by a combination of two labs chosen by the student and the third lab chosen by the Graduate Program Director and/or Graduate Program Committee.

The student will provide a ranked list of five (5) faculty, the first two faculty listed will be the labs for two of the rotations. The remaining three faculty on the list will comprise the pool from which the GPD/GPC will select the faculty member for the third rotation. Factors to be weighed in determining the third lab/rotation: the student's request, faculty needs for taking new graduate students, and the total rotation load of the requested faculty member. The order of the rotation will be random and will not necessarily follow the ranking.

2.3—Adviser Selection Process. After the end of the third rotation, students should discuss with their prospective research advisers about prospectus of joining the research group. Students should then submit their top two, ranked choices for research adviser to GPD. The GPD and graduate program coordinator in consultation with faculty and the Department Head, will finalize the adviser assignments. If a student cannot find a suitable advisor at the end of this process, then the GPD, based on student's academic performance, will discuss with the student possible pathways for moving forward. They include (a) additional rotation(s) or (b) dismissal from the program.

2.4—Changing Research Adviser: Any request to change research adviser change in research-adviser must be submitted to and approved by the Graduate Program Director. The Graduate Program Director may consult with the student's former adviser, student's committee (if already in place) and/or the graduate program committee to facilitate the process.

### 3. Form a Dissertation Committee

3.1—Timing: End of third Semester (typically Fall of the second year)

3.2—Composition of the Dissertation Committee: There will be 4 voting members on the committee. The research adviser will be the chair of the committee. In addition, the committee will have two graduate faculty who are members of the Chemistry Department, and one member of the graduate faculty from another department, known as the outside member. If the research adviser is not primarily affiliated with Chemistry then, he/she must be appointed as graduate faculty in the Chemistry Department and another committee member will be necessary as the outside member.

3.3—Formation of the Committee: The members of the committee are chosen by the student in consultation with the research adviser. The student will then contact the potential committee to seek their consent to serve on the committee. The student will then

**Doctor of Philosophy Degree Requirements**

---

get the signatures of the committee members on the requisite form, which can be obtained from the graduate program coordinator (GPC), and submit the completed form to the GPC. The GPD then recommends the appointments to the Graduate Dean.

4. Advance to Candidacy Stage 1: Successfully defend Prospectus

4.1—Objective: Prospectus is the first formal statement made by the student about his or her topic of research to the dissertation committee. The dissertation committee will evaluate the student's ability to (a) review and make critical use of the literature, (b) formulate a problem, (c) plan a method of attack and work systematically towards a solution, (d) summarize the material or data, and draw conclusions based thereon and (e) demonstrate scholastic attainment in writing and presenting the results.

4.2—Timing: Before the end of classes in the *fourth* semester, the student will schedule a meeting of the dissertation committee to present the Prospectus and will submit the prospectus document to the committee chair. The prospectus exam should be completed by the end of *fourth* semester or immediately thereafter.

4.3—Components of the exam: There are two components to the prospectus exam (1) A written document, which should be submitted to the committee 2 weeks prior to the exam and (2) a presentation to the dissertation committee

4.4—Format of the exam: There are four stages of the exam:

1. Pre-defense discussion about prospectus document and student progress (Committee without the student) < 5 min
2. Prospectus Defense. This part of the exam lasts for about 1 h – 1.5 h and the committee will ask questions during and after the presentation.
3. Post-defense discussion and decision (Committee without the student) [~1-10 min]
4. Outcome discussion and Feedback (Committee with the Student)

4.5—Evaluation: The committee will evaluate the student on each of the five criteria outlined in 4.1 and candidate's continued progress in research.

4.6—Possible outcomes: There are four possible outcomes (1) Pass, (2) Conditional Pass, (3) Deferred Decision and (4) Fail. If the outcome is not a full Pass, then the committee will recommend the next steps to the GPD.

- For options (2) or (3), the committee can recommend specific goals and timelines for the student to meet these goals.
- If the performance is unsatisfactory, then the committee can recommend (a) removal of the student from the program, (b) placement on probation and repeat of the exam, or (c) continuation in the graduate program with a terminal M.S degree. If the committee recommends options (a) or (c), then student stipend support will be discontinued.
- The chair of the committee will communicate the results of the exam and evaluations of the student to the GPD *within 1 week* after the completion of the exam by filling out the on-line form.

**Doctor of Philosophy Degree Requirements**

---

4.7—Prospectus Document: Students should follow Graduate School Formatting Recommendations for Thesis/Dissertation. The templates can be downloaded from the graduate school website. The title and signature pages should conform to Graduate School Recommendations. On the title page, the word ‘Prospectus’ should be used instead of “Thesis” or “Dissertation. Students may request a sample page form the Graduate Program Coordinator. The prospectus document should be at least 6 pages in length excluding the title/table of content pages.

The prospectus document and presentation should address:

- a. What is the primary field/area of your dissertation topic?
- b. What is the primary objective and approach of your proposed research/dissertation topic?
- c. What scientific question(s) will be answered in your dissertation? (Note: the questions “will it work?” or “will it work better if I tune this particular parameter” are not usually good questions)
- d. Why are these scientific questions important to answer?
- e. How does the proposed research relate to prior/ongoing work in the field, and how is it unique from prior work?
- f. What is the current state of the knowledge? What gap in knowledge are you trying to address?
- g. Why is your approach the best approach to use? (Avoid laundry lists of experimental techniques – explain why your specific approach is the best route to answer the question(s)). What problems do you anticipate in your approach?
- h. What preliminary results do you or your research group have?

4.8—Process for Submission of Prospectus to Graduate School: The approved Prospectus document must be signed by every member of the committee and by the Department Head. Apart from any copies needed for your committee, **one (1)** copy (hard copy) of the final, approved, signed Prospectus document must be submitted to the Department. The signature page must have *original* signatures. (The Graduate Program Coordinator will give the Graduate School its required hardcopy.) A PDF of the entire approved document should then be emailed by the student to the Graduate Program Coordinator.

## 5. Advance to Candidacy Stage 2: Successfully defend Original Research Proposal (ORP)

5.1—Objective: The dissertation committee will evaluate the student’s ability to *independently* (a) review and make critical use of the literature, (b) formulate a problem, (c) plan a method of attack and work systematically towards a solution, (d) summarize the material or data, and draw conclusions based thereon and (e) demonstrate scholastic attainment in writing and presenting the results.

5.2—Timing: Before the end of classes in the *fifth* semester, the student will schedule a meeting of the dissertation committee to present the Original Research Proposal and will

**Doctor of Philosophy Degree Requirements**

---

submit the ORP document to the committee chair. The ORP exam should be completed by the end of *fourth* semester or immediately thereafter.

5.3—Components of the exam: There are three components to the ORP exam (1) a white paper that summarizes objectives and aims of the research proposal to be submitted to the committee for approval; the area of focus for ORP should be different from the area of focus in your research group, (2) a written document based on the approved white paper, which should be submitted to the committee 2 weeks prior to the exam, and (3) a presentation to the dissertation committee

5.4—Format of the exam: There are four stages of the exam:

- 1.Pre-defense discussion about ORP document and student progress (Committee without the student) < 5 min
- 2.ORP Defense. This part of the exam lasts for about 1 h – 1.5 h and the committee will ask questions during and after the presentation.
- 3.Post-defense discussion and decision (Committee without the student) [~1-10 min]
- 4.Outcome discussion and Feedback (Committee with the Student)

5.5—Evaluation: The committee will evaluate the student on each of the five criteria outlined in 5.1 and candidate's continued progress in research

5.6—Possible outcomes: There are four possible outcomes (1) Pass, (2) Conditional Pass, (3) Deferred Decision and (4) Fail. If the outcome is not a full Pass, then the committee will recommend the next steps to the GPD.

- The student will advance to candidacy if the performance is satisfactory. For options (2) or (3), the committee can recommend specific goals and time lines for the student to meet these goals.
- If the performance is unsatisfactory, then the committee can recommend (a) removal of the student from the program, (b) placement on probation and repeat of the exam within 60-days, or (c) continuation in the graduate program with a terminal M.S degree. If the committee recommends options (a) or (c), then student stipend support will be discontinued.
- The chair of the committee will communicate the results of the exam and evaluations of the student to the GPD *within 1 week* after the completion of the exam by filling out the on-line form.

5.7—Committee Chair for the ORP: At the ORP defense, a committee member from Chemistry, who is not the dissertation adviser will chair the meeting. The dissertation adviser is a speaking, but not a voting, participant in the proceedings. The student can consult with the adviser to choose the chair and seek the consent of the faculty before the exam.

5.8—Format of the white paper and outcome:

The white paper should be 2-pages and should address the following:

- What is the primary objective and approach of your ORP?

**Doctor of Philosophy Degree Requirements**

---

- What scientific question(s) will be answered in your ORP? (Note: the questions “will it work?” or “will it work better if I tune this particular parameter” are not usually good questions)
- Why are these scientific questions important to answer?
- How does the proposed research relate to prior/ongoing work in the field, and how is it unique from prior work? What is the current state of the knowledge? What gap in knowledge are you trying to address?
- Why is your approach the best approach to use? (Avoid laundry lists of experimental techniques – explain why your specific approach is the best route to answer the question(s)).

The committee will vote up or down on the white paper.

5.9—Format of the Original Research Proposal Document:

- a. Margins and Fonts: Use NSF or NIH guides
- b. The ORP document should be at least 4 pages in length excluding the title/table of content pages.
- c. Use title and signature pages in line with the signature page recommended by Chemistry. It is similar to the prospectus page but will have an additional line for temporary chair.
- d. Use ‘Original Research Proposal’ instead of “Thesis” or “Dissertation”
- e. The references should follow NIH or NSF format.
- f. Include a budget for your proposed research
- g. Include your current CV

The proposal document should expand on the white paper (and the questions that are addressed in the white paper) and include the overall objective, statement of need, central hypothesis of the proposal, specific aims, expected outcomes and their importance, and potential problems and solutions.

5.10—Conclusion of the exam and advancement to candidacy: after successful defense of the ORP, a PDF of the title page of the approved ORP document with signatures should be emailed by the student to the Graduate Program Coordinator.

6. Satisfactory Progress

- (a) Achievement of minimum grades in required courses and maintenance of 3.0 overall GPA.
- (b) Completion of the various requirements of the program by stipulated deadlines.
- (c) Maintenance of continued progress in research.
- (d) Attainment of a research adviser by the end of the student's second semester in the program and thereafter.

A student should meet all of these attributes to maintain satisfactory progress.

## 7. Successful Data Defense

7.1—Objective: To determine whether sufficient progress has been made in dissertation research in data collection and analysis for the candidate to proceed to plan for the final defense. The dissertation committee will also evaluate the student's ability to (a) review and make critical use of the literature, (b) formulate a problem, (c) plan a method of attack and work systematically towards a solution, (d) summarize the material or data, and draw conclusions based thereon and (e) demonstrate scholastic attainment in writing and presenting the results.

7.2—Timing: This meeting may occur at any time in the academic year, but should typically occur *at least **FOUR WEEKS** before the final defense.*

7.3—Format of the exam: There are four stages of the exam:

1. Pre-defense discussion about student progress (Committee without the student) < 5 min
2. Data Defense. This part of the exam lasts for about 1 h – 1.5 h and the committee will ask questions during and after the presentation.
3. Post-defense discussion and decision (Committee without the student) [~1-10 min]
4. Outcome discussion and Feedback (Committee with the Student)

7.4—Format of the Meeting: The student presents the proposed organization and overall plan for the dissertation. The presentation include studies completed, data collected and analysis, and plans for the completion of the dissertation.

7.5—Evaluation: The committee will evaluate the student on each of the five criteria outlined in 7.1. The committee will also evaluate if the student has made sufficient progress in research to justify his or her advancement to the final defense. The chair of the committee will communicate the results of the exam and evaluations of the student to the GPD *within 1 week* after the completion of the exam by filling out the on-line form.

7.6—Possible outcomes: (1) advance to final defense (2) advance to final defense after completion of specific work, (3) cannot advance to final defense, and (4) insufficient progress to continue in the program.

## 8. Successful Defense of Thesis

8.1—Objective: The committee will evaluate if the Dissertation (written and oral defense) meets criterion set by the graduate school: “The dissertation in its completed form will be judged largely upon the ability of the candidate to review and make critical use of the literature; to formulate a problem, plan a method of attack and work systematically towards a solution; to summarize the material or data, and draw conclusions based thereon. Scholastic attainment in writing and presenting the results of the study will be crucial. The goal of the dissertation is to make a contribution to knowledge. It should be of publishable quality.”

8.2—Timing: When the student is ready to defend his or her dissertation. The final defense may be scheduled on a working day and normal work hours during the calendar year, but must occur at least seven months after the approved prospectus is received by

**Doctor of Philosophy Degree Requirements**

---

the Graduate School. The student should take into account the deadlines for notification of the graduate school before and after the exam, and submission deadlines for dissertation and other documents for the desired graduation date. These deadlines are not flexible.

8.3—Notification to Graduate Program Coordinator: The student should notify the GPC at least 45 days prior to the date of the defense. This will allow the GPC to meet the deadlines imposed by the graduate school. If the student does not notify GPC before 45 days, then the defense will have to be rescheduled.

8.4—Components of the exam: There are two components to the thesis defense exam (1) A written dissertation that meets the current formatting guidelines of the graduate school, which should be submitted to the committee 2 weeks prior to the exam and (2) a presentation to a public audience that includes the dissertation committee. The regulations change from time to time, so a previous dissertation may not be an accurate model. A copy of the dissertation should be prepared for each member of the dissertation committee in addition to the copies required by the Graduate School.

8.5—Format of the exam: There are six stages of the exam:

1. Introduction of the student by thesis advisor < 5 min
2. Dissertation Presentation. This part of the exam lasts for about 1 h.
3. Public Question and Answer Session. After the presentation, the committee chair will open the floor for questions from the audience.
4. Closed session with the committee. After the public question/answer session, the committee chair will excuse the audience and the dissertation committee will meet with the student.
5. Post-defense discussion and decision (Committee without the student) [~1-10 min]
6. Outcome discussion and Feedback (Committee with the Student)

Sections 1-3 are open to the public. Section 4 is open to the committee and interested members of the graduate faculty. When the student's performance is evaluated, only the committee members may vote.

8.6—Evaluation: The committee will evaluate the student based on five criteria outlined in 8.1.

8.7—Possible outcomes for oral defense: There are four possible outcomes (1) Pass, (2) Conditional Pass, (3) Deferred Decision and (4) Fail. If the outcome is not a full Pass, then the committee will recommend the next steps to the GPD. The result of this examination is reported in timely fashion to the Graduate Program Director, who then notifies the Graduate School.

8.8—Possible outcomes of dissertation evaluation: The committee can accept the dissertation document or can recommend changes that need to be made to the document. These can be formatting changes to meet the graduate school requirements or content changes to meet the standards of the scientific community. The chair of the committee

**Doctor of Philosophy Degree Requirements**

---

will communicate the results of the exam and evaluations of the student to the GPD *within 1 week* after the completion of the exam by filling out the on-line form.

8.9—Submission of dissertation: Once the dissertation is ready for acceptance, the committee members should sign the signature page of the dissertation using black ink. The signature page should be printed on acid-free paper and should conform to the format and wording requirements of graduate school. The students should follow the guidelines posted by the graduate school for submission.

## B. Duration of Graduate Studies

### 1. Duration of Department Support

For most students, the Department guarantees support over a five-year period (if necessary) as long as the student maintains satisfactory progress in research, academics, and any teaching duties.

### 2. Statute of limitations (SOL)

The statute of limitations is the amount of time allowed for completing the graduate program and is stipulated in the admission letter from the Graduate Dean. Doctoral students are given six years to complete the program. If an extension becomes necessary, the student's adviser will need to provide a written justification to the GPD, including a timeline for completion of the remaining requirements.

### 3. Student Status

Students are considered to be full time students if they are registered for nine or more credits and part time if they are registered for eight or fewer credits. For the purposes of loan deferments, students taking six to eight credits are considered to be half time students. If required, the Department will certify that a student actively engaged in research or dissertation (or thesis) production is to be considered a full time (or half time) student regardless of the number of credits for which the student is registered.

### 4. Termination from the Ph.D. Studies

The graduate program committee in Chemistry can terminate a student from Ph.D. Studies for any of the following reasons:

1. Failure to make satisfactory and timely progress to meet the requirements in the Ph.D. degree Requirements in Section A
2. Academic or professional misconduct
3. Reasons of safety (to others or to self)

**Financial Support and Conditions of Employment (Ph.D)**

---

C. Financial Support During Graduate Studies and Conditions of Employment

1. Sources of support

Students are normally admitted to the Chemistry Graduate Program only if they have financial support as approved by the Department. For most students this support takes the form of an assistantship provided by the Department. Initially such assistantships are teaching assistantships, but later in the program students are typically supported on research assistantships provided by their research adviser's grants. Some students are supported by external sources, such as government scholarships, and some students are supported by assistantships from other campus-based sources outside the Department.

Research assistantships are normally funded by faculty grant support. The selection of appointees, terms of contract, and other details of such appointments fall entirely within the purview of the faculty member who is the principal investigator on the grant, subject to Departmental and University regulations.

Students who have adjunct faculty as advisers are not eligible for departmental teaching assistantships and must be supported by their advisers.

Teaching Assistants and Research Assistants are governed by the GEO contract, which is the agreement between the University and the Graduate Employee Organization.

2. Contract Period

The contract period (period of appointment) for TAs and RAs extends beyond the regular semester dates. Since department support is usually year-round, the employment period is therefore usually a continuous, twelve months. January intersession (the break between the fall and spring semesters, spring break, and summer are all part of the appointment or contract period. (The distinction between the contract-period and the duration of a given semester is critical for understanding the policy on vacation and other time off.) While the Department is flexible in setting working conditions, any proposed departure from the terms of the contract should be discussed with the student's supervisor well in advance.

3. Vacation and Time off (GEO Employees)

The GEO contract stipulates both the amount of time eligible to be taken and the need to obtain approval from the student's research adviser – and from the teaching supervisor as well if the student is also a T.A. (For details on holidays, vacation, and other time-off, refer to the Department's infosheet on the topic or the Graduate School's "Graduate Appointments Policies and Procedures," or to the GEO contract itself.)

4. Workload and limitation on total hours

4.1—US Citizens and Permanent Residents: **40 hours** per week is the maximum for working hours + course credit-hours, excluding dissertation or thesis credits. Work includes any type of campus employment: assistantships, student hourly, work-study, etc.

**Financial Support and Conditions of Employment (Ph.D)**

---

4.2—International Students: F1 and J1 visa-holders are limited to **20 hours** per week during the **regular semester** for *working hours + credit-hours*, excluding dissertation or thesis. Work for internationals includes assistantships and student hourly. Work-study is not an option. 40 hours is allowed during January break and summer.

## 5. Outside Employment

Graduate students appointed as Teaching Assistant or Research Assistant may not accept concurrent employment elsewhere. Any exceptions to this outside-employment restriction must be approved both by the GPD and the dissertation adviser prior to acceptance of any outside employment.

Graduate students should not provide paid tutoring services for any student for whom they have responsibility for grading.

## 6. Satisfactory Performance as T.A. or R.A., Termination of Support

Non-performance or unsatisfactory performance of T.A. duties may result in the contract being terminated. Besides performing the assigned duties poorly, examples of unsatisfactory performance may include not appearing to proctor an exam as requested or being away during the contract period without permission of the T.A. supervisor.

Similarly, an RA who is not performing adequately in research, who is not committing effort or time in the lab, or who is absent without permission of the adviser is subject to dismissal.

For non-academic dismissals, the graduate program director will follow Article 26 (Discipline and Discharge) of the GEO contract.

## 7. Safety Training

Prior to conducting any work in a research laboratory, students must undergo safety training as prescribed by the Department's safety committee. Documentary evidence of the satisfactory completion of this training must be filed with the GPD. Safety training typically includes the lab-safety class during orientation, as well as web-based training provided by the University's Environmental Health and Safety organization.

## 8. Financial Support for Conference Travel

8.1—Departmental Support: Where faculty research-funds are not available to help defray travel expenses, the Department and Graduate School offer some support for conference attendance. Chemistry Department Travel Grants allow each graduate student a one-time, maximum \$300 grant for conference travel. Students should apply for these funds before travel. Applications should include details of the conference and a support letter from the research adviser.

**Financial Support and Conditions of Employment (Ph.D)**

---

8.2—Graduate School Support: The Graduate School offers travel grants on a rolling basis for application and awards. Students should consult with their research-adviser and/or the GPD in regard to the application for travel funds. Applications should be submitted to the graduate program director and should include details of the conference, proof of acceptance into the conferences, and a support letter from the research adviser.

## II. Master of Science (M.S.)

Chemistry does not admit students directly to an M.S. program. In rare circumstances, with the agreement of the GPD and (if relevant) the student's adviser, a student enrolled in the Ph.D program may pursue studies leading to the award of M.S. degree by research (Thesis Master's) or M.S. Degree (non-thesis). The Chemistry requirements are in line with those of the Graduate School and students are advised to study carefully the relevant paragraphs in the Graduate School Bulletin. There is no departmental financial support or stipend in the Master's Thesis or Master's non-thesis terminal degree.

### A. Degree Requirements for M.S. with thesis

#### 1. Complete the following graduate credit requirements

- a. Ten (10) credits of CHEM 699 (Master's Thesis)
- b. Coursework in Chemistry for the M.S. Degree with Thesis with at least 21 credits from the following
  - Core Course in each of the first two semesters.
  - Faculty research seminar in the first semester
  - Research group meeting (CHEM 892) each semester.
  - Any divisional course-work requirements.
  - Electives chosen in consultation with the adviser.
- c. At least 15 of these 21 credits must be taken on a letter graded basis and these must include at least six credits earned in the 600 - 800 series (not counting journal clubs, seminars or group meeting).
- d. Letter-graded courses submitted for the degree must have a GPA of 3.0 or better.

#### 2. Form a Master's thesis committee

The voting members of a Master's thesis committee are the adviser and at least one other member of the Chemistry graduate faculty. The members of the committee are chosen by the student in consultation with the research adviser. If the research adviser is not primarily affiliated with Chemistry, then he/she must be appointed as graduate faculty in the Chemistry Department. The student will then contact the potential committee to seek their consent to serve on the committee. The student will then get the signatures of the committee members on the requisite form, which can be obtained from the graduate program coordinator (GPC), and submit the completed form to the GPC. The GPD then recommends the appointments to the Graduate Dean.

#### 3. Successful defense of thesis outline (Prospectus)

3.1—Objective: Prospectus is the first formal statement made by the student about his or her topic of research to the thesis committee. The thesis committee will evaluate the student's ability to (a) review and make critical use of the literature, (b) formulate a problem, (c) plan a method of attack and work systematically towards a solution, (d)

summarize the material or data, and draw conclusions based thereon and (e) scholastic attainment in writing and presenting the results.

3.2—Timing: This requirement must be completed and the outline received by the graduate school at least *four months* before the defense of thesis final oral examination.

3.3—Components of the exam: There are two components to the prospectus exam (1) A written document, which should be submitted to the committee 2 weeks prior to the exam and (2) a presentation to the dissertation committee

3.4—Format of the exam: There are four stages of the exam:

6. Pre-defense discussion about prospectus document and student progress (Committee without the student) < 5 min

7. Prospectus Defense. This part of the exam lasts for about 1 h and the committee will ask questions during and after the presentation.

8. Post-defense discussion and decision (Committee without the student) [~1-10 min]

9. Outcome discussion and Feedback (Committee with the Student)

3.5—Evaluation: The committee will evaluate the student on each of the five criteria outlined in 4.1.

3.6—Possible outcomes: There are four possible outcomes (1) Pass, (2) Conditional Pass, (3) Deferred Decision and (4) Fail. If the outcome is not a full Pass, then the committee will recommend the next steps to the GPD.

3.7—Prospectus Document: Students should follow Graduate School Formatting Recommendations for Thesis/Dissertation. The templates can be downloaded from the graduate school website. The title and signature pages should conform with Graduate School Recommendations. On the title page, the word 'Prospectus' should be used instead of "Thesis" or "Dissertation. Students may request a sample page form the Graduate Program Coordinator.

The prospectus document and presentation should address:

- i. What is the primary field/area of your thesis topic?
- j. What is the primary objective and approach of your proposed research/thesis topic?
- k. What scientific question(s) will be answered in your thesis? (Note: the questions "will it work?" or "will it work better if I tune this particular parameter" are not usually good questions)
- l. Why are these scientific questions important to answer?
- m. How does the proposed research relate to prior/ongoing work in the field, and how is it unique from prior work?
- n. What is the current state of the knowledge? What gap in knowledge are you trying to address?

- o. Why is your approach the best approach to use? (Avoid laundry lists of experimental techniques – explain why your specific approach is the best route to answer the question(s)). What problems do you anticipate in your approach?
- p. What preliminary results do you or your research group have?

3.8—Process for Submission of Prospectus to Graduate School: The approved Prospectus document must be signed by every member of the committee and by the Department Head. Apart from any copies needed for your committee, **one (1)** copy (hard copy) of the final, approved, signed Prospectus document must be submitted to the Department. The signature page must have *original* signatures. (The Graduate Program Coordinator will give the Graduate School its required hardcopy.) A PDF of the entire approved document should then be emailed by the student to the Graduate Program Coordinator.

#### 4. Successful Defense of Thesis

4.1—Objective: The committee will evaluate if the thesis (written and oral defense) meets criterion set by the graduate school: “The thesis in its completed form will be judged largely upon the ability of the candidate to review and make critical use of the literature; to formulate a problem, plan a method of attack and work systematically towards a solution; to summarize the material or data, and draw conclusions based thereon. Scholastic attainment in writing and presenting the results of the study will be crucial. The goal of the thesis is to make a contribution to knowledge. It should be of publishable quality.”

4.2—Timing: When the student is ready to defend his or her thesis. The final defense may be scheduled on a working day and normal work hours during the calendar year, but must occur at least seven months after the approved prospectus is received by the Graduate School. The student should take into account the deadlines for notification of the graduate school before and after the exam, and submission deadlines for dissertation and other documents for the desired graduation date. These deadlines are not flexible.

4.3—Notification to Graduate Program Coordinator: The student should notify the GPC at least 45 days prior to the date of the defense. This will allow the GPC to meet the deadlines imposed by the graduate school. If the student does not notify GPC before 45 days, then the defense will have to be rescheduled.

4.4—Components of the exam: There are two components to the prospectus exam (1) A written thesis that meets the current formatting guidelines of the graduate school, which should be submitted to the committee 2 weeks prior to the exam and (2) a presentation to a public audience that includes the thesis committee. The regulations change from time to time, so a previous dissertation may not be an accurate model. A copy of the thesis should be prepared for each member of the dissertation committee in addition to the copies required by the Graduate School.

4.5—Format of the exam: There are six stages of the exam:

1. Introduction of the student by thesis advisor < 5 min
2. Thesis Presentation. This part of the exam lasts for about 1 h.

3. Public Question and Answer Session. After the presentation, the committee chair will open the floor for questions from the audience.
4. Closed session with the committee. After the public question/answer session, the committee chair will excuse the audience and the dissertation committee will meet with the student.
5. Post-defense discussion and decision (Committee without the student) [~1-10 min]
6. Outcome discussion and Feedback (Committee with the Student)

Sections 1-3 are open to the public. Section 4 is open to the committee and interested members of the graduate faculty. When the student's performance is evaluated, only the committee members may vote.

4.6—Evaluation: The committee will evaluate the student based on five criteria outlined in 4.1.

4.7—Possible outcomes for oral defense: There are four possible outcomes (1) Pass, (2) Conditional Pass, (3) Deferred Decision and (4) Fail. If the outcome is not a full Pass, then the committee will recommend the next steps to the GPD. The result of this examination should be reported in timely fashion to the Graduate Program Director, who will then notify the Graduate School.

4.8—Possible outcomes of thesis evaluation: The committee can accept the thesis document or can recommend changes that need to be made to the document. These can be formatting changes to meet the graduate school requirements or content changes to meet the standards of the scientific community.

4.9—Submission of thesis: Once the thesis is ready for acceptance, the committee members should sign the signature page of the thesis using black ink. The signature page should be printed on acid-free paper and should conform to the format and wording requirements of graduate school. The students should follow the guidelines posted by the graduate school for submission.

#### B. Degree Requirements for a non-thesis M.S. terminal degree

Under exceptional circumstances a student may petition to be permitted to submit for a terminal non-thesis (course-work) Master's degree.

##### 1. Complete the following graduate credit requirements

- a) 30 Credits (minimum) with an overall GPA of at least 3.0
- b) At least half of those credits, e.g. 15 of 30, must be letter-graded (not "SAT").
- c) No grade lower than "C"
- d) 12 credits or more at the 600-800 level
- e) 21 credits or more in the major field (Chemistry) including:
- f) Core Course (both semesters), CHEM 892 every semester, and any divisional coursework or electives recommended by the adviser

C. Degree Requirements for a non-thesis M.S. degree en route to Ph.D

1. Complete the following graduate credit requirements
  - a) 30 Credits (minimum) with an overall GPA of at least 3.0
  - b) At least half of those credits, e.g. 15 of 30, must be letter-graded (not "SAT").
  - c) No grade lower than "C"
  - d) 12 credits or more at the 600-800 level
  - e) 21 credits or more in the major field (Chemistry) including:
  - f) Core Course (both semesters), CHEM 892 every semester, and any divisional coursework or electives recommended by the adviser
2. Successfully complete prospectus defense and original research proposal defense

### III. Summary of Requirements and Exceptions

#### 1. Summary Requirements

##### A. Doctor of Philosophy

1. Complete the following graduate credit requirements
2. Have a research adviser by the end of the student's second semester in the program and thereafter.
3. Form a Dissertation Committee
4. Advance to Candidacy Stage 1: Successfully defend Prospectus
5. Advance to Candidacy Stage 2: Successfully defend Original Research Proposal (ORP)
6. Maintain Satisfactory Progress
7. Successful Data Defense
8. Successful Defense of Thesis

##### B. Degree Requirements for M.S. with thesis

1. Complete the following graduate credit requirements
2. Form a Master's thesis committee
3. Successful defense of thesis outline (Prospectus)
4. Successful Defense of Thesis

##### C. Degree Requirements for a non-thesis M.S. terminal degree

1. Complete the following graduate credit requirements

##### D. Degree Requirements for a non-thesis M.S. degree en route to Ph.D

1. Complete the following graduate credit requirements
2. Successfully complete prospectus defense and original research proposal defense

#### 2. Exceptions to Requirements

When there is good cause, the Graduate Program Director will consider requests for exceptions to the regulations described in this document. Such requests must be made in writing and, where relevant, accompanied by a supporting memo from the student's adviser.