Doctor of Philosophy Degree

The recipient of a Ph.D. degree is understood to possess thorough knowledge of a broad field of learning and to have given evidence of distinguished accomplishment in that field; the degree is a warrant of critical ability and powers of imaginative synthesis. The degree also signifies that the recipient has presented a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study.

Requirements

- Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete a minimum of 48 semester units, at least 40 of which must be earned in 200 series graduate-level courses;
- Complete the required courses for one of the four emphasis tracks, with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U);

Physical Chemistry emphasis

- At least three of the following four courses: Quantum Chemistry (CHEM 212), Chemical Thermodynamics and Statistical Mechanics (CHEM 214), Chemical Kinetics (CHEM 215), and Molecular Spectroscopy (CHEM 231)
- One graduate course elective (numbered 2xx and at least 3 units) as approved by the Educational Policy Committee
- Four semesters of graduate seminar courses

Organic Chemistry emphasis

- Advanced Organic Synthesis (CHEM 200)
- Reaction Mechanisms (CHEM 201)
- Two graduate course electives (numbered 2xx and at least 3 units each) as approved by the Educational Policy Committee
- Four semesters of graduate seminar courses

Chemical Biology emphasis

- Bioorganic Chemistry (CHEM 202)
- Advanced Computational Biology (QSB 281) or Physical Biochemistry (QSB 207)
- Biochemistry (new graduate course)
- One graduate course elective (numbered 2xx and at least 3 units each) as approved by the Educational Policy Committee
- Four semesters of graduate seminar courses

Computational Chemistry emphasis

- Quantum Chemistry (CHEM 212)
- Chemical Thermodynamics and Statistical Mechanics (CHEM 214)
- Advanced Computational Biology (QSB 281) or Molecular Electronic Structure (new course).

- ❖ One graduate course elective (numbered 2xx and at least 3 units) as approved by the Educational Policy Committee
- ❖ Four semesters of graduate seminar courses

● Earn a passing grade in a course addressing scientific ethics, approved by the Educational Policy Committee;

● Serve as a teaching assistant for at least one semester;

● Pass the preliminary examination;

● Pass the oral Ph.D. qualifying examination;

● Present an open technical seminar at least once each calendar year in residence (the seminar may be given either at UC Merced or elsewhere, *e.g*. at a scientific conference);

● Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

Preliminary examination

All students in the group are required to pass a written preliminary examination that tests undergraduate-level understanding of the fundamental concepts in the field. This exam is administered twice each year, at the beginning of Fall and Spring semesters. Separate exams are offered in physical chemistry, organic chemistry, and biochemistry; only one exam need be passed. Students in any emphasis track may elect to take any one of the exams, but must choose before the start of the exam. Students may elect to take the exam for the first time at the start of either the first or second semester in residence. The exam may be taken each time it is offered, and it must be passed no later than the start of the fourth semester (a maximum of four attempts). Students who have not passed the exam by the start of the fourth semester will be recommended for dismissal to the Dean of the Graduate Division unless they successfully petition the Academic Policy Committee for an extension.

Ph.D. Qualifying Examination

All students are required to pass an oral qualifying examination before advancement to candidacy for the Ph.D. degree. Students are expected to take and pass the qualifying examination before the end of their second year of graduate study unless they successfully petition the Educational Policy Committee to take it at a specific later date. The qualifying examination may not be scheduled until the preliminary examination has been passed and at least three of the required non-seminar graduate courses have been completed. The intent of this examination is to ascertain the breadth of a student's comprehension of fundamental facts and principles that apply in his or her major field of study. It will also determine the student's ability to think critically about the theoretical and practical aspects of the field. Accordingly, the examination should be focused on the student's field of research but may and should venture into other areas of scholarship that underlie or impinge on the thesis topic.

The examination committee is the same as the student's faculty committee. The major professor is a voting member of the committee, but will normally not participate in the examination except to provide technical clarifications as requested by the other members of the committee. The qualifying examination is not open to the public.

The date of the examination is arranged between the student and the committee chairperson. At least one week prior to the examination date, the student will provide to the committee a written document (typically five to ten pages) that describes his or her research topic, summarizes progress to date, and outlines what he or she proposes to do, why it is

relevant, and what will be learned. The committee conducts the examination, and immediately thereafter submits the results of the examination to the Dean of the Graduate Division. The committee members should include in their deliberations such factors as relevant portions of the previous academic record, performance on the examination, and an overall evaluation of the student's performance and potential for scholarly research as indicated during the examination. A unanimous decision is required for a "Pass". If not all members of the committee vote to pass, they must write a report explaining their decision and must inform the student of the reasons for the decision.

A student who has not passed the examination may repeat the qualifying examination after a preparation time of no less than three and no more than nine months. The examination must be held by the same committee except that members may be replaced, with the approval of the Group Chair and the Dean of the Graduate Division, for cause such as extended absence from the campus. Students who fail to pass the examination on the second attempt will be recommended for dismissal to the Dean of the Graduate Division unless they successfully petition the Academic Policy Committee for an exception.

Dissertation and Final Examination

The Ph.D. dissertation must be creative and independent work that can stand the test of peer review. The expectation is that the material has served or will serve as the basis for peer-reviewed publication(s). The work must be the student's, and it must be original and defensible. The student is encouraged to discuss with members of the faculty committee both the substance and the preparation of the dissertation well in advance of the planned defense date. Detailed instructions on the form of the dissertation may be obtained from the Graduate Division.

The student must provide a copy of the dissertation to each member of the faculty committee and allow each committee member at least four weeks to read and comment on it. If one or more committee members believe that there are significant errors or shortcomings in the dissertation or that the scope or nature of the work is not adequate, the student must address these shortcomings before scheduling a defense. Once the committee members are in agreement that the dissertation is ready to be defended (although minor errors or matters of controversy may still exist), the final examination date may be scheduled by the student in consultation with the committee.

The Ph.D. final examination consists of a seminar on the dissertation work, open to the public, followed by a closed examination by the faculty committee. During the examination, the student is expected to explain the significance of the dissertation research, justify the methods employed, and defend the conclusions reached. At the conclusion of the examination, the committee shall vote on whether both the substance of the written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A majority is required for a pass. A student who has not passed the examination may repeat the examination after a preparation time of no less than one and no more than twelve months. A student who fails to pass the Ph.D. final examination on the second attempt will be recommended for dismissal to the Dean of the Graduate Division unless he/she successfully petitions the Academic Policy Committee for an exception.

The written dissertation itself need not be in final form at the time the final examination is passed. At the time of the final examination, the committee will point out any corrections and/or revisions to the dissertation that are needed. The members of the committee should not approve the final version of the dissertation until all required changes have been made.