Degree Requirements for the Graduate Program in Chemistry and Biochemistry

2021–22

This manual is an overview of departmental requirements for both the Ph.D. and the Master's degree programs. Students should consult the University of Oregon General Bulletin for further information on the policies and regulations of the University and Graduate School.

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I. Basic Academic Requirements

Ph.D. degree requirements for all Chemistry and Biochemistry students include Cumulative Exams and an Advancement to Candidacy Exam. Specific Divisional requirements are given below. These apply to all PhD students entering Fall 2020.

Upon admission, beginning students will be asked which Divisional program (Biochemistry, Organic/Inorganic/Materials, or Physical Chemistry) they wish to follow. At any time during their course of study, students may transfer from one program to another by simply making up any deficient requirements for the specific program to which the transfer is being made. While the official thesis advisor must be a member of the Department, the thesis research may be carried out with a faculty member from another science department and/or institute, assuming that satisfactory arrangements can be made with the individuals concerned. Such interdisciplinary research programs are strongly encouraged.

Degree requirements are reviewed each year in January. Degree requirements for students entering in the following year can be changed by approval of the relevant division following discussion at a Department faculty meeting. The faculty and graduate students are to be notified of any changes to division requirements. Students may choose to follow either the requirements associated with the year they entered the PhD program or those in place at the time of their advancement to candidacy exam. Under extraordinary circumstances, department-level requirements may be waived upon approval of the Department Head, Director of Graduate Studies, and the student's thesis committee. Waiver of University-level requirements requires petitioning the Graduate School.

Biochemistry Division

Cumulative exams are intended to expose students to topics outside their own area of research and to assess literature comprehension skills. Students in the Biochemistry division must complete four exams, typically each term of their first academic year and the Fall term of their second year. Exams from any Chemistry Division will count towards the requirement. The usual format is a series of questions based on readings from the current literature, provided one week before the exam.

Advancement to Candidacy in Biochemistry requires success on two benchmarks.
1. **Qualifying examination.** Students must pass an advancement to candidacy examination, typically taken in the Winter term of a student’s second year. The usual format requires formulating the student’s thesis project into a hypothesis-driven proposal and includes both a written and an oral component. The precise format and timing of the exam will be provided to students by the end of their first academic year.

2. **Satisfactory research progress.** The student’s thesis committee will evaluate research progress during a fourth term review (see section below on “Review of Progress and Additional Requirements”) receiving input from both the advisor and the student. Additional thesis committee meetings can be called if the thesis committee or advisor deems it necessary.

**Course requirements:** Students must register for a minimum of nine (9) graduate hours per term up to sixteen (16) maximum. Students must complete at least three graded graduate courses (3 or 4 credits each) in Biochemistry or a related field. A student’s advising committee may recommend or require specific courses to be included. First year students typically take two courses, an advanced genetics course in the Fall term, and an advanced Biochemistry course in the Winter term.

**Organic/Inorganic/Materials Division**

**Cumulative exams** are intended to expose students to topics outside their own area of research, to facilitate the development of literature comprehension skills, and/or to encourage activities beneficial to the student’s career. Students in the Organic/Inorganic/Materials division must complete five exams with a grade of B or better before graduating from the PhD program. Students are asked not to take a cumulative exam during the Fall of their first year, so as to allow incoming students to first adjust to research, teaching and coursework. Students usually take cumulative exams each term, starting in the Winter term of their first year, until the cumulative exam requirement is met. Exams from any Chemistry Division will count towards the requirement. The usual format is a series of questions based on readings from the current literature provided one week before the exam. Alternative activities, for example in independent research proposal development (Fall term each year) or in broader-impacts project development (ongoing) can also be used to fulfill cumulative exam requirements.

**Course Requirements:** Students must register for a minimum of nine (9) graduate hours per term up to sixteen (16), maximum. The programs of first-year students will be worked out in consultation with faculty members at the time of entering the graduate program. The student, following discussions of degree and
research objectives with the research supervisor, should select subsequent coursework. A student’s advising committee may recommend or require specific courses to be included.

First-year students typically take two graduate level Chemistry courses plus additional hours to meet the minimum of nine (9) credit hours. In addition, students must complete at least six (6) graded graduate courses (3 or 4 credits each) at the 500 or 600 level. At least four courses must be in Chemistry; two may be in an obviously related field.

Reading and Independent Study Courses (e.g. CH 605) may qualify as one or more of the required six courses with approval by the student’s committee, and if the courses are taken for a grade at a load of at least 4 credits.

At least 18 credit hours are required in Dissertation (CH 603) for the Ph.D. degree. Credit for Research and Thesis is recorded on a P/NP basis. During the term the thesis is defended, the student must be registered for at least 3 hours of CH 603. Graduate students must maintain a cumulative grade point average of 3.00 in all graduate courses taken during the degree program. Students must be registered for at least 3 credit hours during the term in which they are advanced to candidacy.

Advancement to Candidacy: Organic/Inorganic/Materials students typically undergo this examination during the sixth (6) regular term of their graduate career (excluding summers).

The purpose of the Advancement to Candidacy exam is to assess the student’s general understanding of Chemistry and the scientific method, and the student’s ability to successfully carry out research at the doctoral level. These criteria are evaluated in the context of the student’s presentation of one original research proposal and a research report/proposal. The original research proposal demonstrates the student’s ability to develop research ideas outside of his/her immediate thesis area and to defend those ideas. The research report/proposal allows an evaluation of the student’s research to date, the student’s ability to place his/her research in the context of the field and the student’s understanding of the future direction of the research that will ultimately constitute the basis of his/her thesis.

To advance to candidacy in the Organic/Inorganic/Materials division, a student must:
1. Have passed at least three Cumulative exams with B or better grade (passing five cumulative exams is still required for graduation),
2. Have taken six graded graduate courses with at least a 3.0 GPA,
3. Prepare an original research proposal and a research report (details below), and
4. Orally defend the original research proposal and research report in an Advancement to Candidacy Exam.

The original research proposal is a written document that describes: (1) an interesting original research problem, and (2) how the student proposes to investigate the problem. The purpose is to demonstrate ability to select significant research questions and to suggest reasonable scientific approaches for solving the problems. Generally, it is appropriate to include an introduction, background, proposed research, and significance sections as well as a bibliography. Typical proposals are ~6 pages, single-spaced, including figures but excluding references. The ideas in the proposal must be the student's own. Therefore, it is not permissible to ask for or to receive help from any faculty member. Short discussions with a faculty member relating to the appropriateness of the topic are permitted, as are brief discussions about whether the topic is in-field or out-of-field. In fact, students should consult with several committee members about the general suitability of the topic while the proposal is still in the formative stage (i.e. before committing significant time to the topic). At least four weeks in advance of the exam date, a student should submit a written abstract of the proposed topic to his or her committee chair. While it is not appropriate to discuss the proposal in any substantial detail with faculty, students are encouraged to talk to other students to get their opinions of the proposed ideas. Likewise, students are encouraged to have other students read and critique the proposals.

The research report/proposal summarizes in detail a student's research accomplishments while working in the mentor's research group, and future directions and possible extensions of this research area. The purpose is to assess both the student's depth of knowledge in the field and research progress. Since students are expected to have worked closely with their advisor on the research work accomplished and future directions of the work, students are encouraged to discuss the content of the research report/proposal with their mentor and other faculty. Manuscripts submitted or in preparation can be submitted in lieu of a formal research report if authorized in advance by the committee. A brief document (2-3 pages) outlining future directions should be included with the manuscript.
The Advancement to Candidacy **oral defense** will test the student’s ability to think on one’s feet when confronted with probing questions and to demonstrate specific, as well as general, chemical knowledge. In both the written and oral presentations, the student should stress the question(s) to be examined and indicate clearly how a successful completion of the proposed research would answer the questions posed. Students are advised to prepare a 15-20 minute talk on each proposal (i.e. the original research proposal and the research report/proposal). Numerous questions from the committee will lengthen the presentation beyond the twenty minutes prepared time. Generally, two hours are required for a discussion of both proposals.

**Physical Chemistry Division**

Note: Students seeking to advance to candidacy under Physical Chemistry ground rules must have taken at least three Physical Chemistry graduate courses. In cases when divisional affiliation is uncertain, the appropriateness of a student pursuing the advancement to candidacy exam under Physical Chemistry rules will be taken under consideration by the Physical Chemistry Division.

**Cumulative exams** are intended to expose students to topics outside their own area of research and to assess literature comprehension skills. Students in the Physical Chemistry division must complete four exams, typically each term of their first academic year and the Fall term of their second year, with a grade of B or higher to count towards the total of four exams. Exams from any Chemistry Division will count towards the requirement. The usual format is a series of questions based on readings from the current literature provided one week before the exam.

**Advancement to candidacy** in the Physical Chemistry division has three components.

1. **Cumulative Exams**: pass four exams with a grade of B or higher.

2. **Satisfactory research progress**: The Student’s thesis committee will evaluate research progress during a fourth term review (see “Review of Progress and Additional Requirements” below), receiving input from both the advisor and the student. Additional thesis committee meetings can be called if the thesis committee or advisor deems it necessary.

3. **Advancement to Candidacy Examination**: The exam is typically taken in Winter term of a student’s second year and not later than Spring term. The purpose is to assess the student’s general understanding of Physical
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Chemistry and the student’s ability to successfully carry out research at the doctoral level. These criteria are evaluated in the context of the student’s presentation of a research proposal. The proposal and the examination should demonstrate that the student has a sufficient understanding of the relevance of her or his research project in the larger context of the related current research. The student needs to have a vision of the novel scientific directions in which the project could develop in the course of the thesis, as well as of the possible long-term scientific implications of the research performed. A short written proposal (at least 6 pages) describing the student's planned research will be due one week before the examination. More emphasis will be placed on the quality of the proposal's contents than on its length or precise format. Students are strongly encouraged to contact their committee chair about the proposal and the format of the oral exam well in advance of the examination.

**Research presentation:** In the third year the student is required to present a short talk on her or his research as a divisional or departmental seminar or as a (contributed) talk at a national or regional conference. The talk will substitute for the student’s Annual Review of Academic Progress.

**Course Requirements:** Students must register for a minimum of nine (9) graduate hours per term up to sixteen (16), maximum. The programs of first-year students will be worked out in consultation with faculty members at the time of entering the graduate program. The subsequent program of coursework should be selected by the student following discussions of degree and research objectives with the research supervisor. A student’s advising committee may recommend or require specific courses to be included.

First-year students typically take two graduate level Chemistry courses plus additional hours to meet the minimum of (9) nine required per term. In addition, students must complete at least six (6) graded graduate courses (3 or 4 credits each) at the 500 or 600 level. At least four courses must be in Chemistry; two may be in an obviously related field.

Reading and Independent Study Courses (e.g. CH 605) may qualify as one or more of the required six courses with approval by the student’s committee, and if the courses are taken for a grade at a load of at least 4 credits.

At least 18 credit hours are required in Dissertation (CH 603) for the Ph.D. degree. Credit for Research and Thesis is recorded on a P/NP basis. During the
term the thesis is defended, the student must be registered for at least 3 hours of CH 603. Graduate students must maintain a cumulative grade point average of 3.00 in all graduate courses taken during the degree program.
II. Other Requirements

Journal Clubs and Seminars

Biochemistry Division

1. All Biochemistry graduate students are expected to sign up for, attend, and participate in the Institute of Molecular Biology (IMB) Student Research Seminar Series. Beginning in the third year, students will be asked to present a seminar on their ongoing thesis research once a year. This provides an opportunity to present research results to a general audience.

2. To improve general seminar and lecture presentation skills, all Biochemistry graduate students are expected to sign up for, attend, and participate in the IMB Journal Club Series. Beginning in their second year, graduate students will be called upon to present a journal club seminar at least once a year.

3. All Biochemistry graduate students are expected to sign up for and attend the weekly IMB Seminar Series, which features research seminars presented by invited speakers from other universities. These seminars provide students with exposure to forefront research covering a wide range of topic areas from experts in their discipline.

Organic/Inorganic/Materials Division

1. Students in the O/I/M Division are expected to register for CH 623. In the Fall term, this course helps first-year students develop skills associated with effective scientific presentations, important for success in graduate school and beyond. Students are also required to give a departmental seminar on their thesis research in the Spring term of the third year.

2. All O/I/M students are expected to register for and attend CH 607, "Organic/Inorganic/Materials Seminar."

Physical Chemistry Division

1. Enrollment in the P-Chem journal club is required for all Physical Chemistry students in their first two years, but is optional for more advanced students. First year students will give 10-15 minute talks to faculty and graduate students in the division at the end of each term-long research rotation.

2. All P-Chem students are expected to register for and attend CH 607, "Physical Chemistry Seminar."
Teaching

Candidates for an advanced degree are required to participate in the undergraduate teaching program in Chemistry for a period of three terms sometime during their graduate career. This typically occurs during the first year of study. Non-English-speaking students are required to take the SPEAK test and to score 50 or higher before they may teach.

Research

The Ph.D. program prepares a candidate for independent scientific research. Such preparation requires active experience with the research process.

Rotations

All graduate students are required to rotate through three different laboratories during the Fall, Winter, and Spring terms of their first year. Research rotations give students an opportunity to work in three different environments that both broadens the educational experience and provides a strong basis for the selection of a thesis advisor. Students are expected to discuss possible rotations with faculty before the beginning of each term.

At the end of each rotation period, students will present a 10-15 minute talk on the results of their research project to faculty and students.

If a student does not find a research group to join after three rotations, an ad hoc committee will be formed to advise the student and review their academic progress, including their research progress. If the student is making satisfactory academic progress, the student will be able to complete a fourth rotation arranged collectively by the Department Head, ad hoc committee, and student. If a student does not find a research group to join after their fourth rotation, the ad hoc committee will meet with the student to assess their academic progress. Not finding a research group to join after a fourth rotation is a strong indication that a student is not making satisfactory academic progress, but any such determination will be made by the ad hoc committee.

Doctoral Research

The ultimate, and by far the most important, requirement for the Ph.D. degree is for a student to pursue a research problem to a point culminating in a written thesis that makes a significant and original contribution to the understanding of some aspect of Chemistry. The student will submit the written thesis to the advisory committee for review. The candidate must then defend the thesis before
the committee and be prepared to answer questions about the thesis and related subjects.

7-year limit. Graduate School regulations stipulate that the residency requirement, advancement to candidacy, and the doctoral dissertation must be completed within a seven-year period from the initial date of enrolling, unless an “on-leave” status has been approved.

**Review of Progress & Additional Requirements**

**Prior to Joining a Research Group**

A student’s progress in the first year will be assessed by quarterly rotation reports, which are submitted by the student’s rotation supervisor; course grades; cumulative exams; and teaching evaluations. These are reviewed by the Department Head. Should a minor problem arise, the Department Head will meet with the student to assess the situation and offer advice. For more substantial issues, the Department Head will assemble a review committee of faculty to consult/advice the student and to make appropriate recommendations to the Department Head.

**Fourth-Term Review**

During the fourth term of residence (usually the Fall term of the second year), graduate students are required to meet with their assigned thesis advisory committees. The purpose is to assess the student’s early progress toward the Ph.D. degree. The fourth-term review has three parts:

1. To review course requirements and progress
2. To review initial cumulative exam results
3. To review and discuss the student’s ideas and progress towards a thesis

This review is not a pass/fail situation, but should be viewed as an opportunity to get better acquainted with your thesis committee and to discuss your research ideas and goals with them.

A. Report: students must write a 3-5 page report summarizing ideas and plans for the thesis. Included in this report should be specific plans for what the student will do first (and why), what the student will do second (and why), etc. This report should be presented to the committee one week before the scheduled review.
B. Talk: students should also prepare a ten-minute talk describing the proposed work. This talk will be a framework for the discussion at the review.

All members of the committee should be invited to the meeting, but the outside member is not required to attend. Immediately following the review, students will be given an oral evaluation of their performance to date. In addition, a brief report summarizing the meeting and the committee’s assessment of the student’s progress will be forwarded for placement in the student’s file. A copy of the report will be sent to the student. The Department will notify the students when it is time to schedule the exam.

Annual Review of Academic Progress

Each year following advancement to candidacy, students are required to meet with their thesis advisory committee during Winter or Spring term. For third year students, the annual review can coincide with the Spring term 3rd-year research presentation. The Department will notify students when it is time to schedule the review. Students should contact all members of their committee and try to accommodate their schedules in arranging a meeting. It is not necessary for all members to attend each year, but a minimal group consisting of the student’s thesis advisor, the committee chair, and one other member must be present.

A. Report: Students are expected to write a brief report, usually 3–5 pages, summarizing research progress and plans for the coming year. Students are also encouraged to list other academic activities since the last Annual Review, such as courses taken for a grade, seminars presented and scientific meetings attended, at the beginning of the report.

B. Talk: Students should be prepared to give a short talk (10 minutes) on their work, including a brief introduction, suitable for committee members who are not specialists in the immediate area of research.

Immediately following the review, students will be given an oral evaluation of their progress. In addition, a brief summary of the meeting and the committee’s assessment of the student’s progress will be forwarded to the Department for placement in the student’s file. A copy of the report will be sent to the student. The Department Head will place any graduate students (with the exception of 3rd-year students who are being reviewed as part of their 3rd-year research presentation) for whom a summary has not been received by the end of the Winter term on a list indicating these students are not making satisfactory progress toward the degree. Possible sanctions include suspension of support.
Guidelines for dismissing a graduate student

1. Separation from a Research Group

   This category applies to cases in which separation of a student from a research group, but not dismissal from the graduate program, is considered. In these cases, it is assumed that the student has complied (and continues to comply) with all Department and University requirements and that the student is making satisfactory progress toward the Ph.D.

   a. Separation Prior to Advancement to Candidacy

   At any time before Advancement, a student may be asked to leave a research group by the professor in charge. The student’s committee should be informed of the impending action before the student himself is informed. A meeting may be held at the request of the student, the advisor, or any member of the committee to clarify the situation, but no formal vote of the committee is required. The student will be expected to work as a teaching assistant to support himself or herself during this time.

   b. Separation after Advancement to Candidacy

   Students who have been advanced to candidacy, who comply with Department and University requirements, and who are making satisfactory research progress cannot be separated involuntarily from a research group. The student’s committee must meet to arbitrate an agreeable solution to the conflict. In general, failure to follow proper safety protocols and repeated violations of safety procedures during research can result in dismissal from the program.

2. Dismissal from the Chemistry Program

   This category applies to those students who have failed to meet Department or University requirements and to those students who are not making satisfactory progress toward the Ph.D.

   a. Dismissal Prior to Advancement to Candidacy

   In this case, the student’s committee must meet. The committee has the authority to immediately terminate the student’s enrollment in the graduate program, or it can warn the student by establishing the conditions under which the student may continue in the program. (The latter course of action is preferred.) If the student fails to comply with the conditions set forth by the committee, a second committee meeting with the student should be called to dismiss the student.
The full faculty must be informed at a faculty meeting before the dismissal is official. The full faculty may direct the committee to reconsider the dismissal, but no formal vote of the faculty is required for dismissal. Any dismissal from the program should follow ACS guidelines with regard to financial support, which is typically one additional term on a Department-supported TA-ship.

b. Dismissal at the Advancement to Candidacy Exam

Three outcomes are possible at the Advancement to Candidacy Exam. Students can pass unconditionally; they can be asked to rewrite selected parts of proposals or to fulfill certain other obligations; or they can fail. Outright failure with subsequent dismissal from the program becomes official only after the full faculty is informed at a faculty meeting. Students for whom the decision is postponed and who fail to do the agreed-upon requirements can be dismissed at a subsequent committee meeting. As always, the dismissal becomes official only after the faculty is informed of the decision at a faculty meeting. In all cases, ACS guidelines should be followed with regard to financial support, which is typically one additional term on a Department-supported TA-ship.

c. Dismissal after Advancement to Candidacy

The student’s committee must meet with the student to establish the conditions under which the student may continue in the program. A second meeting should be scheduled to review the student’s compliance with the conditions set forth by the committee. Failure to comply can result in dismissal, as determined by the committee. The dismissal becomes official only after the faculty is informed of the decision at a faculty meeting. In all cases, ACS guidelines should be followed with regard to financial support, which is typically one additional term on a Department-supported TA-ship.

d. Dismissal with a Ph.D.

This category applies to students who have been told by their research advisors to finish their research and write a Ph.D. thesis by a certain date. Typically, the deadline is accompanied by notification that financial support will be terminated should time beyond the deadline be required. The student’s committee must be notified if a research advisor plans to set a deadline for receipt of a Ph.D. thesis. At a meeting with the advisor and the student both present, the committee should work to set a realistic date for receipt of the thesis. The student must be notified in writing of the date set by the committee. The committee must meet a second time to review the student’s progress and to approve the termination of financial support.
III. Transitional Masters Internship to Ph.D. Program

Students transitioning from the industrial master’s internship program to the Ph.D. program are expected to follow the guidelines indicated above for the traditional Ph.D. program with the following differences.

Rotations

Students are encouraged to do at least two rotations through faculty laboratories before joining a research group; however, students may petition to join a lab after only one rotation. Students are expected to contact a prospective rotation advisor prior to transitioning to the PhD program. During rotations, students will be supported either by research stipends from a faculty member’s grants or as Departmental GEs, depending on availability of TA positions during this period. The method of student rotation support will be determined by the prospective rotation advisor.

Fourth-term Review and Advancement to Candidacy

After officially joining a research group, students are expected to complete a “4th term” review after six months and to complete their advancement to candidacy exams within 12 months. The 6 and 12-month durations are similar to the traditional Ph.D. student guidelines for the 4th term and advancement to candidacy reviews. The review dates, however, are not tied to the traditional academic calendar to accommodate different start dates by students returning from their internships. Transitional students typically take a cumulative examination each academic term until they satisfy their division’s requirements. Transitional students may advance to candidacy prior to completing their cumulative examination requirement in certain cases, but it must be completed prior to the Ph.D. defense.

Teaching

Graduate students returning from industrial internships would typically complete their teaching requirements by serving as GEs in the summer master’s immersion courses, teaching at least one quarter during their graduate careers. It is anticipated that most students will teach the equivalent of at least three quarters via a combination of summer course and/or unfilled Department GE positions.

Coursework

Coursework completed as part of the industrial master’s program will count toward the Ph.D. coursework requirement described above. The students’
research advisor may recommend additional coursework. Students are expected to participate in the divisional seminar series and journal clubs. Students are also expected to meet requirements for any departmental seminars in their division (e.g. the O/I/M 3rd year research talk), but the specific timing of these talks may vary from student to student due to variations in start date. Students should discuss with their research advisor when to schedule these talks.

IV. Master’s Degree Requirements

The preceding material has been prepared with the expectation that most entering graduate students plan to attain a Ph.D. degree in Chemistry. Students who have been admitted to candidacy for the Ph.D. degree without a master’s degree do not automatically receive a master’s degree; however, they are encouraged to petition to receive an M.A. or M.S. degree when they have completed the requirements for a master’s degree. Following is a summary of Departmental and Graduate School requirements for a master’s degree. Students are advised to consult the Graduate School for a complete description of University requirements.

Course Requirements

All work applied toward a master’s degree must be completed within (7) seven years, including transferred credits, thesis and all examinations. Students must complete no fewer than 45 credits in courses approved for graduate credit with a grade point average of 3.00 or better in all graded courses. Of this work, 30 hours must be in the Department, 24 must be taken as graded credits, and nine hours must be in courses numbered 600-699. If a thesis is presented as part of the master’s degree program, a minimum of nine credit hours in Thesis (CH 503) must be completed.

Master’s Thesis

Master’s degree candidates are strongly advised to undertake a research problem and write a thesis. The specifications for this thesis should represent a research effort on a problem of significance. The thesis is prepared for review by a faculty committee and is presented orally as a seminar topic. Students must register for a minimum of nine credit hours in Thesis (CH 503) when this option is chosen as part of the degree program.