

GUIDELINES FOR Ph.D. DEGREE CHEMISTRY

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I. Overview

The Ph.D. degree in Chemistry involves the successful completion of the following requirements:

- Entrance exams
- Course program
- Comprehensive exam
- Research prospectus exam
- Seminar program
- Dissertation research and preparation
- Final dissertation defense.

It is the function of this document to delineate these requirements and to define the Chemistry Department's supervisory role. The information given here supplements statements of degree requirements published in the University Bulletin. Additional information may be obtained from the Office of Graduate Studies and Research and the Chemistry Departmental office.

II. General Requirements

A. Entrance Exams

Prior to beginning the proposed program, each student will be required to demonstrate basic proficiency in at least *three* of the five recognized subspecialties of chemistry:

Analytical Chemistry

Biochemistry

Inorganic Chemistry

Organic Chemistry

Physical Chemistry (Quantum, Thermodynamics and Dynamics)

Basic proficiency is determined by an acceptable performance on entrance examinations. The entrance exams are standardized exams constructed by the American Chemical Society and are given to assess the background of entering graduate students. To pass the exam a student must score above the 50th percentile for that exam. A student may take the exam in each subspecialty no more than three times – in addition to the initial offering as students enter the graduate program, the entrance exams are offered at the end of each term of the first year (Fall, Winter, and Spring). All students are required to pass at least three of the entrance exams by the end of their first academic year; failure to do so will result in dismissal from the program.

When: By the end of the 1st year in residence.

B. Coursework

Students are required to complete a minimum of 6 graduate courses of formal instruction in science. These courses must be worth a total of at least 18 credit hours and be at the 500/600 level. Course credits such as: seminar, survey faculty research and research cannot be applied to the coursework requirement. Courses with a laboratory component, such as CH 536/37, are considered to be one course but students are generally discouraged from taking laboratory component (exception: CH525, Electronics and Instrumentation Laboratory). It is expected that the majority of coursework will be completed in the first two years of residence. Due to the interdisciplinary nature of the departmental

research programs, courses from outside chemistry will often be part of a student's curriculum. A maximum of two course from other departments may be applied to the six course requirement, but must be relevant to chemistry and the students research program. All coursework must be approved by the graduate adviser and the GAAC/DAC.

When: By the end of the 2nd year in residence.

C. Comprehensive Examination

In their second year students will complete their comprehensive exams. The comprehensive exam is divided into two parts: a written and an oral exam. These exams are intended to ensure that students have a sufficiently strong background in the general sub-specialty and in their specific field of interest.

Written Exam: Students will prepare a written document (about 10-12 pages in length) that resembles a proposal of the research they intend to complete for their Ph.D. The document should demonstrate the student has a strong grounding in their sub-specialty as well as an appreciation for remaining challenges in their field of interest. The document must include the following sections:

- Specific Aims
- Background and Significance
- Preliminary Results
- Research Plan

The documents will be assessed by the student's initial advisory committee (see section III. Advising). The written portion of the examination must be submitted to members of the student's initial advisory committee at least 7 days prior to the oral exam.

Oral Exam: Students will give an oral presentation (about 30 minutes) on their document. The examining committee will hold questions until the presentation is complete. At the conclusion of the presentation the examining committee will proceed to question the student on both the contents of their presentation and written exam but also any appropriate area of the student's sub-specialty.

Students may pass one or other or both of the comprehensive exams. In the event of a no-pass, an opportunity to retake that examination will be given in the next term after the first exam. It is not necessary to retake an exam that has been passed. In the event that the student receives a second no-pass on either exam they are admission to the program will be cancelled.

When: By the end of winter term of the 2nd year.

D. Prospectus Examination

The prospectus exam **must** be completed during a student's third year in the program. It is a combination of written and oral examination, along the lines of the comprehensive exam. The student will prepare a report of their research progress in the program to date and their research plans for the remainder of their time in the program and how that will lead them to a successful dissertation. The written report must be provided to each member of the DAC at least 7 days prior to the exam. The report should be about 15-20 pages, be concise but also complete. It should provide:

- a clear picture of the background required to the work.
- a clear description of the student's research accomplishments to date.
- the student's future research plans.

The report should briefly but clearly provide a road map of how the student plans to address outstanding research questions in their chosen research area and how this will lead them to a successful Ph.D. The oral exam will begin with a presentation (30-40 minutes) by the student of their research accomplishments to date and how they see their results transforming into a PhD thesis. The purpose of the exam is to examine both the research history and plans of the student to ensure that they will be successful in their pursuit of a Ph.D. A student may be asked to revise their report and/or your research plans the DAC prior to advancing to candidacy. Once your committee is satisfied that your research is on track you will be recommended for advancement to candidacy. Students who have advanced to candidacy are permitted to register for CH603 dissertation credits (see section E.). Students should ensure that a copy of form GO-23 is available for the DAC at the end of the exam. Students should not handle this form once it has been signed.

When: During the 3rd year in residence

Form: <http://www.pdx.edu/ogs/sites/www.pdx.edu.ogs/files/GO-23.pdf>

E. Departmental Seminar

Students must attend the weekly chemistry departmental seminar at 3:15 on Friday afternoon. Participation in the departmental seminar is an important part of a student's development as a research scientist. As an inducement light refreshments are offered.

During the 4th year in residence all students must present a seminar on research progress their entire department. The purpose of this seminar is to afford the student the experience of presenting to a large audience before they present their dissertation defense, but also the edification of the department as a whole host of the research being undertaken by the student. The student must be sure to enroll for CH507 Seminar Presentation (there are 3 CRNs corresponding to CH 507, the student should ensure that they have selected the CRN corresponding to seminar presentation) in the term in which they are presenting their seminar. Seminar presentations are graded pass/no pass.

When: Attendance weekly, and presentation during the 4th year in residence

F. Credit Requirements

A total of 87 credit hours at the graduate level are required for a PhD in chemistry. Included in these 87 credits must be:

- A minimum of 18 course credits at the graduate level (500 or 600 level) and a minimum of 6 courses.
- 2 credits of CH510 *TA Prep* in the first fall term.
- 1 credit of CH510 *Survey of Faculty Research* in the first fall term.
- 2 credits of CH507 *Professional Preparation* in the first spring term
- 1 credit of CH507 *Research Seminar* graded in the fourth year
- A minimum of 27 credits of CH603 *Dissertation* are required. A student may not enroll for CH603 credit prior to advancement to candidacy (completion of the prospectus exam).

The remaining credits will be made up of either: graduate level courses, research (CH601) and/or dissertation (CH603) credits.

G. Dissertation

Upon completion of the approved research plan (see prospectus requirement above) the candidate will prepare a dissertation describing the results of the course of study. The dissertation will be prepared according to the General Thesis Instructions, GO-14 form, obtainable from the Office of Graduate Studies and Research (OGSR). Copies of the dissertation will be presented to members of the DAC at least 2 weeks before the oral exam. Following acceptance of the dissertation by the DAC, the dissertation will be orally presented and defended by the candidate. The examination committee will consist of the student's DAC (which includes a representative of the Office of Graduate Studies) and Research Adviser. In the first part of the defense the student will present a public seminar on the dissertation research. This will be followed by a private oral examination attended by members of the examination committee covering the subject area of the thesis. Successful completion of the oral examination and the suggested revisions to the dissertation imposed by the examination committee will be required for completion of the degree.

When: Within 5 years of entering the program. Waiver for a sixth year can be requested.

Forms:

Electronic Thesis formatting guidelines:

http://www.pdx.edu/ogs/sites/www.pdx.edu.ogs/files/ETD_Formatting_Checklist.pdf

Doctoral Defense form:

<http://www.pdx.edu/ogs/sites/www.pdx.edu.ogs/files/GO-17D.pdf>

Dissertation signature page:

<http://www.pdx.edu/sites/www.pdx.edu.ogs/files/ETD%20Doc%20Sig%20Page.pdf>

III. Student Advising

At the time of entry into the Ph.D. program the Graduate Admission and Advisory Committee (GAAC) are responsible for advising the graduate student and are the resource to which any graduate student problems should be taken first. After selection of the Research Adviser the primary responsibility for the student's program will pass from the GAAC to the Research Adviser. The Research Adviser has the major responsibility for monitoring the progress of the student, even in cases where the research is performed in collaboration with another laboratory. The Research Adviser will provide advice on and preliminary approval of the program of study. At the same time as the research advisory selected an initial advisory committee (IAC) will be appointed for each student. The primary purpose of this committee is to examine the student's comprehensive exam, this committee will also assist the adviser in monitoring the student's progress.

Once a student has completed their comprehensive exams they must form a Dissertation Advisory Committee (DAC) which replaces the IAC and continues to serve in an advisory capacity to the graduate student. It is the Research Advisor's responsibility to schedule meetings with the Dissertation Advisory Committee, including the Prospectus and Final Oral Examinations and to submit the Annual Summary Report to the Department Chair. These reports become part of the student's permanent file.

A. Graduate Admissions and Advising Committee (GAAC)

Upon entry into the PhD program students are initially advised by the Graduate Admissions and Advising Committee (GAAC). In order to facilitate the advising process, all new graduate students are required to take Graduate Entrance Exams (mentioned above) prior to enrollment in a course program. Once the examination results are known, each new student will meet with the GAAC to discuss a course program for the coming academic year. The GAAC will continue to oversee the student's progress and be available for informal advising until such time as a Research Adviser and Dissertation Advisory Committee are selected. The student may contact the GAAC with any advising questions throughout their time in the program.

B. Research Adviser

Each doctoral student must begin discussion potential research projects with faculty members during their **FIRST TERM** and should have selected a Research Adviser before the end of this term. The procedure for adviser selection is as follows.

- The student will register for CH510 *Survey of Faculty Research* in the fall term of their admission. Each faculty member will give a short presentation of the research interests.
- The student will discuss fields of interest and potential research projects with at least three faculty members.
- The student uses the Selection of Research Adviser form available from the chemistry department office. The student obtains the signature of each faculty member with whom they discuss potential research projects.
- The student ranks the top **three** preferences for adviser (1 = first choice, 2 = second choice...)
- The GAAC will review all students' adviser choices.
- The GAAC and department chair will determine whether the faculty member preferred by the student is willing to accept the student. If not, then the GAAC and department chair will move on to the student's next preference.

In the event that a student is not paired with an adviser during this process, then the department chair will assist the student in making another suitable selection. Students are required to find a research adviser by the end of their first year. Failure to place with a research adviser in the first year will result in cancellation of admission to the program.

When: First term in the program, or by the end of the first year at the very latest.

Form: Selection of Research Adviser (available from the chemistry department office)

C. Initial Advisory Committee (IAC)

The IAC will advise and examine a student's progress through first terms of the program. The purpose of this committee is to provide a panel of experts in the subspecialty of the adviser to assist in monitoring the student's progress and examine the student's comprehensive exam. This committee will be appointed by the GAAC at the time of adviser selection. This committee should meet with the

student at least twice: once close to the end of the 1st year and once in the 2nd year to examine the comprehensive exam. This committee, like the DAC which will supersede it, is intended as a first resort for students and advisers seeking advice with regard to their research progress. That notwithstanding students should be clear that the GAAC is always happy to take up any problem or concern that the graduate student may have at any point in the program.

D. Dissertation Advisory Committee (DAC)

The DAC will advise and examine a student's progress through the program from completion of the comprehensive exam to final defense. As soon as a student has passed their comprehensive exam they should complete the process of forming their DAC. Students should work closely with their research adviser on selecting committee members. It is advisable to have a committee that will understand the technical aspects of your research and provide constructive comments that will help improve the quality of the research. The DAC may vary in size from four to six faculty members. Students should keep in mind that more committee members can make scheduling meetings more difficult. The DAC is comprised of:

- The student's research adviser; the adviser serves as chair of the DAC.
- Three tenured or tenure-track faculty members from within the chemistry department at Portland State University (including the adviser).
- One representative of the Office of Graduate Studies (OGS). The OGS representative must be a faculty member in another Portland State department with a doctoral program. Students must suggest two possible candidates for this role but final selection lies with the OGS.

The DAC may be augmented with faculty members from outside the department (in addition to your OGS rep) to increase relevant expertise on the DAC. This should be discussed with the research adviser before proceeding. All members of the DAC must hold doctoral degrees. OGS will require *curriculum vitae* for any faculty members from outside Portland state University. University approval of the DAC is required prior to the prospectus exam which must be completed in the student's third year.

The DAC plays an oversight role, ensuring adequate student progress. The DAC will conduct an annual review of the student's progress, based on a meeting with the student. Additional meetings may be scheduled at the discretion of the student, Research Adviser, Department Chair, or any

member of the DAC, but must be at least once per year. The DAC is also responsible for final approval of the research prospectus/recommendation for Advancement to Candidacy and the Dissertation. In addition, the DAC administers the candidate's oral prospectus exam, presentation of Independent Research Proposal, and final oral exam. Note: the Dissertation Advisory Committee fulfills the roles of both the Advisory Committee and the Dissertation Committee (specified in the University Bulletin) for Ph.D. students in Chemistry.

When: The DAC should be formed soon after the comprehensive exams have been passed, no later than the end of 2nd year in residence year.

Form: The DAC is assembled by completing and submitting from GO16D available here: www.pdx.edu/sites/www.pdx.edu.ogs/files/GO-16D.pdf.

E. Committee Meetings

Students must meet with their advisory committee on an annual basis. This is to ensure that the student's progress is satisfactory at each stage of the program. The schedule for meetings should be as follows:

Year	Purpose	Committee
1	Monitor progress	IAC
2	Comprehensive exam	IAC
3	Prospectus exam	DAC
4	Monitor progress	DAC
5	Dissertation defense	DAC

IV. Status in Program

A. Advancement to Candidacy

A student is nominated for advancement to candidacy by the student's approved Dissertation Advisory Committee with the approval of the Department Chair after the student has satisfactorily completed the entrance exams, all coursework, the comprehensive exam, and the oral prospectus exam. This should occur no later than the end of the 3rd year of a student's degree program. The nomination is made on the Prospectus Approval form. The student will be informed by the Dean of Graduate Studies of advancement to candidacy. Note that currently (September, 2014), students who are advanced to candidacy will receive a higher GA stipend for either teaching assistant (TA) or research assistant (RA) duties.

B. Maintenance of Enrollment in Program

The student must maintain a minimum 3.0 cumulative graduate-level grade point average (GPA) and be enrolled for credit each term of the academic year (unless the student has obtained a leave of absence). After completion of 9 *graded* credit hours, if a student's cumulative graduate GPA falls below 3.0 this places the student's assistantship and place in the program in jeopardy. If a student's cumulative graduate GPA falls below 3.0 the student will be placed on ACADEMIC PROBATION by the Office of Graduate Studies. ACADEMIC PROBATION means that the student is not eligible to hold a graduate assistantship or advance to candidacy. The student has until the completion of a further 9 nine graded credit hours to raise their cumulative graduate GPA back to 3.0 or above. A student on academic probation who fails to raise their cumulative graduate GPA to 3.0 within 9 graded credit hours will permanently lose their graduate assistantship. In addition to maintaining a cumulative graduate GPA of 3.0 graduate students must ensure that in each term their graduate GPA is 3.0 or better. If a graduate student's term GPA falls below 3.0, or the student receives a grade of C or below the student may be eligible WARNING STATUS. The student may only be eligible for WARNING STATUS once, on the 2nd occasion ACADEMIC PROBATION follows.

Students must be registered every term during the academic year (minimum 1 credit) while working on any phase of the dissertation (research, writing, and revision) through the term of approval of the dissertation by the Office of Graduate Studies and Research.

Additionally students must make satisfactory progress in research work each year as judged by their adviser (or DAC once advanced to candidacy) through the annual summary reports. A Periodic Review Form (*q.v.*, Appendix C) will be filled out by the student's Ph.D. adviser (or GAAC Chair) each year in September. There are nine categories of progress that may be evaluated in any given year. This form may be filled out and given to the student mid-year if there are perceived deficiencies in a student's performance, and in such cases students will be re-evaluated in three months' time to assess if the deficiencies have been overcome. If progress is still deemed unsatisfactory, the GAAC committee may recommend to the Department Chair that the student be dismissed from the Ph.D. program. In some cases, students dismissed from the Ph.D. program will be granted admission to either the M.S. or M.A. programs. A copy of this recommendation will be transmitted to the student.

C. Maintenance of Graduate Assistantship

The student must enroll in and successfully complete 9 graduate level credits each term. A student may register for more than 9 credits but the tuition remission granted by the department covers only 9 credits and the student will need to pay the extra tuition costs out-of-pocket. Course audits are not counted as credits. Graduate assistants are expected to devote full time to their studies, teaching, and research duties. Students may **not** hold any outside employment while on assistantships (RA or TA) without expressed consent of the Department Chair and the GAAC. This consent must be obtained by the Research Adviser on the student's behalf. Violation will result in loss of eligibility for assistantship support. In addition, students expecting a graduate assistantship in the form of a TA must perform teaching duties satisfactorily each term in order to qualify for reappointment by the Department Chair. Ph.D. students in good standing will only be supported on teaching assistantships for a maximum of twenty (20) terms. A special *one term* extension may be granted by the GAAC and the Department Chair following petition by the Research Adviser on the student's behalf. Failure to adequately perform teaching and/or other duties as a TA may lead to the loss of a graduate assistantship unless research funds for RA are available for the research adviser.

D. Residence Requirement

The student must spend at least three consecutive terms in full-time (at 9 credits per term) residence at Portland State University after admission to the doctoral degree program. A minimum of three

years in graduate study is also required. The student must complete 27 credits of dissertation research under CH 603 after advancement to candidacy.

E. Leave of Absence

Under special circumstances, including parental leave, requests for a leave of absence of up to one year may be approved by the Department Chair in consultation with the student's Research Adviser or the Graduate Admissions and Advising Committee. *Such applications must be filed with the Office of Graduate Studies and Research no later than the last day to register for classes in the term in which the request is made.* No more than **TWO** leaves of absence will be approved and such leaves are included in the five year time limit after advancement to candidacy for completion of the degree. Only students in good academic standing can be granted a leave of absence.

F. Withdrawal / Change to the M.S. Program

Any student who ceases to be enrolled for more than **ONE** academic term without formal leave of absence will be assumed to have withdrawn from the degree program and will no longer be enrolled by the Chemistry Department. The student can be readmitted only with the consent of the Graduate Admissions and Advising Committee.

Students wishing to change to the M.S. degree program should file an M.S. degree program admission application with the Graduate Admissions and Advising Committee and consult with the Department Chair. Once the change has been approved, the student would be required to reapply to the Ph.D. program, as would any other student, so this change is not generally advisable. The two-year (8-term) time limit for assistantship support for the M.S. degree would also include any time spent on support in the Ph.D. program.

Form: <http://www.pdx.edu/sites/www.pdx.edu.ogs/files/go-19d.pdf>

Ph.D. students have the option of preparing and defending an M.S. thesis during the progress toward their Ph.D. dissertation, with the Research Adviser's consent, however the student must inform the GAAC of this intention by the time of their first taking of the Ph.D. comprehensive exam. Attainment of a M.S. degree concomitant with the Ph.D. requires the following:

- Completion of 6 formal courses (the same courses can also be used for the Ph.D. requirements)
- Completion of a literature-based seminar (this is *distinct* from the research-based seminar required for the Ph.D.)
- Formation of a DAC (even if the same DAC serves for the Ph.D. a new GO-16 is required)
- Completion of research that is formally distinct from that used for the Ph.D.
- Preparation of a properly formatted and approved M.S. thesis
- Oral defense of this research work
- 1 credit of CH503 in the term of their M.S. thesis defense, which must be completed successfully by the end of the Winter term of their third year.

The concomitant attainment of an M.A. degree while pursuing a Ph.D. degree is not allowed.

Forms: <http://www.pdx.edu/sites/www.pdx.edu.ogs/files/go-16m.pdf>

<http://www.pdx.edu/ogs/sites/www.pdx.edu.ogs/files/GO-17M.pdf>

<http://www.pdx.edu/sites/www.pdx.edu.ogs/files/ETD%20Mast%20Sig%20Page.pdf>

G. Completion of Program

The awarding of a degree during a specific term involves the following steps which must be met by certain deadlines. Exact due dates are posted in the Office of Graduate Studies and Research but it is advisable for the student to finish the requirements well ahead of the deadline to allow leeway for unexpected delays. All of the forms below should be turned in to the Office of Graduate Studies and Research by the posted deadlines. Any Incomplete or In Progress grades (except 603) must be removed no later than two weeks before graduation.

VI. APPENDIX A

A. Summary of Responsibilities

The following summary of responsibilities of the various people and entities involved in the Ph.D. program in Chemistry is intended to serve as a quick reference guide and may not be considered all-inclusive or binding. It is still contingent upon the students and advisers to acquaint themselves with the particulars of their duties.

Student's Responsibilities:

It is the student's responsibility to acquaint themselves with all of the requirements associated with the various levels of governance (University, Chemistry Department) of their graduate program. This document and the Chemistry Program Guidelines along with the University Bulletin should be considered the primary source of information. Additional information, including answers to specific questions and term specific deadlines, can be obtained from the Chemistry Department, and the Office of Graduate Studies and Research.

Specific responsibilities include: 1) Preparation for and successful completion of all of the requirements listed above. 2) An initial individual literature search of material applicable to the proposed research and 3) An ongoing familiarity with recent developments in the field. 4) Competent independent execution of the research project. 5) Preparation and presentation of the dissertation.

Research Adviser's Responsibilities:

- 1) Primary advising of the student in terms of both the course of study and the research project. The RA should thus be aware of the coursework requirements of the degree program.
- 2) Advising and assisting in the preparation of the Comprehensive Exam, Research Prospectus, Research Seminar and the Dissertation. Scheduling of the latter three exams.
- 3) Assisting the Department Head in the selection of the Dissertation Advisory Committee.
- 4) Filing the Annual Summary reports, and the Graduate Office forms (especially GO-16D and 17D.)

Initial Advisory Committee (IAC) Responsibilities:

- 1) Oversee the student's progress in the degree program.
- 2) Provide advice regarding the preparation of the comprehensive exam.
- 3) Provide final approval of the student's course of study and comprehensive exam.
- 4) Administer the oral research comprehensive exam.

Dissertation Advisory Committee (DAC) Responsibilities:

- 5) Oversee the student's progress in the degree program.
- 6) Provide advice regarding the preparation of the research prospectus and dissertation.
- 7) Provide final approval of the student's course of study, research prospectus and dissertation.
- 8) Administer the oral research prospectus exam and dissertation defense.

B. Project Timeline Summary (The following is an idealized 5-year Ph.D. degree program)

- Fall term, year 1:
 - Entrance exams
 - Formal coursework (1 or 2 classes)
 - Survey of Faculty Research and advisor selection
 - TA training
 - TAing
 - Winter term, year 1:
 - Entrance exams (if needed)
 - Formal coursework (1 or 2 classes)
 - Lab work
 - TAing
 - Spring term, year 1:
 - Entrance exams (if needed)
 - Formal coursework (1 class)
 - Lab work
 - TAing, if appropriate
 - Seminar/proposal prep class (2 credits)
-
- Fall term, year 2:
 - Formal coursework (1 class)
 - Lab work
 - Preparation of document for written Comprehensive examination
 - Winter term, year 2:
 - Formal coursework (if needed)
 - Lab work
 - Oral Comprehensive exam, or start written research proposal
 - Spring term, year 2:
 - Formal coursework (if needed)
 - Lab work
 - Oral/Written Comprehensive exam
 - Prospectus exam, for students who have passed comprehensive exams
-
- Fall term, year 3:
 - Lab work
 - Prospectus exam, for students who have passed comprehensive exams
 - Re-take of comprehensive exam(s), if needed
 - Winter term, year 3:
 - Lab work

- Prospectus exam, for students who have passed comprehensive exams (should be done before the end of their third year at the latest).
 - Spring term, year 3:
 - Lab work
 - Prospectus exam, if needed (should be done before the end of their third year at the latest).
-

- Fall term, year 4:
 - Lab work
 - Winter term, year 4:
 - Lab work
 - Spring term, year 4:
 - Lab work
 - Departmental seminar on research
-

- Fall term, year 5:
 - Lab work
- Winter term, year 5:
 - Lab work and thesis writing
- Spring term, year 5:
 - Thesis writing
 - Ph.D. defense