SCOPE OF RESEARCH

Research in the Chemistry and Chemical Biology Graduate Group spans the subdisciplines of chemistry (organic, physical, inorganic, analytical, theoretical/computational, and materials), chemical biology, and biochemistry.

GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission through the Graduate Division's on-line application system. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of the Graduate Division makes final decisions on admission.

APPLICATION DEADLINES FOR ADMISSION

The deadline for receipt of applications is January 15. Late applications will be considered as space permits. Normally applications will be accepted for Fall semester only.

MATERIALS TO BE SUBMITTED

* The complete official application form;
* The application fee;
* All official university/college/junior college transcripts;
* An official Graduate Record Exam (GRE) score report. Only the general tests are required, but the subject test in physics, chemistry, or mathematics is also recommended;
* Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and promise as a researcher;
* Official score reports from the Test of English as a Foreign Language (TOEFL) if the applicant's native language or language of instruction is other than English.

ADMISSION CRITERIA

The minimum requirement for graduate admission to UCM is a bachelor's degree, or any other degree or certificate which the Graduate Division accepts as equivalent, and a grade point average no lower than 3.0 on a 4.0 scale. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation will also be evaluated as important determinants of an applicant's potential for success in graduate education. Foreign students from non-English speaking countries are required to attain a minimum score on the iBT TOEFL exam of 92. Students from non-English speaking countries will normally be interviewed by telephone in order to evaluate English proficiency.

GENERAL REQUIREMENTS FOR ADVANCED DEGREES

RESIDENCY

Students registered in regular University courses as a full-time student are regarded as being in residence. Students must enroll for a minimum of 12 units per semester to be considered in full-time status.

SCHOLARSHIP

Graduate students must maintain at least a 3.0 grade-point average to be considered in good academic standing or to be awarded an academic graduate degree. A student whose cumulative graduate grade-point average falls below 3.0, or who is judged not to be making satisfactory progress toward the degree by his or her faculty committee, will be placed on academic probation. The student will then be allowed a maximum of two semesters to make up the deficiencies and be returned to good academic standing. Otherwise, the student will be recommended for dismissal by the Dean of the Graduate Division unless he or she successfully petitions the Academic Policy Committee for additional time.

FACULTY COMMITTEES FOR ADVANCED DEGREES

The major professor, in consultation with the student and program faculty, recommends appointment of faculty members to advise on and supervise the student's dissertation research, serve on examination committees, and review and pass upon the merits of the doctoral dissertation. Final approval of the membership of these committees rests with the Dean of the Graduate Division. The committee should be appointed no later than the end of the second semester in residence.

Advanced degree committees in the Chemistry and Chemical Biology group consist of at least four members. One is the student's major professor, two are other UC Merced faculty members in the group (one of whom is appointed as Chair), and one is from outside the group. This outside member may be a regular or adjunct faculty member from any UC campus or an individual from outside the University of California who has special expertise and qualifications. In this case, the graduate advisor should submit a brief statement indicating the appointee's affiliation and title and how the prospective appointee has special expertise or qualifications that are not represented on the campus. In addition to the justification letter from the graduate advisor, a curriculum vitae and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Dean of the Graduate Division for review and approval. If potential conflict of interest issues exist as defined by Graduate Division policy, an additional Oversight Member must also be appointed.

All members of the committee must be in attendance for Ph.D. qualifying and final examinations or Master's comprehensive oral examination (Plan II). All members of the committee must approve the Master's thesis (Plan I) or Ph.D. dissertation. If a committee member's absence from campus for an extended period of time makes scheduling of examinations unreasonably difficult, the student may request that the committee be reconstituted. Reconstitution of the committee may also be justified by a substantial change in the student's thesis topic or may be required by the departure of a committee member from the university. When membership changes must be made, the major professor in consultation with the student should recommend a new committee member, giving the reason for the change. The reason must be acceptable to the Dean of the Graduate Division.

DOCTORAL DEGREE

SIGNIFICANCE

The Doctor of Philosophy degree is not granted by the University of California merely for the fulfillment of technical requirements, such as residence or the completion of fundamental courses. 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

The Chemistry and Chemical Biology group has established the following requirements for the Ph.D. degree:

- 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 three emphasis tracks as described below, with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U);
- 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 or research poster at least once each academic year in residence;
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

SELECTION OF A MAJOR PROFESSOR

The core of the Chemistry and Chemical Biology graduate program is the completion of a piece of original scientific research leading to a Master's thesis or Ph.D. dissertation. To this end, each student should discuss research interests and possible research projects with faculty in the group as early as possible, and select a faculty research advisor (major professor) no later than the end of the second semester of study. Selection of a major professor must occur before the student's faculty committee can be constituted. The student and the major professor together will develop a research topic, and research will normally occupy a majority of the student's time after the first year of residence. Interdisciplinary projects are highly encouraged, as are research collaborations with faculty or senior scientists outside UC Merced. However, the major professor must be a member of the Chemistry and Chemical Biology group.

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.

COURSEWORK REQUIREMENTS

The minimum coursework requirements are determined by the student's research area. Each emphasis area requires both core courses and one or more electives as follows:

Physical Chemistry emphasis

- At least three of the following four courses: Quantum Chemistry (CHEM 212), Chemical Thermodynamics and Statistical Mechanics (CHEM 214) or Statistical Mechanics (PHYS 212), 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)
- Graduate-level Biochemistry (QSB 202)
- 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) or Statistical Mechanics (PHYS 212)
- Advanced Computational Biology (QSB 281) or Molecular Electronic Structure (CHEM 225).
- One graduate course elective (numbered 2xx and at least 3 units) as approved by the Educational Policy Committee
- Four semesters of graduate seminar courses

Course electives must be regular graduate courses, not research or independent study. Courses offered by other graduate programs may be taken as electives but require approval of the Educational Policy Committee. Requirements for formal course work beyond the minimum are flexible and are determined by the individual student's background and research topic in consultation with the major professor.

PH.D. QUALIFYING EXAMINATION

All students in the Chemistry and Chemical Biology Ph.D. program 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 during 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 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.

ADVANCEMENT TO CANDIDACY

Upon successful completion of the Qualifying Examination, the student is given an application for advancement to candidacy by the examining committee chair. When it is filled out and signed by the graduate advisor and major professor, the student pays a candidacy fee and submits the form to Graduate Studies. Upon advancement to candidacy for the degree, the faculty committee is then charged to guide the student in research and in the preparation of the dissertation.

SEMINARS

All students in the group are required to present an open technical seminar or research poster at least once each year. The topic of the presentation may be the student's own research or it may be any other topic that falls within the areas of study spanned by the group, broadly defined. The presentation may be given as part of a regular seminar series or as a special event. Seminars or posters presented away from UC Merced, *e.g*. at scientific conferences, may also count toward this requirement. The open presentation given as part of the Ph.D. defense may be counted as one of the required seminars. The Educational Policy Committee has the authority to determine whether a particular presentation meets this requirement.

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.

Idealized time line for Ph.D. program	
Year 1	Pass preliminary exam (undergraduate level competence) Complete required TA service (1 semester) Choose major professor and begin research (by end of first semester) Complete most required courses Constitute and meet with faculty committee (spring or summer)
Year 2	Complete remaining required courses Make progress in research Pass advancement to candidacy exam (spring semester)
Year 3-4	Do research, write papers, present results at conferences Start exploring career options Meet with faculty committee each spring or summer
Year 4-5	Write and defend Ph.D. dissertation Take postdoctoral position or job in academe, industry, or government

MASTER'S DEGREE

SIGNIFICANCE

Students are normally admitted to the graduate program in Chemistry and Chemical Biology to work toward the Ph.D. degree. However, a student who has been in residence for at least two semesters, is in good academic standing, and has passed the preliminary exam may petition the Admissions Committee to pursue a terminal M.S. degree. The recipient of a M.S. degree is understood to possess knowledge of a broad field of learning that extends well beyond that attained at the undergraduate level, but is not necessarily expected to have made a significant original contribution to knowledge in that field.

REQUIREMENTS

The master's degree may be attained through either the Thesis option (Plan I) or the Comprehensive Examination option (Plan II). The requirements are as follows:

PLAN I

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete a minimum of 24 semester units, at least 12 of which must be earned in letter-graded 200 series graduate-level courses;
- Complete the required courses for one of the four emphasis tracks listed under Ph.D. requirements, with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U);
- Earn a passing grade in a course addressing scientific ethics, approved by the Educational Policy Committee;
- Pass the preliminary examination;
- Prepare an acceptable thesis describing original research in the field.

PLAN II

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete a minimum of 24 semester units, at least 12 of which must be earned in letter-graded 200 series graduate-level courses;
- Complete the required courses for one of the four emphasis tracks listed under Ph.D. requirements, with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U);
- Earn a passing grade in a course addressing scientific ethics, approved by the Educational Policy Committee;
- Pass the preliminary examination;
- Pass a comprehensive oral examination administered by the faculty committee that tests the student's understanding of the main concepts in the field at the graduate level.

The M.S. and Ph.D. programs are two separate programs. A student in the Ph.D. program who wishes to change his/her degree objective to the M.S. must petition the Admissions Committee for admission to the M.S. program. A student who has received the M.S. degree and wishes to pursue a Ph.D. must petition the Admissions Committee for admission to the Ph.D. program. When a student changes from one degree objective to another, any requirements for the new degree that have already been satisfied will be transferred.

TIME TO DEGREE AND ANNUAL EVALUATION OF GRADUATE STUDENT PROGRESS

The Chemistry and Chemical Biology group places no strict limits on the length of time a graduate student may remain in residence. However, it is normally expected that successful completion of the Ph.D. will require no more than five years.

In order to ensure satisfactory progress toward the degree, each student must meet with his or her faculty committee for an annual review of progress at a mutually agreeable time prior to the first day of each Fall semester. At least three members of the committee, including the major professor, must be present. The committee will review the student's progress toward the degree during the past year and develop a time table, mutually agreeable among student, major professor, and faculty committee, for completion of the remaining requirements. The annual report of the committee will become part of the student's record.

Should the committee conclude that the student is not making satisfactory progress toward the degree, the student may be placed on academic probation as described under "Scholarship" above.

TEACHING AND RESEARCH ASSISTANTSHIPS AND STIPENDS

1. Newly admitted students are normally supported as graduate teaching assistants (TAs) during their first two semesters in residence. After that, students are supported as either TAs or graduate student researchers (GSRs) depending on availability of TAships and the major professor's funding situation.

2. New students who cannot be appointed as TAs because of limited English proficiency or lack of available TA positions may be appointed as GSRs for their first one or two semesters by mutual agreement of the student and the major professor. The conditions of appointment are the same as in #3 and #4 below. Normally all students are required to TA for at least one semester as long as a suitable TA position is available. TA experience at other institutions may satisfy this requirement.

3. Graduate students serving as GSRs during the academic year are appointed at 49.9% at the step for which the monthly stipend is most nearly equal to that for a first-year TA in the Natural Sciences. There is no additional or reduced pay during break periods.

4. Graduate students serving as GSRs during the summer are appointed at the step determined in #3 above. The appointment is 60% for students who have not yet been advanced to candidacy for the Ph.D. degree, and 70% for those who have been advanced to candidacy. Students are expected to spend the remainder of their time pursuing independent study toward the degree. GSRs do not accrue paid vacation time.

5. These policies should be revisited and revised as necessary on an annual basis.

6. Exceptions to these policies may be made at the recommendation of the student's major professor, the graduate group chair, and the Dean of the Graduate Division, if necessary.