Proposal for the Development of a Graduate Program leading to
M.S. and Ph.D. Degrees in

Environmental Systems

University of California, Merced

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1.7.2 Campus-Wide Evaluation. Graduate Council will review the ES graduate group on a 5-year cycle following standard procedures adopted for program review at UC Merced. Prior to each 5-year review, the ES graduate group will prepare and conduct a self-review culminating in a report to the Graduate Council for use in their review.

2. PROGRAM OF STUDY

The Environmental Systems (ES) graduate program strives to equip students with the knowledge and skills to improve the scientific understanding of the Earth as coupled systems of atmosphere, hydrosphere, lithosphere and biosphere. This understanding is gained through the systematic study of biological, chemical and physical processes. Courses are designed to provide the scientific principles underlying the function and sustainability of natural and engineered environmental systems. The program places the principles of natural science and engineering in the context of (1) pollution prevention, treatment and ecosystem restoration, and (2) integrating physical, chemical and biological cycles. ES program faculty members are affiliated with the Schools of Natural Sciences and Engineering. The ES graduate program leads to M.S. and Ph.D. degrees in Environmental Systems. Programs of study emphasize laboratory, field and modeling studies of the natural and engineered environments from an interdisciplinary perspective.

2.1 Admissions Procedures and Requirements

All students seeking admission to the ES program must make a formal application for admission. We encourage applicants to use the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to the Group Chair; the Dean of Graduate Studies makes final decisions on admission. The deadline for receipt of applications is January 15 for enrollment in Fall semester. Enrollment in other semesters will be considered on an individual basis. Applicants are encouraged to contact individual faculty members about their areas of research and teaching interests prior to applying.

Materials to be submitted:

- Official application form
- Application fee
- Official transcripts from all prior university or college attendance
- An official Graduate Record Exam (GRE) score report (only the general tests are required)
- A statement of research interests and career goals
- Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and promise as a researcher (letters from faculty are preferred)
- 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. The Test of Spoken English (TSE) is recommended (not required) for admission, but is required for such applicants who wish to be considered for teaching assistantship (TA) positions.

The minimum requirement for graduate admission to UCM is a bachelor's degree with grade point average for upper division courses of 3.0 or greater on a 4.0 scale. Performance on the GRE, distribution of undergraduate grades, 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. Students will be considered for the degree program for which they apply. Students admitted to the M.S. program and later wishing to gain admission to the Ph.D. program must be re-evaluated by the ES Admissions Committee, and should supply the committee with letters of recommendation from the proposed dissertation advisor and two additional members of the ES graduate program.

Students with undergraduate degrees in engineering, physical geography, or natural sciences normally have a background that is well suited to the M.S. and Ph.D. programs in environmental systems. Applicants with other degrees will be examined on a case-by-case basis. Students are expected to have some proficiency in chemistry, physics, and calculus.

2.2 General Requirements for Advanced Degrees

2.2.1 Residency. In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. M.S. students must be registered as a full-time student for at least one semester before advancement to candidacy. M.S. students must, prior to conferral of the degree, be in residency for at least one semester after advancement to candidacy before conferral of the degree. Residency is established by satisfactory completion of at least one upper division or graduate course of four units or more per term.

2.2.2 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 is judged by his or her major professor and degree committee to be making unsatisfactory progress toward the degree , may be placed on academic probation. If academic probation is recommended, then the student has the right to appeal this decision to the Academic Advising Committee (or subset of this committee that does not overlap with the student's degree committee). A student on probation will then be allowed a maximum of two semesters to make up deficiencies and be returned to good academic standing. Otherwise, the student will be dismissed from the graduate program. Specifically:

1) Only courses in the 100 and 200 series in which the student receives grades of "A", "B", and "S" may be counted as satisfying the requirements for advanced degrees. Courses in which a student receives a "C" or lower cannot be used to satisfy the unit requirement for the M.S. degree but will count in determining the grade point average..

2) Courses graded "S/U" will not be counted in determining grade point averages.

3) Candidates must be in good academic standing in order to qualify for advancement to candidacy.

4) Candidates must make satisfactory progress on their programs of study as determined by their major professor and their degree committee.

2.3 Masters Degree (thesis option, Plan I; non-thesis option, Plan II)

The Masters of Science degree is not granted by the University of California merely for the fulfillment of technical requirements, such as residency or completion of fundamental courses. The recipient of a M.S. degree is understood to possess a thorough understanding of a broad field of knowledge and to have given evidence of accomplishment in that field.

There are two options for the Environmental Systems (ES) M.S. degree. The ES M.S. thesis option (Plan I) is designed to educate students to be professionals in environmental systems, both by coursework preparation and completing an independent research project. This program is designed to take two years to complete. The ES M.S. non-thesis option (Plan II) is designed to provide students with the technical expertise to be professionals in environmental systems or as coursework preparation for a doctoral program. This program is designed to take one year to complete.

2.3.1 Requirements. The ES group has established the following requirements for the M.S. degree:

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete coursework as outlined in Coursework Requirements (see below);
- Give an oral presentation in a seminar class or a poster or oral presentation at an approved professional conference;
- Present and successfully defend a M.S. thesis containing an original research (Plan I);
- Pass the comprehensive examination (Plan II).

2.3.2 Selection of a Major Professor. All incoming M.S. students will be assigned an interim major professor during the semester (usually summer) immediately prior to enrollment. We recommend that all M.S. students chose their major professors by the end of their first semester. This is mandatory for Plan II M.S. students. Plan I M.S. students are required to have selected a major professor by the end of their second semester. Major professors must be ladder ranked ES faculty.

For the ES thesis option (Plan I), the heart of this program is the completion of a piece of original scientific research leading to the preparation and defense of a M.S. thesis. To this end, each student should discuss research interests and possible M.S. projects with a broad range of the ES faculty as early as possible, and select a major professor early during the first year of study. Selection of a major professor must occur before the student's degree committee can be constituted. The student and the major professor together will develop a research topic. Research will be expected to 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.

For the ES non-thesis option (Plan II), the course program should be determined before the first semester the interim major professor will help the student design his/her program. The major professor will chair the comprehensive examination.

2.3.3 Coursework Requirements. Each student is expected to develop graduate-level competency in ES. Graduate students in the Environmental Systems group are required to submit a program of study to the interim advisor and the Academic Advising Committee upon

enrollment in the program. All program of studies are to be approved by the Academic Advising Committee. Coursework requirements are:

1) Plan I requires completion of at least 24 units of work at the upper division and graduate levels and submission of a thesis. At least 18 of the 24 units required must be strictly graduate work in the major subject.

2) Plan II requires completion of at least 32 units of upper division and graduate courses and satisfactory performance on a comprehensive final examination. At least 24 of the 32 units required must be strictly graduate courses in the major subject. No more than 2 units of research (299 courses or equivalent) may be used in satisfying the 32 unit graduate course requirement.

As there is considerable freedom in the program, each student is expected to assume responsibility for designing his/her program.

2.3.4 Transferring Credit. Though ordinarily all work for the M.S. degree is done in residence, some work taken elsewhere may be credited toward the degree. The normal limit for such transfer work is two courses from another institution or up to one half of the unit requirement from another campus of the University of California, provided the units were not used to satisfy the requirements for another degree. The following regulations apply specifically to the transfer of units toward M.S. degree requirements:

1) Units taken elsewhere than the University of California may not be used to reduce the minimum residence requirement or the minimum requirement in the 200 series courses taken at the University.

2) Requests for transfer credit are to be made prior to or at the time of advancement to candidacy. The major professor should make a request to the Dean specifying the units and courses involved, and provide an official transcript for the course (s).

2.3.5 Faculty Committee for M.S. Degree. Once the M.S. student selects his/her major professor, he/she, in consultation with the major professor and program faculty, forms a degree committee. The role of the degree committee is to advise on and supervise the student's choice of courses, thesis research, serve on examination committees, and/or review and pass upon the merits of the thesis. The degree committee is composed of a minimum of three members, including the major professor; the majority of the committee must be ladder ranked ES faculty. Other committee members may be regular or adjunct faculty from any UC campus, or an individual from outside the University of California who has special expertise and qualifications. In this case, the major professor 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 major professor, a curriculum vitae and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Dean of Graduate Studies for review and approval. The committee membership must be approved by the Dean of Graduate Studies.

Reconstitution of the committee may 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. Also, 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.

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. Changes to the degree committee must be approved by the Dean of Graduate Studies

2.3.6 Advancement to Candidacy. Every student must file an official application for advancement to candidacy after completion of at least one half of the unit requirements for the degree and at least one semester before completion of all degree requirements. The requirements for advancement to candidacy are:

A minimum of one semester of residency

Plan I: Completion of at least 12 units of coursework at the 100/200 level (see Course Requirements)

Plan II: Completion of at least 16 units of coursework at the 100/200 level (see Course Requirements)

Every student must file an official application for advancement to candidacy after completion of at least one half of the unit requirements for the degree and at least one semester before completion of all degree requirements.

Advancement to candidacy is approved by the Dean of Graduate Studies after verification that the student has fulfilled the candidacy requirements. If changes need to be made in a student's program for the degree after advancement to candidacy, the major professor must make recommendations for such changes to the Dean of Graduate Studies.

2.3.7 Plan I: Thesis and Final Examination. The M.S. thesis must be written on a topic approved by the degree committee. The topic should be acceptable to all members of the degree committee, when they agree to serve, and a joint meeting of the committee members and the student should be held at that time.

The M.S. thesis must be the student's independent and creative work that can stand the test of peer review. The expectation is that the material will serve as the basis for publication(s) in a peer-reviewed journal. The student is encouraged to discuss with members of the degree committee both the substance and the preparation of the thesis well in advance of the planned defense date.

The student must provide a copy of the thesis to each member of the degree committee and allow each committee member at least two weeks to read and comment on it. If one or more committee members believe that there are significant errors or shortcomings in the thesis, or that the scope or nature of the work is not adequate, then the student must address these shortcomings before scheduling a defense. Once the committee members are in agreement that the thesis is ready to be defended (even though 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 date must be reported to the Dean of Graduate Studies, and one copy of the thesis filed, no later than two weeks before the proposed date of the final examination.

The M.S. final examination consists of an open seminar on the M.S. work followed by a closed oral examination by the degree committee. No student should appear for this examination until

after she or he has been advanced to candidacy by the Dean of Graduate Studies. A student must be registered or in current filing fee status when the examination is taken.

Oral thesis examinations may not be longer than three hours. All members of the degree committee must be in attendance for an oral M.S. final examination (connection via videoconferencing is acceptable). An ES faculty member of the degree committee, who is not the major professor, will chair the thesis defense. During the examination, the student is expected to explain the significance of the thesis research, justify the methods employed, and defend the conclusions reached. At the conclusion of the examination, the committee shall vote on whether both the written thesis and the student's performance on the exam are of satisfactory quality to earn a University of California M.S. degree. A simple majority is required for a pass. All members of the degree committee sign the final thesis.

Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the thesis. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the thesis that is submitted to Dean of Graduate Studies.

If the thesis is regarded as of less than acceptable quality, the student should be given an appropriate period of time, clearly specified by the committee, in which to improve her/his work. If, after that period of time(usually a semester or more), the thesis is still unacceptable to a majority of the committee, the majority may recommend to the Dean of Graduate Studies that the student be disqualified from further graduate study.

2.3.8 Plan II: Comprehensive Examination. The Comprehensive Examination is normally administered at the end of the spring semester and should be taken by students who have completed their Plan II course requirements. No student should appear for this examination until after she or he has been advanced to candidacy by the Dean of Graduate Studies. A student must be registered, or in filing fee status when the examination is taken.

The degree committee conducts the M.S. comprehensive examination. A comprehensive examination in the major subject may be written, oral, or both at the discretion of the degree committee. The format of the comprehensive examination will be determined by the degree committee at the time of advancement to candidacy. All committee members must be present for the oral (portion of the) examination. Oral comprehensive examinations may not be longer than three hours. A unanimous vote is required of the committee to pass a student on the comprehensive examination. If a student does not pass the examination, she/he may be reexamined. Changes in the composition of the committee may be made only for reasons of clear necessity (e.g. the extended absence of a member from the campus). The examination may not be repeated more than once. A student who does not pass on the second attempt is thereby subject to disqualification from further work as a graduate student in this program. The results of all M.S. comprehensive examinations must be reported to Dean of Graduate Studies.

2.4 Doctoral Degree

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 demonstrated 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.

2.4.1 Requirements. The ES 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 the Environmental Systems course with a letter grade of at least "B"
- Complete a seminar course on current ES topics
- Complete a minimum of 12 units of graded Environmental Systems courses while in residence
- Complete two semesters of the Environmental Systems seminar series as an enrolled student
- Pass the oral Ph.D. qualifying examination
- Complete a research proposal for the doctoral dissertation
- Present an open technical seminar at least once while in residence
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

2.4.2 Selection of a Major Professor. The heart of the Environmental Systems Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a faculty research advisor (major professor) by the end of the first year of study. Selection of a major professor must occur before the student's degree 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. Students will be assigned an interim adviser and an interim advising committee when they first enroll, unless the student already has chosen an adviser.

2.4.3 Coursework Requirements. Students in the Ph.D. program are expected to demonstrate core knowledge in three areas represented by the ES group and equivalent to or surpassing that of the M.S. degree. This requirement may be satisfied by some combination of course work, independent study, and research. Before registering for classes, graduate students in ES, in consultation with their interim advisor and are required to submit a program of study to Academic Advising Committee (AAC) for approval before registering for classes. Later, typically during the student’s second semester, the ES AAC will conduct a formal review to assess student proficiency and specify further course requirements in the student’s program of study. The program of study must then be updated annually until the student advances to candidacy, with any changes approved by the Academic Advising Committee. In addition, there is a coursework requirement of a minimum of 12 graded ES course units in residence. Included in these units is a prescribed course in environmental systems (with a grade of B or higher), if such a course has not been previously completed. Enrollment in at least 2 semesters of a

graduate seminar in current ES topics is also required. As there is considerable amount of freedom in the program, each student is expected to assume responsibility for designing his/her program. Each student is expected to develop graduate-level competency in both their specific area of research as well as in ES.

2.4.4 Faculty Committees for the Ph.D. Degree. All incoming Ph.D. students will be assigned an interim advising committee consisting of three members, including his/her major professor, when selected. After the Ph.D. student selects his/her major professor but before commencing dissertation research, he/she, in consultation with the major professor and program faculty, forms a degree committee 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 on these committees rests with the Dean of Graduate Studies.

Advanced Ph.D. degree committees in the Environmental Systems group consist of a minimum of four members, the majority must be ladder ranked faculty in ES. One committee member must be from outside of the ES group, and 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 major professor 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 major professor, a curriculum vitae and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Dean of Graduate Studies for review and approval.

All members of the degree committee must be in attendance for the qualifying and Ph.D. final examinations (connection via videoconferencing is acceptable). An ES ladder ranked faculty member of the degree committee, who is not the major professor, will chair the examinations. 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. Changes in committee membership must be approved by the Dean of Graduate Studies.

2.4.5 Ph.D. Qualifying Examination. All students in the Environmental Systems Ph.D. program are required to pass an oral qualifying examination before advancement to candidacy for the Ph.D. degree. The qualifying examination is normally taken after completion of a majority of formal coursework, but no later than before the end of the fourth semester in residence (excluding summer semesters), unless the student successfully petitions Academic Advising Committee for a later date. The purpose of the exam is to test basic knowledge and the ability to formulate and defend two proposals for original research. The student’s major advisor and other faculty may assist the student in preparing through recommended coursework, reading, or other avenues of investigation. The two proposals for the qualifying examination (five pages each) should present propositions for original research on two substantially different topics and outline a tractable approach for carrying out the research. 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, and the student's ability to implement research methods. Both requirements 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 dissertation topic.

Proposal topics must be approved by the members of the student's degree committee. The student must meet with his/her degree committee not less than six weeks in advance of the oral examination for approval of the two proposal topics. Prior to this meeting, the student will submit draft titles of the proposals to the committee members, which will be discussed at the meeting with the student and modified as the committee sees fit. Following the meeting, it is the student's responsibility to develop clear, concise written proposals on the topics approved by the committee. The student will submit his/her proposals to the degree committee not less than two weeks before the oral examination date. Qualifying examinations may not be longer than three hours.

For each proposal, the degree committee will expect the student to identify a valid scientific problem of intrinsic value to the scientific community and to develop a research plan to study the problem. Proposals may take the form of theoretical developments, computations, field and/or laboratory studies, the exploration of a new technique, or combinations of approaches. One proposal may be related to research that the student wishes to pursue for his/her Ph.D. dissertation, but this is not a requirement. The student is also permitted to develop proposals from work previously performed in a seminar or other coursework.

The date of the examination is arranged between the student and the committee members. The committee conducts the examination, and immediately thereafter submits the results of the examination to the Dean of Graduate Studies. Possible outcomes are:

1) Pass (conditions may not be appended to a pass decision)

2) Conditional pass (acceptable conditions include prescribed courses or rewritten proposals)

3) Fail (one re-examination allowed)

The committee members should include in their evaluations of the student 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 and the research proposals. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is "Conditional Pass" or "Fail", the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining its decision and must inform the student of its decision. In the case of a "Conditional Pass" the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Graduate Council. The Council will use these individual reports to adjudicate the result.

A student who has failed the examination may repeat the qualifying examination after a preparation time of at least three months. The examination must be held by the same committee except that members may be replaced, with the approval of the major professor, for cause such as

extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree. After a second examination, only PASS or FAIL is recognized by the Dean of Graduate Studies.

2.4.6 Research Proposal. After successful completion of their oral examination the student will prepare his/her research proposal in consultation with their major advisor, and will submit the completed proposal to committee members for review. The document (typically five to ten pages) will describe 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 will review this document and determine if the student has outlined a project that is appropriate for a Ph.D. Committee members will respond within two weeks of receiving the research proposal. If any committee member has serious reservations regarding proposal content, a meeting of the entire committee with the student will be called to discuss the proposed research. The student is then given a month to rewrite the research plan. After any revisions to the research proposal, the student will submit the final version to committee members for approval. Committee members will indicate their approval of the research proposal by signing the Advancement to Candidacy form.

2.4.7 Advancement to Candidacy. The requirements for advancement to candidacy are:

- A minimum of two semesters of residency
- Completion of the 12 graded ES courses (including ES 200 Environmental Systems) with grade “B” or better
- Passing of the qualifying exam
- Approval of the written research proposal on his or her proposed research topic

The student must fill out an application for advancement to candidacy that is signed by the major professor and the degree committee, the Environmental Systems Chair and submitted to the Dean of Graduate Studies. Upon advancement to candidacy for the degree, the degree committee is then charged to guide the student in research and in the preparation of the dissertation. Advancement to candidacy must occur no later than the sixth semester of residence in the ES program.

2.4.8 Seminars. All students in the Environmental Systems group are required to present an open technical seminar at least once during their residence in the graduate group. The topic of the seminar 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 seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open presentation given as part of the Ph.D. defense may be counted as the required seminar.

2.4.9 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 will serve as the basis for publication(s) in a peer-reviewed journal. The work must be the student's, and it must be original and defensible. The student is encouraged to discuss with members of the degree committee both the substance and the preparation of the dissertation well in advance of the planned date of final examination and dissertation defense.

The student must provide a copy of the dissertation to each member of the degree committee and allow each committee member at least three weeks to read and comment on it before scheduling

the date of the final defense. 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 the 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. Final examinations may not be longer than three hours. The date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination.

The Ph.D. final examination consists of an open seminar on the dissertation work followed by a closed examination by the degree 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a Ph.D. degree from the University of California. A simple majority is required for a pass. Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the dissertation that is submitted to Division of Graduate Studies. All members of the degree committee must sign the final dissertation.

2.5 Nominal Times to M.S. and Ph.D. Degrees

The M.S. and Ph.D. programs, while overlapping in course offerings, promote different career trajectories and the M.S. program is not considered to be a prerequisite for the Ph.D. program. Students who complete the terminal M.S. degree will frequently work professionally in engineering and earth systems science in the context of private consulting firms, government agencies, or non-government organizations. Students completing the Ph.D. program will be equipped for careers in research and teaching.

The nominal time for completion of the M.S. program is 3 semesters (non-thesis plan) and 4 semesters for the thesis plan. The thesis plan often requires that the student work on their research project over the summer. Nominal time for completion of the Ph.D. degree for a student entering the program with an M.S. degree in a relevant field is 4 years. Students entering the program without an M.S. degree typically will require an additional year or more of study to prepare themselves to complete their doctoral research.

In some instances a student may need to withdraw from the Ph.D. program for non-academic reasons. This student may be considered for an M.S. degree through either the thesis or non-thesis plan, and is referred to section 2.3 for the M.S. degree requirements.

3. PROGRAM DEMAND AND JOB PROSPECTS

Healthy enrollment in related UC programs (Table 2) suggests that there is ample student demand for environmental science and engineering graduate programs. Table 3 provides the application and enrollment numbers for the first 3 years of the ES program at UCM. It is worth noting that these numbers were achieved with a minimum of advertisement. Given the startup conditions and extensive administrative demands on UCM faculty, the ES group has initially limited admissions to students needed to staff their research projects. However, we are now

considering admitting larger numbers of students, such as may be associated with professional-type MS programs.

Environmental Systems includes a broad array of research efforts aimed at improving understanding of components of the natural environment through the systematic study of the biological, chemical, and physical processes between and among those components. This research is frequently motivated by a desire to apply science and engineering principles to reduce adverse effects of solid, liquid, and gaseous discharges on the land, and to improve the quality and quantity of surface water, groundwater, and air resources that might be impacted by human activities that threaten those resources. The graduate experience will integrate natural sciences and environmental engineering. Environmental systems research is intended to develop an understanding of the scientific principles underlying the function and sustainability of natural and engineered ecosystems. In many cases, environmental systems research will integrate biological, chemical and physical processes used in conjunction with engineered systems to restore the usefulness of polluted land, water and air resources. Environmental systems research is intended to develop an understanding of the scientific principles required to integrate biological, chemical, and physical processes used in conjunction with engineered systems to restore the usefulness of polluted land, water, and air resources. The program emphasizes science and engineering principles underlying pollution avoidance, as well as pollution treatment and reparation. Advances that might be expected to result from this research include, but are not limited to, ecosystem modeling, improved sensors, innovative production processes, waste reduction and recycling, advanced information systems used for environmental monitoring and assessment, and industrial and agricultural process enhancement. Research may be directed toward ecosystem restoration, predicting ecosystem change, improving the cost-effectiveness of pollution assessment and control as well as developing new principles for pollution avoidance technologies.

Graduates from the proposed program will find jobs in research/academia, government agencies (e.g., state and federal EPA, U.S. Geological Survey, U.S. Bureau of Reclamation, National Park Service, etc.) private consulting firms, and non-government organizations (NGOs). The U.S. Bureau of Labor Statistics is optimistic about career opportunities for environmental scientists, hydrologists and environmental engineers, three job categories which will likely be indicative of the marketability of Environmental Systems graduates (http://www.bls.gov/oco/ocos050.htm). Environmental scientists and hydrologists held about 81,000 jobs in 2004 (not including faculty positions). Environmental scientist jobs are expected to grow by 9 to 17% between 2004 and 2014. The outlook is better for hydrologists (> 26% over the same time), especially in areas where populations is increasing in environmentally sensitive, water-scarce areas, which describes many parts of California and the southwestern U.S. The environmental engineering (49,000 jobs in 2004) job growth rate is projected to be “much faster than average” growth (>26%) between 2004 and 2014.

4. FACULTY AND AFFILIATES

The ES program faculty members are affiliated with the Schools of Natural Sciences (NS), Engineering (SoE), and Social Sciences, Humanities and Arts (SSHA) (click name for faculty websites, or see Appendix A for CVs):

- Andres Aguilar, Assistant Professor of Natural Sciences
- Roger Bales, Professor of Engineering
- Martha Conklin, Professor of Engineering
- Yihsu Chen, Assistant Professor of Engineering and Social Sciences, Humanities and Arts
- Wei-Chun Chin, Assistant Professor of Engineering
- Carlos Coimbra, Acting Associate Professor of Engineering
- Michael Dawson, Assistant Professor of Natural Sciences
- Benoit Dayrat, Assistant Professor of Natural Sciences
- Gerardo Diaz, Assistant Professor of Engineering
- Jessica Green, Assistant Professor of Natural Sciences
- Qinghua Guo, Assistant Professor of Engineering
- Thomas Harmon, Professor of Engineering and Chair of the Environmental Systems Graduate Program
- Lara Kueppers, Assistant Professor of Natural Sciences
- Valerie Leppert, Associate Professor of Engineering
- Monica Medina, Assistant Professor of Natural Sciences
- Peggy O'Day, Professor of Natural Sciences
- Wolfgang Rogge, Associate Professor, School of Engineering
- Samuel Traina, Professor of Natural Sciences and Engineering; Director of the Sierra Nevada Research Institute, Acting Vice-Chancellor of Research and Dean of Graduate Studies
- Anthony Westerling, Assistant Professor of Engineering and Social Sciences, Humanities and Arts
- Roland Winston, Professor of Natural Sciences and Engineering
- Jeff Wright, Professor and Dean of Engineering

Two affiliates are:

- Dr. Philip Duffy (LLNL), Adjunct Professor of Natural Sciences
- Dr. Nigel Quinn (LBNL), Adjunct Research Engineer, School of Engineering

Affiliated research staff are:

- Dr. Eric Berlow (SNRI), Station Manager
- Dr. Liying Zhao, Environmental Analytical Laboratory (EAL) Manager

5. COURSES

Table 3 summarizes potential course offerings in the ES program along with the most recent instructor and other faculty who will teach the course on a rotational basis or as needed (e.g., sabbatical by regular instructor). The table does not reflect teaching assignments. With our starting contingent of graduate students we have been reassessing course offerings on a semester-by-semester basis. As we are now a larger group, and as our undergraduate teaching needs are becoming more clear, we are attempting to revisit our curriculum to converge on a more

definitive plan. As of Fall 2007, the unofficial ES teaching load for its member faculty is as follows:

(1) One co-listed course per year serving upper division undergraduates (biology, environmental engineering, and/or earth systems science majors and entry-level ES graduate students.
(2) One research-oriented graduate course every two years

In addition to these courses, the ES program has offered ES 291 Environmental Systems Seminar since Fall 2004 (the first and longest running seminar series at UC Merced). Graduate research (ES 295), directed group study (ES 298), and directed independent study (ES 299) courses are also used extensively while we continue to add new faculty and expand formal course offerings.

Table 3. Environmental Systems graduate (200-level) courses and relevant undergraduate (100-level) courses.

Course No.	Title (units) - Description	Frequency (last offered)	Instructor(s)	Backup Instructor(s)
ES 200	**Environmental Systems (3) -** This course will explore linkages in environmental systems and tools to evaluate important features of those systems. This will be done by examining the characteristics of different Earth compartments (pedosphere, lithosphere, biosphere, atmosphere and hydrosphere) in terms of mass and energy balance, residence times and interactions.	Annually (F05)	Conklin Traina	All ES faculty
ES 202	**Chemistry and Mineralogy of Soils (3) -** Thermodynamics and kinetics of chemical process in soil systems. Formation and identification of common minerals, adsorption/ desorption, precipitation/dissolution, electro-chemical reactions in soils.	Biannually (Sp06)	Traina	O'Day
ES 203	**Geochemistry of Earth Systems (3) -** Quantitative analysis of Earth systems using principles of thermodynamics, kinetics and isotope geochemistry; solution mineral equilibrium and phase relations; equilibrium and reactive transport approaches to modeling geochemical processes at ambient and elevated temperatures.	Triannually (Spring 2005)	O'Day	Traina
ES 204	**Environmental Organic Chemistry (3) -** Focus on organic chemical reactions in soils and sedimentary environments. Formation and weathering of natural organic matter and reactions of natural organic matter with pollutants.	Biannually	Conklin	O'Day

ES 205	**Watershed Biogeochemistry** (3) **-** Movement, storage and transformations involving water, nutrients and solutes in natural and human impacted watersheds; biological and chemical processes; modeling of biogeochemical processes. Interactions of watersheds with lakes and streams.	As needed	Conklin	Harmon
ES 206	**Instrumental Methods in Environmental Systems (4)**	Biannually	EAL Staff (O'Day)	
ES 207	**Environmental Data Analysis (3) -** The objective of this class is to provide students with probabilistic and statistical methods to analyze environmental data. This class will emphasize on both theoretical and applied aspects of data analysis methods. Topics include: distribution, hypothesis test, linear regression, multiple regression, uncertainty analysis, outlier detection, and sample design.	Biannually	Guo	Chen
ES 208	**Surface and Colloid Chemistry of Earth Materials (3) -** Surface, colloid and interfacial chemistry related to soil, environmental and microbial applications; properties, energetics and reactivity of surfaces and interfaces of earth materials; the role of mineral surfaces in-promoting and catalyzing chemical phenomena at phase boundaries.	Biannually (Fall 2007)	Traina	O'Day
ES 209	**ES 209: Chemistry and Mineralogy of Earth Materials (3) -** Chemical principles, structure and bonding of minerals and Earth materials, including crystallography (symmetry, space groups, group theory), coordination chemistry, bonding models (valence bond, crystal field, and MO theories), and electronic and magnetic properties.	As needed	O'Day	Traina
ES 212	ES 212: Subsurface Hydrology (3) – Hydrology, Prinicples of groundwater flow, well hydraulics, regional groundwater flow, unsaturated zone hydraulics, greophysical techniques, numerical gsoil and groundwater modeling, design project.	Annually	Harmon	TBN
ES 214	**ES 214: Mountain Hydrology of the Western U.S. (4) -** Principles of snow formation, occurrence, and measurement; components of evapotranspiration; runoff generation; ground-water recharge processes; water resource assessments; and resource management.	Biannually	Bales	Harmon

ES 218	**ES 218: Global Change (4) -**Detection of, adaptation to and mitigation of global climate change. Climate-change science, sources, sinks and atmospheric cycling of greenhouse gases. Societal context for implementing engineered responses. Assessment of options for responding to the threat of climate change.	Biannually	Westerling	Duffy
ES 221	**Environmental Microbiology (4) -** Fundamentals of environmental microbiology: physiology, biochemistry, metabolism, growth energetics and kinetics, ecology, pathogenicity and genetics, with application to both engineered and natural environmental systems. Specific applications to water, wastewater and the environmental fate of pollutants.	Biannually	TBN	TBN
ES 224	**Terrestrial Ecosystem Ecology -** Ecosystem ecology is the study of interactions between organisms and their environment. Focus on energy, water and nutrient flows through the living (plants, animals, microbes) and non-living (soils, atmosphere) components of ecosystems. This course examines both natural and human-modified terrestrial ecosystems. Graduate requirements include preparation and peer review of a research proposal.	Annually	Kueppers	TBN
ES 225	**Microbial Ecology (4) -** Advanced course in microbiological systems**,** laboratory and field techniques.	Biannually	TBN	TBN
ES 226	**Environmental Genomics (4) -** Introduction to the principles and methods of genomics as applied to the understanding of ecosystems. Population genetics, adaptation to environmental change, genomic analysis of environmental microbial communities; experimental and computational methods relevant to environmental genomics.	Biannually	TBN	TBN
ES 228	**Ecological Modeling (3) -** Advanced course on modeling population dynamics and the flow of energy and matter in ecosystems.	As needed	TBN	TBN
ES 232	**Climatology (3) -** The global and surface energy balance; the hydrologic cycle; the influence on climate of the atmospheric and oceanic circulation; climate history, sensitivity, modeling, and natural and anthropogenic change.	As needed	Westerling	Bales, Duffy

ES 234	**Air Pollution and Resources [3]** Chemistry and physics of atmospheric pollutants, urban air pollution, visibility, mitigation and resource economics.	Biannually	Rogge	TBN
ES 235 ENGR 135	**Heat Transfer (4) -** Study of conduction, convection and radiation heat transfer, with applications to engineering problems.	Annually (S 07)	Coimbra	Diaz
ES 236 MEAM 236	**Advanced Mass Transfer (4)** Steady and unsteady mass diffusion; mass convection, simultaneous heat and mass transfer; Fick's law in a moving medium; similarity and integral methods in mass transfer; high mass transfer theory; researh project in mass transport.	Biannually	Coimbra	TBN
ES 237 MEAM 251	**Viscous Flows (4)** Study of the Navier-Stokes equations; Stokes' problems; creeping flows; internal and external flows; similarity and integral methods in boundary layer flows; stability and transition to turbulence.	Annually (F 07)	Coimbra	Diaz
ES 240	**Water Resources Planning and Management (3) -** Basic concepts of and issues in water resources management, water resources planning, institutional and policy processes. Quantitative analytical methods in water resources planning and management; introduction to systems analysis, multi-objective planning and risk assessment.	As needed	Wright	TBN
ES 252 (EnvE 152)	**Remote Sensing of the Environment (3) -** Fundamentals of electromagnetic remote sensing, concepts of information extraction and applications pertinent to environmental engineering and Earth systems science. Emphasis on water and other resource management topics.	Annually	Guo	TBN
ES 260 (EnvE 160)	**Sustainable Energy (4) -** Current systems for energy supply and use. Renewable energy resources, transport, storage and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration and disposal of greenhouse gases from fossil-fuel combustion.	Annually	Winston	TBN

ES 262	**Modeling and Design of Energy Systems (3) -** Concepts and applications of solar thermal processes; applications of solar collectors for water heating; active and passive building heating and cooling; fundamentals and design of wind energy systems; economics of solar energy.	Biannually	Winston	TBN
ES 270 (EnvE 170)	**Contaminant Fate and Transport (3)** Properties and behavior of organic and metal contaminants, in soils, groundwater, surface waters and air. Emphasis on phase transfer and transport for organic compounds; complexation and surface processes for metals. Modeling of environmentally important compounds, photochemical reactions, natural organic matter, sorption phenomena.	Annually	Harmon	Conklin, Traina
ES 291	**Environmental Systems Seminar** (2) – This is a technical seminar series in which invited scholars present to and interact with ES graduate students on research and policy issues.	Each semester (Spr06)	All ES faculty	
ES 292	**Special Topics in Environmental Systems** (2-4) Treatment of a special topic or theme in Environmental Systems.	Annually (Spr06)	All ES faculty	
	Courses under development by new faculty			
ES TBD	**Biodiversity in Environmental Systems**	As needed	Dayrat	TBN
ES TBD	**Application and advances in molecular ecology (TBD)**	Annually	Aguilar	TBN
ES TBD	**Statistical Analysis and Data Visualization**	Annually	Westerling	Guo
ES TBD	**Natural Resources and Environmental Economics**	Biannually (Fall 2008)	Y. Chen	TBN
ES TBD	**Decision Analysis and Theory**	Biannually	Y. Chen	TBN
ES TBD	**Computational Heat Transfer**	Biannually	Diaz	TBN
	Upper division courses of interest to ES graduate students			

EnvE 110	**Hydrology and Climate (4) -** Basics of the hydrological cycle and the global climate system. Fundamentals of surface water hydrology, hydrometeorology, evaporation, precipitation, statistical and probabilistic methods, unit hydrograph and flood routing.	Annually	Bales	Harmon
EnvE/ESS 100	**Environmental Chemistry (4) -** Chemical principles of Earth and environmental systems focusing on environmental processes in water, soil and air. Emphasis on acid-base chemistry, aqueous speciation, mineral and gas solubility, oxidation and reduction, and isotopes.	Annually	O'Day	Conklin
EnvE 130	**Meteorology and Air Pollution (4)** - Basic physics and thermodynamics of the atmosphere; fundamentals of atmospheric sciences important to environmental problems; chemistry and physics of atmospheric pollutants; visibility; air quality modeling; emissions; and air pollution control strategies..	Annually	Rogge	Bales
ESS 141	**Environmental Science and Policy (4)** - In depth-analysis of environmental case studies. Focus on science critical to policy development and implementation, the policy-making process, and policy outcomes. Special emphasis on interaction between scientific information and policy-making. Example topics include Western water resources, biodiversity conservation, and global warming. Emphasis on written and oral communication and critical analysis.	Annually	Kueppers	Westerling
EnvE 180	**Spatial Analysis and Modeling (4) –** Principles of geographic information systems (GIS); applications of GIS to environmental, water and resource management issues; problem solving with GIS; spatial interpolation techniques, model integration.	Annually (F05)	Guo	TBN
EnvE 181	**Field Methods in Snow Hydrology (1-3) -** Properties and measurement of snow. Principles of snow metamorphism and melting. Field workshops.	Annually (Spr05)	Bales	TBN
EnvE 182	**Field Methods in Surface Hydrology (1-3)** Measurement and interpretation of data; stream gauging, hydrography and limnology exercises; evaporation studies; micro-meteorological instruments and methods; discharge measurement; flood plain mapping; preparation of hydrologic reports. Field workshops.	Biannually	Bales	Harmon

EnvE 183	**Field Methods in Subsurface Hydrology** Introduction to fundamental field instruments used for vadose zone and subsurface field investigations.	Biannually (Spr08)	Harmon	Traina
EnvE 184	**Field Methods in Environmental Chemistry (1-3) -** Introduction to the fundamental field instruments used for environmental chemistry field investigations. Air, water and soil sample collection and preservation procedures. Particle separation and analysis, ion selective electrodes, colorimetric assays for nutrients and metallic species, extraction of organic species.	Annually (Spr08)	Conklin	O'Day, Traina

Footnotes:
TBN (to be named): Current priorities in Environmental Systems strategic hiring plan included (i) air pollution engineering/science, (ii) environmental microbiology, (iii) microbial ecology, (iv) ecosystem science, (v) global change ecology, and (vi) sustainability science.

6. RESOURCE REQUIREMENTS

6.1 Faculty FTE

The ES graduate group participated in UCM's strategic planning process during the 2005-06 academic year. The main goal of the group is to become an internationally recognized, premier graduate research program that emphasizes interdisciplinary studies of complex environmental systems. To achieve this status, we plan to (1) hire several key faculty members with direct ties to the ES group, (2) invest ES group effort in several current cross-school hiring initiatives to maximize interdisciplinary opportunities across all schools, and (3) formalize ties with neighboring institutions through adjunct faculty and professional research staff appointments (e.g., Lawrence Livermore National Lab, Lawrence Berkeley National Lab, National Park Service). Each of these activities is discussed further in the following sections.

6.1.1 Key Faculty Hires. UPDATE The ES faculty recognizes that the strength and uniqueness of our program lies in its position at the interface between science and engineering disciplines. As such, an important tenet of our strategic plan for faculty growth is to maintain a complementary balance of faculty in the Schools of Engineering and Natural Sciences, or joint positions, when appropriate, in strategic areas. We have identified the following areas to fill strategic needs in the ES program as either single- or cross-school FTE's towards maintaining this interdisciplinary program-building approach:

Searches in Progress (authorized either from original school allocations or AY '05-'06 cross-unit FTE (1)):

A. <u>Air Pollution Science and Engineering (1) : Search has identified one candidate, senior search is ongoing)</u>. Professor Wolfgang Rogge joined the faculty July 2007. We are seeking an additional person in the area of environmental science and engineering focused on air pollution in order to allow the ES group to better address regional and national air

quality problems. Recognizing California's increasingly poor air quality and the resulting negative impact on human health and the environment this area of research is conspicuously absent at UC Merced. Desirable areas of interest include biogenic emissions, urban and regional aerosols, and atmospheric chemistry, using approaches that may include laboratory or field measurements, or modeling. Ideally, we envision a Natural Science-Engineering joint hire.

B. Microbial Ecology (NS position): This position was allocated from the original 20 in NS. A candidate was identified and approved by CAP. Negotiations will begin once a spousal issue is resolved. This position has a high priority as we currently have no faculty representation in either NS or ENG in the broad area of microbiology of the environment.

C. Ecology/Ecosystem Science (NS position): This position was allocated from the original 20 in NS. A search was conducted last year that was not successful. The position was closed and will be re-advertised. This area has a high priority because of the need to supply missing expertise in ecology and strengthen interdisciplinary links between biological and physio-chemical environmental systems.

D. Ecology/Ecosystems Science (NS position): This position has not yet been detailed, but will be a replacement hire (NS faculty Jessica Green left UCM in July 2007).

NOTE: FTEs for positions B, C and D have been allocated as of August 2007.

Requested positions: AY '06-'07:

E. Sustainability Science. The ES Group sees a need for an FTE working on research in one or more areas of the emerging domain of sustainability. For UC Merced, we envision a interdisciplinary scholar working at the interface of science, engineering, and social problems pertaining to one or more of the critical sectors in sustainability from the perspective of SNRI and globally: water and sanitation, energy, environment and health, agriculture, biodiversity, and sustainable cities. Pertinent subtopics may include climate change and effects (e.g., water resources, biodiversity), global and regional population growth, urbanization, poverty and food production, environmental health, and global economics.

NOTE: **FTE for position E has been ALLOCATED as of AUGUST 2007**.

F. Environmental Microbiology. Environmental microbiologist is seen by the ES Group as another high priority hire if we are to achieve national competitiveness. This individual is necessary both at the graduate and undergraduate level for teaching (environmental microbiology) and expanding the capabilities of the group. This individual would be expected to provide a connection between ES with biosciences. Leading environmental research programs in the nation include a strong core subgroup of environmental microbiology and microbial ecology, typically 2-3 investigators. Engineering successfully identified a senior candidate for this position in 2004-05, but the candidate's current institution successfully retained that individual. The emphasis on this position is engineering microbiology, including the characterization of microbial communities in

both natural and engineered systems. This individual would be expected to team with microbial ecology and ecosystem science faculty from Natural Sciences to give the ES group a strong emphasis in this critical dimension of environmental systems.

G. Spatial Analysis/Earth Surficial Processes. The ES Group has also identified spatial analysis as an area for strategic recruitment. An individual working in the area of surficial processes would be appropriate, including areas such as landform/landscape evolution and forecasting, land surface geochronology, sediment transport, and land use-ecosystem interactions. This candidate might be well-suited for a hire in Natural Sciences, Engineering, or jointly between the schools. The group envisions that a hire in this area would provide the viable research core (along with Assistant Professors Shawn Newman (Computer Scientist) and Qinghua Guo) that would position the group competitively in the rapidly expanding area of research associated with multiscale observations and analyses of environmental patterns and processes through remote sensing, data mining, and feature extraction. Areas of interest to the ES group will depend on hires during the interim, but may include erosion and/or sediment transport, process geomorphology, ecohydrology, and hydrogeology.

6.1.2 Investment in Cross-School Faculty Hiring Initiatives. The ES group will continue to commit substantial effort to the on-going cross-unit searches aimed at identifying scholars who can bridge strategic gaps between UCM's Schools. These searches were identified as a result of UCM's previous strategic plan, and are in the broad areas of (1) environmental economics, (2) environmental policy, (3) chemistry and nanotechnology (with potential environmental applications), (4) materials and energy, and (5) evolutionary biology. In all cases the faculty appointment may reside within a single School, or may be joint between Schools, depending on the specific hire. In each case, the ES group recognizes potential for synergistic appointments although these individuals may not be principally associated with the ES group. For example, the environmental economist's research would address the economics or political economy of resource allocation, including market approaches to resource allocation; human impacts on the environment; economic effects of environmental change; the economic impact and design of environmental regulation; or the economics and finance of regulatory policy or infrastructure related to natural resource allocation. Similarly, the environmental policy candidate may be identified with interests in resource management policy; spatial aspects of environmental change; environmental consequences of urbanism and development; environmental justice; health and the environment; or cultural, political or economic dimensions of environmental policy.

6.1.3 Adjunct Faculty and Research Staff Appointments. At present the ES group has appointed one adjunct professor (Dr. Phil Duffy, LLNL) and one research engineer (Dr. Nigel Quinn, LBNL), all of which have already contributed by way of authoring extramural grants and co-advising UCM graduate students. Professor Traina and ES faculty were awarded a grant by the NSF for technician support for the Environmental Analytical Laboratory (EAL). UC Merced provides matching support for this individual, Dr. Liying Zhao, who started work on September 2006. In additions, Dr. Eric Berlow was appointed in Fall 2006 as the Sierra Nevada Research Institute Station Manager at the SNRI Wawona Station in Yosemite NP.

6.2 Library Acquisition

The UC Merced library opened its doors in 2005 with complete access for students and faculty to the combined collections of all of the University of California Libraries. The combined collection totals approximately 32M bound volumes and millions of items in other formats, including microfilm and sound recordings. Electronic access to extensive on-line information is available to all UC faculty and students through the California Digital Library.

As one of UC Merced's first three academic buildings, the Leo and Dottie Kolligian Library is a university research library of the 21st century, integrating physical and digital collections. The resources and services available are accessible from computers connected to the campus network and to the Internet. Some Library resources will be in either physical or digital mode. The mix of material will ultimately be determined by a faculty committee to guide acquisitions.

Early collection development has focused on the acquisition of gift materials that will support planned research and instructional programs. Volume count to date is in the tens of thousands. Scholarly journals include those in life sciences, geophysics, psychology, sociology, linguistics and public administration. Monograph collections include 750 rare books and brochures, 4,500 volumes about Native Americans and 1,500 volumes of Spanish literature. Materials in other formats include a collection of Asian music recordings and books about Asian music and a complete set of Early American Imprints on microcard. The early Library partnership with the National Park Service and the Ruth and Sherman Lee Institute for Japanese Art are early indicators that digitization of unique material and provision of online access will be a vital strategy for the development of special collections in support of research needs.

6.3 Computing

Academic computing resources are readily available at this stage of UC Merced's development. Several high performance computational clusters have been created by Natural Science and Engineering faculty, and are typically available for computationally intense research topics by ES graduate students and their mentors. A Geographic Information Systems computational lab is vital to the research of several ES faculty, and is currently being developed by Professors Guo and Bales in support of courses (ENGR 180, ES 240, ES 252, etc.).

6.4 Equipment

Professor Traina and ES faculty were awarded a grant by the NSF for technician support for the Environmental Analytical Laboratory (EAL). UC Merced provides matching support for this individual, Dr. Liying Zhao, who started work on September 2006. The EAL, which is dedicated to graduate research for the ES program, is equipped with the following major equipment: Aglient 7500cs inductively coupled plasma-mass spectrometer (ICPMS); Perkin-Elmer Optima 4000 DV inductively coupled plasma-atomic emission spectrometer (ICP-AES); Perkin-Elmer AAnalyst 600 graphite furnace atomic absorption spectrometer; two Dionex ICS 2000 ion chromatographs (one for cations, one for anions) equipped with pulsed electrochemical conductivity detectors; Agilent CP-3800 gas chromatograph coupled to an Agilent Saturn 2200 tandem mass spectrometer (GC-MS-MS); HP 6890 Gas Chromatograph equipped with electron capture and flame ionization detectors; Anton Paar Multiwave 3000 microwave digestion system (for solids digestion) and muffle furnace; Shimadzu TOC-VCSH total organic carbon analyzer

coupled to an AS1-V auto-sampler, a TNM-1 nitrogen module, and a SSM-5000A furnace for the determination of organic C and N in solid and liquid samples; and a Lachat QuikChem-8500 flow injection auto-analyzer. We anticipate adding an HPLC to this compliment of instruments within the next 3 months.
The Imaging and Microscopy Facility (IMF) is the first centralized, recharge-based research facility at UC Merced. This facility houses a FEI Quanta 200 environmental scanning electron microscope (E-SEM) with an EDAX Genesis 2000 EDS system, and a JEOL-2010 high resolution transmission electron microscope (TEM) equipped with a Gatan Image Filter (Gatan Model GIF2002) for electron energy-loss spectroscopy, an energy dispersive spectrometer with an ultra-thin window detector for light-element mapping, and liquid nitrogen cryotransfer holder. The facility is staffed with a full-time laboratory manager, who is responsible for student training and support as well as routine instrument maintenance.

6.5 Space and Capital Facilities

The majority of the ES faculty moved into the newly completed Science and Engineering 1 (SE1) building. SE1 consists of over 100,000 ASF with laboratory and office space for 92 faculty and laboratory desk space for graduate students and postdoctoral students in the laboratories. The space is currently configured in a manner that mixes ES faculty regardless of their school affiliations. This configuration is optimal for the interdisciplinary research mission of the program. The same cannot be said for the graduate student office space in SE1, which is inadequate and fragmented, eliminating opportunities for informal collaborative learning and cross-disciplinary research amongst the students. Another issues is the Environmental Analytical Laboratory (EAL), which remains housed in its original location at the Castle facilities. The EAL is needed by a large number of the ES graduate researchers, staff, and faculty, and this arrangement reduces research efficiency by further fragmenting the efforts of the group. Both of these issues are currently under negotiation between the administration, the ES group, and SNRI.

NOTE: As of May 2007, it was decided that a large portion of the EAL facilities would be moved to campus. Changes in space infrastructure (e.g., electrical) are currently being undertaken to accommodate the move.

7. GRADUATE STUDENT SUPPORT

In principle, our goal is to provide a minimum of four years of stipend support for each graduate student accepted into the doctoral program. Under ideal conditions we would hope that central support would be available for a student's first year or two years in a program. Currently, there is a shortage of teaching assistants (TAs) at UC Merced, and early support for the students is generally available (albeit across a broader spectrum of undergraduate courses than most environmental graduate students would typically experience). This surplus in TA positions is expected to disappear as other graduate programs appear at UC Merced.

At our sister campuses, fellowships (so-called "block grants") are also used to attract and support graduate students in their early years. No fellowship money was available for UC Merced in 2004-05, and approximately $90,000 in fellowship money was made available to UC Merced in 2005-06 (across all disciplines). This level of support is insufficient for a fledgling campus, and projections indicate a substantial deficit in the funds available to fully support the proposed graduate student population at UC Merced. In order for us to close this gap we will need to

capitalize on a wide variety of funding sources and other resources to support graduate education in the earliest years of the campus. ***In the early development phase of the ES program, and UC Merced graduate education as a whole, it is critical that larger block grant allocations be made available for graduate student recruitment and retention. This is especially the case from the perspective of assisting the many junior faculty at UC Merced.***

Beyond early support from special fellowships and TA positions, the ES faculty mentors are assuming responsibility for the stipend and fees of their graduate students. At this stage the faculty have proven that they can successfully compete for large-scope extramural funding in support of our research and training mission, having garnered more than $6M total over the past 2.5 years.

University of California, Merced
Applied Mathematics Graduate Studies
Policies and Procedures
2007–2008

Approved by GRC on 15 May 2007

Revised Section 9 approved by GRC on 18 December 2007

1 Scope of Research

The Applied Mathematics Graduate Studies (AMGS) at UC Merced explores the applications of mathematics in the development of natural sciences, engineering and social sciences. The Applied Mathematics Graduate Group offers a multidisciplinary research and training program for Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) students who want to study applied mathematics. Research projects are available on topics ranging from deep ocean convection, ultrafast optics, coronal mass explosions, atomic physics and optical imaging of tissues. Course work will provide a background in the fundamental tools of applied mathematics, including ordinary and partial differential equations, asymptotics and perturbation methods, numerical analysis and scientific computing. The graduate group will offer opportunities for students interested in multidisciplinary mathematics projects at the interface with life sciences, physical sciences, engineering and social sciences.

2 Core and Affiliate Faculty

A focus of the AMGS is to be highly interdisciplinary with contributions from faculty throughout the UC Merced campus. To facilitate this, the AMGS faculty is composed of Core Faculty and Affiliate Faculty. While Core Faculty Members are responsible for administration of AMGS and instruction of Core Courses, AMGS Affiliate Faculty Members in good standing have the following opportunities:

- teach special topics and/or core MATH courses;
- advise graduate students in the AMGS program;
- serve on Ph.D. and M.S. thesis committees.

3 Required Core Courses

AMGS M.S. and Ph.D. students are required to complete the following five core courses (20 units total) with a grade of B or better:

- Partial Differential Equations I and II (MATH 221 & MATH 222);
- Numerical Analysis (MATH 231);
- Numerical Analysis of Partial Differential Equations (MATH 232);
- Asymptotics and Perturbation Methods (MATH 223).

These courses constitute training in the techniques and theories that are considered fundamental in an applied mathematics graduate education.

4 Graduate Admissions

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

4.1 Application Deadlines for Admission

The deadline for receipt of applications is January 15. Normally applications will be accepted for Fall semester only, enrollment in other semesters will be considered on an individual basis, with applications due no later than seven months prior to the beginning of the semester when the student would like to begin graduate studies. Applicants are encouraged to contact individual faculty members to discuss their research interests before applying for graduate study.

4.2 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;
- Applicants are encouraged to submit an GRE official score report for either the Math Subject Test or Physics Subject test if one or more of the following applies:
  - Applicant does not have an undergraduate degree in pure or applied mathematics;
  - Applicant does not meet the minimum GPA requirement;
  - Applicant is concerned about the strength of his/her application in terms of the other required materials;
- Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and potential as a researcher;
- Official score reports from the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

Applicants are encouraged to contact individual faculty members to discuss their research interests before submitting a full application.

4.3 Admission Criteria

The minimum requirement for graduate admission to UCM is a bachelor's degree with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum will be waived only under circumstances where the applicant has demonstrated strong academic skills subsequent to their undergraduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Each academically qualified student will also have a telephone or in-person interview with one or more AMGS faculty members. Finally, the match of the candidate's skills and interests to AMGS research programs will be considered for M.S.-thesis and Ph.D. applicants. For this reason applicants are encouraged to contact AMGS faculty before applying.

5 General Requirements for Advanced Degrees

5.1 Residency

In accordance with Senate Regulation 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy, Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. For the purposes of determining residency, only the Fall and Spring semester will be counted; however, the summer semester may be counted in evaluating students on academic probation. Residency is established by satisfactory completion of at least 12 units of graduate or upper-division course work (including research) per term. Ordinarily, a graduate student shall not receive credit for more than 12 units of graduate courses in any semester. The AMGS only accepts full-time students. Exceptions will be only granted for students in the non-thesis M.S. degree program (Section 7.2) with the permission of the graduate group Chair, in consultation with the Executive Committee.

5.2 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 graduate advisor or faculty committee, will be placed on academic probation. The student will then be allowed a maximum of one semester to make up the deficiencies and be returned to good academic standing (beyond the semester they go on probation). Otherwise, the student will be dismissed from the graduate program.

Specific scholarship requirements are as follows:

1. Only courses in the 100 or 200 series and MATH 399 (*University Teaching*) in which the student receives grades of A, B, or S may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a $B-$ or lower cannot be used to satisfy the unit requirement for the degree but will count in determining the grade point average.

2. Candidates must maintain an average of at least three grade points per unit in all upper division and graduate courses elected during their residence as graduate students at the University of California.

3. Courses graded S/U will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their graduate research advisor.

5.3 Faculty Committees for Advanced Degrees

All Ph.D. and M.S.-thesis students in the AMGS must have a graduate research advisor and committee. The student's graduate research advisor (see Section 6.3), normally in consultation with the student, the graduate group and other faculty, recommend appointment of faculty members to advise on and to supervise the student's dissertation research, to serve on examination committees, and to review and to pass upon the merits of the doctoral dissertation. Final approval of the membership on these committees rests with the Dean of Graduate Studies.

Advanced degree committees in the AMGS typically consist of three members, although additional committee members are permitted if warranted by the student's research project. The committee chair is the student's research advisor, and the three members must be UC Merced faculty members in the AMGS (see Section 2). Under some circumstances one of the committee members can be a UC Merced faculty member from outside the group or 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 research 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 vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the Applied Mathematics graduate group for review and approval by the Executive Committee.

All members of the committee must be in attendance for Ph.D. qualifying examinations and thesis defense. 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 graduate advisor in consultation with the student should recommend a new committee member, giving the reason for the change. The change must be approved by the Chair of the Applied Mathematics graduate group with consultation from the Executive Committee.

5.4 Preliminary Exams

Preliminary examinations are offered at the beginning and end of the Spring semester each year. These are four closed-book written examinations in (*i*) differential equations, (*ii*) advanced calculus, (*iii*) complex variables and (*iv*) linear algebra. The examinations are given at the advanced-undergraduate/beginning-graduate level. For each of the four exams, students receive a score of 1, 2 or 3, as determined by the faculty committee in charge of the examination.

All students in AMGS are required to take the preliminary exams in the beginning of the Spring semester in the first year of graduate studies. All students must obtain a score of at least 2 on all four exams. A student may retake from one to four of the exams, but exams must be re-taken at the end of the same Spring semester. If the student does not obtain a score of at least 2 on all four exams after two attempts, he or she will be disqualified from further study in AMGS.

6 Doctor of Philosophy Degree

6.1 Significance

The Doctor of Philosophy degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study.

6.2 Requirements

The AMGS has established the following requirements for the Ph.D. degree. Students must:

- Obtain a score of 3 on at least three of the four written preliminary exams and 2 on the remaining exam (Sections 5.4);
- Complete at least four semesters of full-time academic residence (12 units minimum per semester) at UC Merced;
- Complete the five required core courses with a grade point average of 3.25 and with a grade of at least B in each (Section 3);
- Complete at least two special topics courses with grade of at least B (Section 6.4);
- Produce at least one paper that is deemed publishable in an appropriate peer-reviewed journal (Section 6.5);
- Complete the Applied Mathematics Seminar for at least two semesters with grade of S; students are expected to attend all seminars in the Applied Mathematics Seminar Series when possible (MATH 291, Section 6.6);

- Serve as a half-time Teaching Assistant (TA) for at least two semesters (or equivalent) (Section 9);
- Complete MATH 201 *Teaching & Learning in the Sciences* (or equivalent) and MATH 399 *University Teaching*;
- Pass a qualifying exam composed of two parts: (*i*) a written research proposal (Section 6.7.1) and (*ii*) an oral examination (Section 6.7.2);
- Present at least one open technical seminar while in residence (Section 6.9);
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field (Section 6.10).

6.3 Selection of a Graduate Research Advisor

The heart of the Applied Mathematics Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a graduate research advisor by the second year of study. Selection of a graduate research advisor must be approved by the graduate group and must occur before the student's faculty committee can be constituted. The student and the graduate research advisor 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 graduate research advisor must be a member of the AMGS. Students will be assigned an initial advisor when they first enroll, unless the student has already chosen an advisor.

6.4 Special Topics Course Work

All students in the group must also successfully complete (grade of B or better) at least two additional graduate courses (courses numbered 200-299 and worth at least three units each) exclusive of research (MATH 295) that are appropriate to the student's research area. Suggested courses include linear and nonlinear wave propagation, integral equations, dynamical systems, waves in random media, and fluid dynamics. Other graduate-level courses appropriate to the student's specific field of research, including Directed Independent Study (MATH 299) may be used to meet the two-course minimum requirement with consent of the student's faculty committee. Courses numbered 100-199 offered outside MATH will be considered by petition. Normally Special Topics courses should be taken during the second year of graduate study. 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 student's graduate research advisor.

6.5 Publication Requirement

The final confirmation of the quality of a Ph.D. dissertation is the ability to publish the research results in a peer-reviewed journal. The research field may influence the timing and work required to publish research results, making it difficult to define the number of publications required for each dissertation. For this reason, whether a student has made sufficient progress for the Ph.D. will ultimately be determined by the student's advisor and thesis committee. However, it is expected that the research project should be sufficiently complete to support publication of at least one full manuscript. The AMGS Executive Committee may determine if having simply submitted a manuscript is sufficient to warrant completion of the Ph.D. requirements, although in most cases, acceptance of the manuscript by the journal will be expected (i.e. manuscript "in press" or "in print"). The publication requirement should encourage the student to view submission of manuscripts as the ultimate goal of any research project, and to teach the student how to organize research projects and write scientific manuscripts. The process of writing the manuscript will be undertaken with the assistance and guidance of the student's research adviser. Manuscripts should be presented to the graduate committee for examination and approval at the time of the student's thesis defense.

6.6 Applied Mathematics Seminar Series

The Applied Mathematics Seminar Series runs in the Spring and Fall semesters, with talks held nearly each week. Talks cover a broad spectrum of mathematical problems and novel applications. All students are required to enroll in MATH 291 *Applied Mathematics Seminar* for at least two semesters, where attendance in the Seminar Series is required. Regardless of enrollment in MATH 291, AMGS students are expected to attend all seminars in the series whenever possible.

6.7 Qualifying Exam

All students in the Applied Mathematics Ph.D. program are required to pass a qualifying examination before advancement to candidacy for the Ph.D. degree. Students are expected to take and pass the qualifying examination during their second or third year of graduate study unless they successfully petition the graduate group chair to take it a different year. The examination committee is the same as the student's faculty committee. The dates for the examination are arranged between the student and the examination committee.

6.7.1 Part 1: Written Research Proposal

Before the oral portion of the qualifying exam, the student will provide to the degree committee a written document (typically five to ten pages) that describes his or her dissertation research topic, summarizes progress to date, outlines what he or she proposes to do, why it is relevant, and what will be learned. The committee will review this document with the student and determine if the student has outlined a project that is appropriate for a Ph.D. If not, the student is given one month

to rewrite the research plan. Once the research plan is approved, the student may take the oral portion of the Qualifying Examination.

6.7.2 Part 2: Proposal Presentation & Oral Exam

The oral component of the qualifying exam is comprised of two parts. The first part is a presentation of the research proposal (see Section 6.7.1). This part is open to the public. At least one week prior to the examination date, the student will provide to the committee his or her research proposal. The second part is an oral exam to ascertain the breadth of a student's comprehension of fundamental facts and principles from his or her graduate course work. This part is closed to the public – only the student and the committee are present.

6.7.3 Assessment

The committee will assess the two parts of this exam and notify the student. The result will be determined by a vote of the examination committee. The committee conducts the examination, and immediately thereafter submits the result of the examination to Graduate Studies. Possible outcomes are:

1. Pass (conditions may not be appended to a pass decision)
2. Not Pass with an option to retake the examination within a specified time period, or to satisfy specific requirements
3. Fail

The committee members should include in their evaluations of the student 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. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is Not Pass or Fail, the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining its decision and must inform the student of its decision. In the case of a Not Pass decision, the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Chair of the graduate group. The Chair, in consultation with other members of the graduate group, will use these individual reports to adjudicate the result.

Upon recommendation of the examination committee, a student who has not passed the examination may repeat the qualifying examination after a preparation time of no more than six months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate advisor, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification

from further study for the doctoral degree. After a second examination, a vote of NOT PASS is unacceptable; only PASS or FAIL is recognized by the Dean of Graduate Studies.

6.8 Advancement to Candidacy

Upon successful completion of the examinations and approval of a research plan, 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 research, 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.

6.9 Seminars

All Ph.D. students in AMGS are required to present an open technical seminar in the Applied Mathematics Seminar Series during their residence. The topic of the seminar 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 open presentations given as part of the Ph.D. qualifying examination and dissertation defense may not be counted as one of the required seminars. Each student will be provided feedback on his/her presentation written by one or more AMGS faculty members, where at least one is not the student's advisor.

6.10 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 will serve as the basis for publication(s) in a peer-reviewed journal. 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 and abstract may be obtained from the Graduate Studies office.

The student must provide a copy of the dissertation to each member of the faculty committee, after which each committee member is allowed 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 are 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 date must be reported to the Dean of Graduate Studies no later than one week before the proposed date of the final examination. One copy of the final dissertation must be filed no later than four weeks after the examination date.

The Ph.D. final examination consists of an open seminar on the dissertation work 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A simple majority is required for a pass. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the graduate research advisor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies. At least two members of the degree committee must sign the final dissertation.

6.11 Transfer from Ph.D. to M.S. Program

Students in good academic standing and who obtained scores of at least 2 on all preliminary exams may petition to move from the Ph.D. to M.S. program and pursue a terminal M.S. degree.

7 Master of Science Degree

7.1 Significance

Students may be admitted to the graduate program in Applied Mathematics to work towards a Master of Science (M.S.) Degree. A student working towards a Ph.D. who completes M.S. requirements may petition to be awarded a M.S. Degree. Additionally, a Ph.D. student who has been in residence for at least two semesters, is in good academic standing, and has completed at least three of the core courses 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.

7.2 Requirements

The Applied Mathematics group has established the following requirements for the M.S. degree. Two different degree plans are recognized:

PLAN I

- Obtain a score of at least 2 on each of the four written preliminary exams (Sections 5.4);
- Complete at least two semesters of full-time academic residence (12 units minimum per semester) at UC Merced;
- Complete the five required core courses with grade of at least B (Section 3);
- Prepare an acceptable thesis describing original research in the field under the guidance of an AMGS faculty research advisor. The student must successfully defend the thesis to a

committee chaired by the research advisor that is composed of at least two additional members from the AMGS faculty (see Section 5.3);

- Serve as a half-time Teaching Assistant (TA) for at least one semester (or equivalent) (Section 9);
- Complete MATH 201 *Teaching & Learning in the Sciences* (or equivalent) and MATH 399 *University Teaching*;

PLAN II

- Obtain a score of at least 2 on each of the four written preliminary exams (Sections 5.4);
- Complete at least two semesters of full-time academic residence (12 units minimum per semester) at UC Merced;
- Complete the five required core courses with grade of at least B (Section 3);
- Complete at least two special topics courses with grade of at least B (Section 6.4);
- Complete the capstone requirement, which is the preparation of an acceptable written document presenting research accomplished under a faculty advisor (Section 7.3);
- Serve as a half-time Teaching Assistant (TA) for at least one semester (or equivalent) (Section 9);
- Complete MATH 201 *Teaching & Learning in the Sciences* (or equivalent) and MATH 399 *University Teaching*;

7.3 M.S. Plan II Capstone Requirement

Plan II M.S. Degree students are required to complete an acceptable written document presenting research accomplished under an AMGS faculty advisor. Examples of such research projects include a literature review, a series of numerical simulations, or a data analysis. The research project should be considerably shorter than that expected of a M.S. Thesis project; a single semester should be sufficient for project completion. The document must be signed by any two AMGS faculty members who deem it to be acceptable work.

7.4 Transfer from M.S. to Ph.D. Program

A student admitted to the M.S. program may petition the Executive Committee to join the Ph.D. program if he/she is in good academic standing and has obtained a score of 3 on at least three of the four preliminary exams, and a score of 2 on the remaining exam. The decision to accept or deny the petition is based on the original graduate application, performance in UC Merced graduate coursework, and match of the student's research interests to faculty interests.

8 Time to Degree and Annual Evaluation of Graduate Student Progress

The Applied Mathematics Graduate Group places a nominal time limit of two years from entrance to completion of the M.S. and five years for completion of the Ph.D. Extensions beyond these limits can be permitted by the Chair of the Applied Mathematics Graduate Group in consultation with the Executive Committee. Ph.D. students entering with a M.S. degree have a nominal time limit of four 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. For Ph.D. students these meetings occur each year after advancing to candidacy. At least two members of the committee 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, graduate research advisor, 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 (Section 5.2).

9 Graduate Assistantships & Stipends

Graduate students in Applied Mathematics are normally offered stipend support through appointment either as a Teaching Assistant (TA), Teaching Fellow (TF), and/or Graduate Student Researcher (GSR). Students in their first semester of residence usually serve as TAs for appropriate courses in the schools of Natural Sciences or Engineering. After the first semester, support may be offered through either funding as a TA or a GSR in the graduate research advisorÕs laboratory. Graduate students with external fellowships are still required to satisfy the one- or two-semester teaching requirement and will be paid by the school for teaching. While every effort will be made to provide employment as a TA, Teaching Fellow, or GSR for all graduate students in residence, admission to graduate studies carries no guarantee of financial support beyond that specified in the initial letter of commitment of financial support. During the academic year, appointments are limited to 49.9% time. During academic breaks and summer months, students may be appointed at 100% time when research funds to support additional GSR support are available.

9.1 Appointments for Students Not Admitted To PhD Candidacy

Students not admitted to PhD Candidacy with teaching appointments will be recommended for appointment as Teaching Assistants. Students appointed as GSRs will be paid at a step level such that pay is as close as possible to that for a TA with the same percentage-time appointment. For example, at the 2007 stipend scales (see Table 1), a student not yet admitted to candidacy would

be appointed as GSR Step 5. In the summer, an appointment percentage-time would be decided between the student and the studentÕs research advisor, but the GSR appointment would still be Step 5. Under this plan, a student who is expected to work full time should receive a 100% appointment. This also applies during academic breaks in the academic year.

9.2 Appointments for Students Admitted To PhD Candidacy

Students admitted to PhD Candidacy with teaching appointments who have demonstrated excellence in teaching will be recommended for appointment as Teaching Fellows rather than TAs. The Lead Dean is responsible for deciding to appoint a student as a TA or TF. Students appointed as GSRs will be paid at a step level such that pay is as close as possible to that for a Teaching Fellow with the same percentage-time appointment. For example, at the 2007 stipend scales (see Table 1), a student admitted to candidacy would be appointed as GSR Step 7. In the summer, an appointment percentage-time would be decided between the student and the studentÕs research advisor, but the GSR appointment would still be Step 7. Under this plan, a student who is expected to work full time should receive a 100% appointment. This also applies during academic breaks in the academic year. When a student advances to candidacy, the step increase will apply at the beginning of the next period (start of semester or start of summer).

Table 1: TA, TF, and GSR monthly stipend amounts at 49.9% time with 9-month appointment. Amounts are current as of 07 November 2007, and are subject to change.

Appointment	Monthly Stipend
GSR Step 4	$1,740.51
GSR Step 5	$1,856.28
GSR Step 6	$1,942.61
GSR Step 7	$2,098.30
GSR Step 8	$2,265.46
Teaching Assistant	$1817.58
Teaching Fellow	$2,131.56

10 Changes to Policies & Procedures

A student entering AMGS is bound under the Policies and Procedures in place in the student's first semester. If Policies and Procedures change, a student may petition the Executive Committee to work under the new requirements.

Modified November, 2007

University of California, Merced

Graduate Group in Biological Engineering and Small-scale Technologies

Policies and Procedures

2007-2008

I. SCOPE OF RESEARCH

The engineering sciences are undergoing a vast and fundamental metamorphosis from isolated disciplines to more integrative and multidisciplinary topics. The Biological Engineering and Small-scale Technologies (BEST) Graduate Group at UC Merced offers a multidisciplinary research and training program for masters degree and doctoral students who want to be at the forefront of this revolution in biologics engineering and nanotechnology. Research projects are available on topics ranging from fundamental characterization of materials to tissue engineering, and coursework will provide a background in the tools of biologics and integration of modern materials. The graduate group will offer opportunities for students interested in multidisciplinary projects at the interface between biological engineering, nanotechnology, bioelectrical engineering, mechanical engineering, computer science, and materials characterization and design.

II. GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to utilize the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of Graduate Studies makes final decisions on admission.

II. A. APPLICATION DEADLINES FOR ADMISSION

The deadline for receipt of applications is January 15. Normally applications will be accepted for Fall semester only, enrollment in other semesters will be considered on an individual basis, with applications due no later than seven months prior to the beginning of the semester when the student would like to begin graduate studies. Applicants are encouraged to contact individual faculty members to discuss their research interests before applying for graduate study.

II.B. 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;
* 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) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

Applicants are encouraged to contact individual faculty members to discuss their research interests before submitting a full application.

II.C. ADMISSION CRITERIA

The minimum requirement for graduate admission to UCM is a bachelor's degree, with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum will be waived only under circumstances where the applicant has demonstrated strong academic skills subsequent to their undergraduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Academically qualified students may also be required to complete a telephone or in-person interview with one or more of the BEST faculty members. Finally, the match of the candidate's skills and interests to BEST research

programs will be considered. For this reason applicants are encouraged to contact BEST faculty before applying.

III. GENERAL REQUIREMENTS FOR ADVANCED DEGREES

III.A. RESIDENCY

In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. M.S. students must be registered as a full- time student for at least one semester before advancement to candidacy. M.S. students must be in residency for at least one semester after advancement to candidacy before conferral of the degree. For the purposes of determining residency, only the Fall and Spring semester will be counted; however, the summer semester may be counted in evaluating students on academic probation. Residency is established by satisfactory completion of at least 12 units of graduate coursework (including research) per term. Ordinarily, a graduate student shall not receive credit for more than 12 units of graduate courses in any semester. The BEST graduate group only accepts full time students. Exceptions will only be granted for students in the non-thesis Masters Degree program (Section V.B.) with the permission of the graduate group Chair, in consultation with the Executive Committee.

III.B. 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 graduate advisor or faculty committee, will be placed on academic probation. The student will then be allowed a maximum of one semester to make up the deficiencies and be returned to good academic standing (beyond the semester they go on probation). Otherwise, the student will be dismissed from the graduate program.

Specific scholarship requirements are as follows:

1. Only courses in the 100 and 200 series in which the student receives grades of "A", "B", or "S" may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a "C" or "D" or lower cannot be used to satisfy the unit requirement for the degree but will count in determining the grade point average.

2. Candidates must maintain an average of at least three grade points per unit in all upper division and graduate courses elected during their residence as graduate students at the University of California. Students must maintain an average grade point of 3.0 for advancement to candidacy and conferral of the degree.

3. Courses graded "S/U" will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their graduate research advisor.

III.C. FACULTY COMMITTEES FOR ADVANCED DEGREES

All students in the BEST graduate group must have a graduate research advisor and committee. The student's graduate research advisor (see section IV.C.), normally in consultation with the student, the graduate group and other 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 on these committees rests with the Dean of Graduate Studies.

Advanced degree committees in the Biological Engineering and Small-scale Technologies group typically consist of three members, although additional committee members are permitted if warranted by the student's research project. One is the student's graduate research advisor and the two or more others are UC Merced faculty members in the group (one of whom is appointed as Committee Chair). Under some circumstances one of the committee members can be a UC Merced faculty member from outside the group or 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 research 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 vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the Biological Engineering and Small-scale Technologies graduate group for review and approval by the Executive Committee.

All members of the committee must be in attendance for Ph.D. qualifying examinations and thesis defense. 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 graduate advisor in consultation with the student should recommend a new committee member, giving the reason for the change. The change must be reviewed and approved by the Executive Committee.

IV. DOCTORAL DEGREE

IV.A. SIGNIFICANCE

The Doctor of Philosophy degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study.

IV.B. REQUIREMENTS

The Biological Engineering and Small-scale Technologies graduate group has established the following requirements for the Ph.D. degree. Students must:

- Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced;
- Earn a passing grade in at least four graduate courses of three-four units each (exclusive of research) (see section IV.D);
- Complete all graduate courses with a letter grade of at least "B";
- Serve as a Graduate Student Instructor (GSI) for at least one semester;
- Pass a qualifying oral exam (see section IV.F.)
- Present an open technical seminar at least twice while in residence; (see section IV.H)
- Publish at least one scientific paper in the peer-reviewed literature (see section IV.I.);
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field. (see section IV.J.)

IV.C. SELECTION OF A GRADUATE RESEARCH ADVISOR

The heart of the Biological Engineering and Small-scale Technologies Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a graduate research advisor early during the first year of study. Selection of a graduate research advisor must be approved by the graduate group and must occur before the student's faculty committee can be constituted. The student and the graduate research advisor 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 graduate research advisor must be a member of the Biological Engineering and Small-scale Technologies group. Students will be assigned an initial advisor when they first enroll, unless the student has already chosen an advisor.

Changing graduate research advisors

The faculty recognizes that under certain circumstances there may be valid reasons for a graduate student to want to change his/her research advisor (e.g. lack of funding, personality conflicts, change in the direction of the research program, or resignation of the PI from the faculty). If a student requests change in the graduate research advisor, the program will make every effort to be helpful and to ensure that this is not a traumatic experience for the student. However, it may result in a change of financial support and may also increase the time required to complete the degree. The following procedure should be followed when a graduate student wants to change his/her research advisor.

a. The graduate student must inform the research advisor in writing and give reasons.
b. The graduate research advisor will meet with the student within 1 week to discuss options available. The student then has one additional week to decide to move forward with the change of advisors.

c. The graduate advisor will inform the chair of the Executive Committee. They will help the student to identify a new graduate advisor.
d. The student will be responsible for securing another graduate student advisor and funding for the new project.
e. Concerns regarding intellectual property rights and obligations to funding agencies should be resolved before the student begins his/her work on a new dissertation topic.

Policy on Conflict of Interest
If a faculty advisor has a conflict of interest, the Graduate Group Chair and Graduate Dean must be notified in writing. The Graduate Group Chair will then examine the potential impact upon the student. If there is a potential harm to the student, then an additional faculty member, termed the "Oversight Member", will be appointed by the Graduate Dean to the student's advisory committee to insure that the faculty conflict does not impact the academic interest of the student. If the "Oversight Member" perceives an academic problem related to the conflict of interest that cannot be resolved at the academic unit level, then the matter will be turned over to the Graduate Dean for resolution.

The University of CA is currently developing a policy to deal with matters involving cases where a student may be the conflicted party. These would include instances involving a student who holds a financial interest in an outside entity that may have an interest in a project on which the student is or may be working. In such cases, it is important to consult with the campus Conflict of Interest Oversight Committee or the Vice Chancellor for Research/Graduate Dean.

IV.D. COURSEWORK REQUIREMENTS

All graduate students in the Biological Engineering and Small-scale Technologies group are required to take two semester courses, Special Topics in Bioengineering (BEST 200) and Special Topics in Materials and Technology (BEST 201) that exposes them to current, cutting-edge research directions in the field. These are 3-unit per semester courses consisting of three hours of discussion per week and significant out-of-class reading and study. The course format emphasizes student-led presentation, analysis, and discussion of reading assignments from the current and recent scientific literature. These courses are considered "core" to the program and may not be substituted or waived.

Research Seminar (BEST 291) attendance is also critical for the graduate student's education. Students are required to register for this 1-unit course, repeated for the first 2 semesters of graduate study, but are encouraged to continue attending research seminars during their tenure as a graduate student.

All PhD students in the group must also successfully complete (grade of B or better) at least two additional courses (one of which must be graduate level course numbered 200-299 and worth at least three units each) exclusive of research (BEST 295) that are appropriate to the student's research area. Suggested courses include Characterization of Materials, Tissue Engineering, Biomembranes, Polymeric Materials, Nanotechnology and Nanoscience, Modeling of Nanoscale Processes, Medical Imaging, Bioinstrumentation, Biophysics, and Electron Microscopy. Other graduate-level courses appropriate to the student's specific field of research, including Directed Independent Study (BEST 299) may be used to meet the two-course minimum requirement with consent of the student's faculty committee. Normally these courses should be taken during the first year of graduate study. 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 student's graduate research advisor.

IV.E. RESEARCH PROPOSAL

One month before the qualifying exam, the student will provide to the degree committee a written document (typically five to ten pages of a research proposal written in NIH or NSF format) 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 will review this document with the student and determine if the student has outlined a project that is appropriate for a Ph.D. If not, the student is required

to rewrite the research plan. Once the research plan is approved the student may take the oral portion of the Qualifying Examination.

IV.F. PH.D. QUALIFYING EXAMINATION

All students in the Biological Engineering and Small-scale Technologies Ph.D. program are required to pass a qualifying examination before advancement to candidacy for the Ph.D. degree. Students are expected to take and pass the qualifying examination within the first 2 years of graduate study unless they successfully petition the graduate group chair to take it at a specific later date. The examination committee is the same as the student's faculty committee except that the graduate research advisor is replaced by another member of the group, selected by the chair of the graduate group in consultation with other committee members. The members of each student's examination committee will select one member to chair the examination committee. The dates for the examination are arranged between the student, their graduate research advisor, and the examination committee chair. The graduate research advisor may attend the qualifying exam if he/she wishes, but is a non-speaking and nonvoting attendant.

The qualifying exam may be taken only after the student's written research proposal has been approved by the student's committee (Section IV.E.). The exam will focus on the student's research proposal, but may cover any related field of science or engineering (including biology, chemistry, physics, fluid mechanics, thermodynamics, behavior of materials, electronics, and kinetics), and will typically last three hours. The committee conducts the examination, and immediately thereafter submits the results of the examination to Graduate Studies. Possible outcomes are:

1. Pass

2. Conditional pass (additional assignment or course may be required by the committee)

3. Fail, with an option to retake the examination once within a specified time period

The committee members should include in their evaluations of the student 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. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is "Conditional Pass" or "Fail", the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining its decision and must inform the student of its decision. In the case of a "Conditional Pass" decision, the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Chair of the graduate group. The Chair, in consultation with other members of the graduate group, will use these individual reports to adjudicate the result.

Upon recommendation of the examination committee, a student who has not passed the examination may repeat the qualifying examination after a preparation time of no more than six months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate advisor, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree.

IV.G. ADVANCEMENT TO CANDIDACY

Upon successful completion of the examinations and approval of a research plan, 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 research advisor, 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.

IV.H. SEMINAR PRESENTATIONS

All students in the Biological Engineering and Small-scale Technologies group are required to present an open technical seminar at least twice during their residence in the graduate group. The topic of the seminar 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 seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open presentation given as part of the Ph.D. defense may be counted as one of the required seminars.

IV.I. PUBLICATION REQUIREMENT

The final confirmation of the quality of a PhD dissertation is the ability to publish the research results in a peer-reviewed journal. The research field may influence the timing and work required to publish research results, making it difficult to define the number of publications required for each dissertation. For this reason, whether a student has made sufficient progress for the PhD will ultimately be determined by the student's advisor and thesis committee.

IV.J. 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 will serve as the basis for publication(s) in a peer-reviewed journal. 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 and abstract may be obtained from the Graduate Studies office.

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 are 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 date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination.

The Ph.D. final examination consists of an open seminar on the dissertation work 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A simple majority is required for a pass. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the graduate research advisor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies. All members of the degree committee must sign the final dissertation.

V. MASTER'S DEGREE

V.A. SIGNIFICANCE

Students may be admitted to the graduate program in Biological Engineering and Small-scale Technologies to work towards a Masters Degree (M.S.). Additionally, a Ph.D. student who has been in residence for at least two semesters, is in good academic standing, and has completed at least three of the core courses 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.

V.B. REQUIREMENTS

The Biological Engineering and Small-scale Technologies group has established the following requirements for the M.S. degree. Each M.S. student has a committee with at least three members (see description for Doctoral committees above), and students writing a masters thesis have a graduate research advisor. Two different tracks are recognized:

PLAN I

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least two of the group's graduate core courses, plus one additional 200-299 level course with a letter grade of at least "B";
- Complete at least 20 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 9 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining hours may be research or similar courses;
- Prepare an acceptable thesis describing original research in the field and successfully defend thesis to thesis committee.

PLAN II

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least 2 of the group's graduate core courses, plus 2 additional 200-299 level courses with a letter grade of at least "B";
- Complete at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 12 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining hours may be research or similar courses;
- Pass a comprehensive qualifying oral examination administered by the faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

V.C. 5th YEAR M.S. IN BIOLOGICAL ENGINEERING AND SMALL-SCALE TECHNOLOGIES

The Biological Engineering and Small-scale Technologies Graduate Group offers undergraduate students conducting original research in the UC Merced Bioengineering and Materials Science and Engineering degree programs the opportunity to continue study beyond their bachelor's degree to achieve a M.S. degree PLAN I. A carefully designed program starting with undergraduate research can permit a student to complete the M.S. degree one year sooner than is otherwise possible. This degree requires at least two additional semesters of full-time academic residence at UC Merced. Note: BEST graduate program will waive the GRE exam requirement for UC, Merced undergraduate students.

VI. TIME TO DEGREE AND ANNUAL EVALUATION OF GRADUATE STUDENT PROGRESS

The Biological Engineering and Small-scale Technologies Graduate Group places a nominal time limit of two years from entrance to completion of the M.S. and five years for completion of the Ph.D. Extensions beyond these limits can be permitted by the Executive Committee.

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. (For Ph.D. students these meetings occur each year after advancing to candidacy.) At least two members of the committee 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, graduate research advisor, 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 (Section III.B.)

VII. TEACHING AND RESEARCH ASSISTANTSHIPS AND STIPENDS

Graduate students in the Biological Engineering and Small-scale Technologies group are normally offered stipend support in the form of either Graduate Student Instructor positions (GSIs) or Research Assistantships (RAs). Students in their first semester of residence usually serve as GSIs for appropriate courses in the schools of Natural Sciences or Engineering. After the first semester, support may be offered through either a funding as a GSI or an RA in the graduate research advisor's laboratory. GSI stipends are set by the schools while RA stipends are determined by the Graduate Group. Graduate students with external fellowships are still required to satisfy the one semester teaching requirement and will be paid by the school for teaching.

While every effort will be made to provide employment as a GSI or RA for all graduate students in residence, admission to graduate study carries no guarantee of financial support. Financial support will be provided for PhD students, however; financial support for Masters Degree students will be addressed on a case-by-case basis.

University of California, Merced

Graduate Studies with Emphasis on

Electrical Engineering and Computer Science

Policies and Procedures and Bylaws

Submitted by:
Stefano Carpin, Assistant Professor
Graduate Program Chair
On behalf of the EECS Faculty
School of Engineering
February 23, 2009

Part I
Policies and Procedures

According to the policies, procedures and guidelines established in the UC Merced Graduate Advisors Handbook, this document specifies additional rules concerning graduate studies with emphasis on Electrical Engineering and Computer Science (EECS program.) This document complements but does not substitute the Graduate Advisors Handbook, and the reader is encouraged to refer to it for aspects not covered herein.

This is a living document and is subject to change upon approval by the Graduate and Research Council (GRC). Existing graduate students are responsible of all policies and procedures present in the version of this document that is current upon their enrollment at UC Merced. We ask that readers of this document report any errors to the EECS faculty.

1 Admission

All persons seeking admission to the EECS program must submit a formal application according to the procedures and deadlines established by the UC Merced graduate division office (http://graduatedivision.ucmerced.edu.) Completed applications are reviewed by the EECS Admissions Committee which makes recommendations for admission. The Dean of Graduate Studies makes final decisions on admission.

1.1 Deadlines for Admission

Applications will be normally accepted for Fall semester only. Enrollment in other semesters will be considered on an individual basis and requires the unanimous approval of the Admissions Committee, Graduate Program Chair, and Dean of Graduate Studies.

1.2 Materials to be Submitted

Prospective students seeking admission are required to submit all the materials required by the graduate division office. Incomplete applications will not be evaluated by the admission committee and therefore rejected without further consideration. Applicants are encouraged to specify their research interests in their statement of purpose, possibly linking them to the activities of current EECS faculty members.

1.3 Admission Criteria

In addition to campus wide criteria, the Admission Committee will evaluate the applicants' background in Computer Science and Electrical Engineering. The successful applicant is supposed to demonstrate an adequate preparation in numerous areas, including, but not limited to: programming languages; data structures and algorithms; mathematics (linear algebra, differential equations, numerical methods, probability and statistics); systems and signals; circuit design; control theory; communications. An applicant to the EECS program can be granted conditional admission pending remedial classes that would allow the student to take the graduate classes in the program.

2 General Requirements for Graduate Degrees

2.1 Residency

The minimum residency requirement for the Masters Degree is two semesters, while the minimum residency requirement for the doctoral (*Ph.D.*) degree is four semesters. Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters before advancement to candidacy. For the purpose of determining residency, only the Fall and Spring semesters will be counted; however, the summer semester may be counted in evaluating students on academic probation. Residency is established by satisfactory completion of at least 12 units of graduate coursework (including individual study and research) per semester. Only full time students will be admitted to the EECS graduate program. Exceptions will only be granted for students in the comprehensive examination Masters Degree program (Section 4.1.2) with the permission of the Graduate Program Chair, in consultation with the EECS Executive Committee.

2.2 Scholarship

Graduate students must maintain at least a 3.0 grade-point average (GPA). A student whose cumulative graduate GPA falls below 3.0, or who is judged not to be making satisfactory progress toward the degree by his or her graduate advisor or faculty committee, will be placed on academic probation. Students put in academic probation will be informed according to the procedures established by the graduate division office. The student will then be allowed a maximum of one semester to make up the deficiencies and return to good academic standing (beyond the semester they go on probation.) Otherwise, the student may be considered for dismissal according to the policies established by the University of California.

3 Students Supervision

3.1 Students pursuing a M.S. degree

Upon enrollment at UC Merced, each student pursuing a MSc degree in EECS is assigned a *graduate advisor*. The graduate advisor must be a faculty professor member of the EECS graduate program. When the student choses his plan (see section 4.1), the student's graduate advisor, normally in consultation with the student, the Graduate Program Chair and other faculty, recommends the appointment of a committee to advise and supervise the student's progress (*M.S. committee*). The MSc committee consists of at least three faculty belonging to the EECS program (either members or affiliated.) Under special circumstances one of the committee members can be a UC Merced professor from outside the EECS program, or 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 vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the EECS. Final approval of the membership on the MSc committees rests with the Dean of Graduate Studies. A student may petition in writing the Executive Committee to be assigned a different graduate advisor, and the final decision rests with the committee. The Executive Committee may also decide to change the graduate advisor without a formal request from the student.

3.2 Students pursuing a Ph.D. degree

Upon enrollment at UC Merced, each student pursuing a Ph.D. degree in EECS is assigned a *graduate research advisor*. The graduate research advisor must be a faculty member with the EECS graduate program. When the student starts preparing his research proposal (see section 5.3), his/her graduate research advisor, normally in consultation with the student, the Graduate Program Chair and other faculty, recommends appointment of a committee to advise and supervise the student's progress through the program (*Ph.D. committee.*) The Ph.D. committee consists of at least four faculty members. At least three of them must be faculty in the EECS graduate program, and at least one of them must be not with the EECS graduate program (*external member.*) The external member can be either from UC Merced or from a different campus, and a curriculum vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the EECS program before the committee is recommended for appointment. Final approval of the membership on the Ph.D. committees rests with the Dean of Graduate Studies. All members of the Ph.D. committee must be in attendance for the qualifying examinations and thesis defense (see 5.4 and 5.6.) 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 graduate research advisor in consultation with the student should recommend a new committee member, giving the reason for the change. The change must be reviewed and approved by the Executive Committee and by the Dean of Graduate Studies.

4 General Course Requirements for Graduate Degrees

The EECS faculty encourages graduate students to enroll in a variety of courses that value both depth and breadth. A list of approved courses is maintained by the Graduate Program Chair upon consultation with the EECS faculty. This list will be revised at the beginning of every semester to keep it actual with the development of the university and the increased availability of appropriate courses. The list will be normally be made available to the graduate students on the EECS website (`http://eecs.ucmerced.edu`.)

4.1 Master of Science (M.S.)

The master's degree in EECS is attained by: Plan I, the Thesis option, or Plan II, the Comprehensive Examination option.

4.1.1 Plan I (Thesis)

In addition to an approved thesis, a minimum of 24 semester units in approved courses is also required, at least 20 of which must be earned in approved courses exclusive of credit given for thesis research and preparation. A general examination is also required. Under Thesis option a thesis is required. The M.S. Committee shall approve the subject, pass on the content of the thesis, and administer the general examination. Usually one of the committee members directs the work.

4.1.2 Plan II (Comprehensive Examination)

In addition to the comprehensive examination, a minimum of 32 semester units in approved courses, at least 24 of which must be from approved courses. The comprehensive examination may be substituted by a project report to be approved by the student's MS committee.

4.1.3 Advancement to candidacy

In accordance with University of California policy, students must be advanced to candidacy for their degree prior to the beginning of the final semester of enrollment. An Application for Advancement to Candidacy initiated by the student and approved by the Graduate Group should be submitted to the Graduate Dean before (preferably 30 days before) the opening of the semester in which the degree is expected. The Application must be accompanied by petitions for any course credits that have not already been approved by the Graduate Dean. If the master's degree requires a thesis (Plan I), membership of the thesis committee must be included, and the Graduate Program Chair, and the graduate student must sign the Statement of Conflict of Interest form, which is included in the Application.

4.2 Doctor of Philosophy (Ph.D.)

Ph.D. students must complete at least 32 units of coursework of approved courses, taken for a letter grade and not including seminar or independent study courses (courses with course numbers 290 or higher.) At least 16 of them must be from EECS. Credits not from EECS must be approved by the student supervisor and the Ph.D. committee. The student, in close collaboration with his/her graduate research advisor, will elaborate an appropriate selection of courses that will ensure both breadth and depth, as required by the nature of the Ph.D. degree. In addition to the course requirements, students pursuing a Ph.D. degree are subject to the additional requirements specified in section 5.

4.3 Thesis submission

For the degrees where a thesis is required, the thesis must be filed according to the University regulations. Detailed instructions are available in the Graduate Advisor Handbook.

5 Doctor of Philosophy Degree

The Doctor of Philosophy (Ph.D.) degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his/her chosen field of study. In addition to the general prerequisites specified in sections 2 and 4.2 the following additional requirements apply.

5.1 Teaching Requirements

All students pursuing a Ph.D. degree in EECS are required to complete at least one semester as Graduate Student Instructor.

5.2 Seminar

All students in pursuing a Ph.D. degree in EECS are required to give at least two open technical seminars during their residence in the program. The topic of the seminar 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. Each seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open public presentation given as part of the Ph.D. defense may be counted as one of the required seminars.

5.3 Research Proposal

Two weeks before the Qualifying Examination (see section 5.4), the student will provide to the Ph.D. committee a written *research proposal* that describes his/her research topic, summarizes progress to date, and outlines what he/she proposes to investigate, why it is relevant, and what will be learned. Guidelines about the format of the proposal will be established by the Ph.D. committee and will be communicated to the student by the graduate research advisor. Within one week the Ph.D. committee will review this document and determine if the student has outlined a project that is appropriate for a Ph.D. degree. The committee may approve the plan, possibly suggesting minor changes to be included before the Qualifying Examination. Alternatively, the committee may reject the proposal, and the student will revise the research plan to address the criticism raised by the committee. In case of rejection, the committee will provide a written document detailing the proposal weaknesses and suggesting how to improve it. Once the research proposal is approved, the student may take the oral portion of the Qualifying Examination. Students filing a petition for the qualifying examination are required to complete the appropriate paperwork according to the deadlines and procedures set by the graduate division office.

5.4 Ph.D. Qualifying Examination

All students pursuing a Ph.D. degree are required to pass a qualifying examination before advancement to candidacy. The members of the student's Ph.D. committee will select one member to chair the examination committee. The dates for the examination are arranged between the student and the examination committee chair. The qualifying exam may be taken only after the student's written research proposal has been approved (section 5.3), and the exam will focus on the student's research proposal, but may cover any related field of interest. The committee conducts the examination, and immediately thereafter evaluates the exam and informs the student of the outcome. The final result of the examination is submitted in writing to the Graduate Division, according to the established procedures. Possible outcomes are:

- Pass
- Conditional pass (additional assignment or course may be required by the committee).
- Fail, with an option to retake the examination once within a specified time period.

The committee members should include in their evaluations of the student 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 emerged during the examination. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If

the decision is "Conditional Pass" or "Fail", the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining the decision. In the case of a "Conditional Pass" decision, the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Graduate Program Chair. The Chair, in consultation with the Executive committee, will use these individual reports to adjudicate the result. Upon recommendation of the examination committee, a student who has not passed the examination may repeat the qualifying examination after a preparation time of no more than six months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate advisor, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree according to the policies established by the University of California. The Ph.D. Qualifying Examination is normally an open event. Under exceptional circumstances one of the Ph.D. committee members may petition the Executive Committee for an examination not open to the general public. The final decision rests with the Executive Committee.

5.5 Advancement to Candidacy

Upon successful completion of the Qualifying Examination, the student is entitled for advancement to candidacy and is required to complete the formal procedure according to the requirements set by the Graduate Division office. 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.

5.6 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 will serve as the basis for publication(s) in a peer-reviewed publication. The work must be the student's, and it must be original and defensible. The student is encouraged to discuss with members of the Ph.D. committee both the substance and the preparation of the dissertation well in advance of the planned defense date. 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 are 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 deficiencies or matters of controversy may still exist), the final examination date may be scheduled by the student in consultation with the committee. The date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination. The Ph.D. final examination consists of an open seminar on the dissertation work followed by a closed examination by the Ph.D. 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A simple majority is required for a pass. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will

select one member, normally the graduate research advisor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies. All members of the Ph.D. committee must sign the final dissertation. In case the vote is not unanimous, the dissenting member has to justify its dissent in writing.

5.7 Evaluation of Progress

In order to ensure satisfactory progress toward the degree, each student pursuing a Ph.D. degree must meet with his/her faculty research advisor on a regular basis. In addition, an annual evaluation of progress takes place for all Ph.D. students, normally during the Spring term. For the yearly evaluation all students are required to submit to their respective graduate research advisor a one page document outlining their progress since their previous evaluation. Students must be given at least two weeks to prepare their report, and must submit their report at least one week before the yearly evaluation takes place. The evaluation of progress is conducted by a joint meeting of all faculty members of the EECS program, and each individual report is introduced by the graduate student research advisor. Faculty will review the student's progress toward the degree during the past year and, when appropriate, formulate suggestions for completion of the remaining requirements. The annual report will become part of the student's record, and will be discussed with the student by his/her graduate research advisor.

6 Financial Support

Admission to the graduate program does not imply any form of financial support. However, a variety of fellowships and employment options are available on a competitive basis for selected outstanding candidates. Employment possibilities for graduate students include Teaching Assistant (TA) positions, and Graduate Student Researcher (GSR) appointments. TA stipends and required qualifications are set by the school offering the position, while GSR stipends and required qualifications are determined by the faculty member offering the position. Graduate students pursuing a Ph.D. degree with external fellowships are still required to satisfy the one semester teaching requirement (see Section 5.1.) Financial support provided through TA or GSR appointments is subject to periodic review and can be modified or revoked according to the appropriate regulations implemented at UC Merced. Prospective and current graduate students are strongly advised to carefully read the corresponding section in the Graduate Advisor Handbook.

Part II
Bylaws

7 Faculty Membership

Membership shall be open to faculty who are actively involved in scientific inquiry and scholarship in any related disciplines to EECS. Membership may be granted also to faculty of other UC campuses and adjunct faculty from other institutions. The inaugural faculty members of the EECS graduate program are:

- Stefano Carpin, Assistant Professor of Engineering
- Miguel Carreira-Perpiñán, Assistant Professor of Engineering
- Alberto Cerpa, Assistant Professor of Engineering
- Marcelo Kallmann, Assistant Professor of Engineering
- Steve Kang, Professor of Engineering
- Shawn Newsam, Assistant Professor of Engineering
- David Noelle, Assistant Professor of Engineering and Social Sciences, Humanities and Arts
- Songhwai Oh, Assistant Professor of Engineering
- Ming-Hsuan Yang, Assistant Professor of Engineering

Newly appointed faculty members hired through faculty lines allocated to the CSE undergraduate major are automatically granted membership to the EECS program. The Lead Dean for the EECS program is the Dean of the School of Engineering, UC Merced. Other professors desiring to gain membership to the EECS program must submit their application to the Graduate Program Chair. The final decision is taken by the Executive Committee upon consultation with all EECS members. Members have voting rights, are requested to actively participate in the administration and development of the program, and may serve as Chair or members of the various committees.

8 Faculty Affiliation

Affiliation shall be open to faculty whose research area is not necessarily within EECS but are nonetheless involved in scientific inquiry and scholarship with some degree of overlapping with EECS. Affiliation may include faculty from other UC campuses and adjunct faculty from other institutions. Individuals desiring to gain affiliation with the EECS graduate program must submit their application to the Graduate Program Chair. The final decision is taken by the Executive Committee upon consultation with all EECS members and affiliates. Affiliates do not have voting rights and may not serve as Chair or members of the various committees.

9 Graduate Program Chair

Members of the EECS faculty will designate a nominee to serve as Graduate Program Chair. The name of the nominee together with a statement indicating a willingness to serve as Chair will then be submitted to the Dean of Graduate Studies, who, in consultation with the candidate's Academic Dean, will appoint or reject the nominee. The normal term of appointment will be three years. The Chair's responsibilities include:

- Call and preside at meetings of the Executive Committee
- Preside over the Group meetings in the Fall and Spring semesters.
- Act as the administrative liaison between the graduate program and the Division of Graduate Studies.
- Maintain a list of approved courses for the EECS graduate program.

10 Committees

10.1 Executive Committee

The Executive Committee (EC) shall, in consultation with the faculty, determine and implement policies for the good of the graduate program, establish and guide the educational requirements, and represent the interests of the program to University and other agencies. The Executive Committee consists of at least three EECS faculty members and is appointed by the Chair upon consultation with the EECS faculty. The Chair will then inform the Graduate Division with a written memo indicating its composition. The Graduate Program Chair will serve as an ex officio member of the EC. The normal term of appointment of the EC is three years. The EC will take decisions concerning petitions asking for deviations from the rules specified in this handbook. Unanimous vote is required to grant exceptions. The EC will be responsible for reviewing applications from faculty who wish to be member or affiliated with the EECS graduate program. In addition, the EC will review memberships and affiliations every five years and may decide to remove memberships or affiliations of faculty no longer pursuing activities related to the program.

10.2 Admissions Committee

The Admissions Committee is charged with the development of recruiting materials for the Group, reviewing applications for admissions, making recommendations for admissions to the Dean of Graduate Studies, exploring graduate student support mechanisms, and allocating intramural financial assistance. The Admissions Committee consists of three EECS faculty members and is appointed by the Chair upon consultation with the EECS faculty. The Chair will then inform the graduate division with a written memo indicating its composition. The normal term of appointment is three years.

11 Graduate Student Representative

A graduate student representative will be consulted in all deliberations that revolve around issues having to do with educational policy and curriculum. The Group chair will choose the student representative from the EECS Graduate Group after soliciting all active graduate students in the

program for their interest. Students will serve a one-year term and can be reselected for a second term.

12 Meetings and voting quorum

Members should meet once during the Fall and Spring semesters. The Graduate Program Chair is responsible for calling all regular and special meetings of the membership. Faculty can request additional meetings when needed. Unless otherwise specified, issues that require a vote need to have a quorum of at least 50% of the total membership participating in the voting. Voting may be done electronically so as to accommodate members who are off campus for extended periods of time. A positive or negative decision requires a simple majority of the vote.

13 Amendments

Amendments to the Program Rules or By-Laws require approval by two-thirds of the members. Written notice of the proposed amendment shall be sent to each member at least five working days prior to the meeting at which the amendment is to be discussed. All amendments must also be submitted to the GRC for approval.

Mechanical Engineering and Applied Mechanics

A Proposal for the Development of a Graduate Program leading to M.S. and PhD Degrees in MEAM at the University of California, Merced

Submitted by:

Carlos F. M. Coimbra, Associate Professor
School of Engineering

January 31, 2007

1. Introduction

Mechanical Engineering and Applied Mechanics is a multidisciplinary field that includes the traditional areas of continuum solid and fluid mechanics and the rheology of viscoelastic and viscoplastic materials (fluids, pastes, colloidal suspensions, bio-derived products, etc.) with the pertinent transport phenomena (momentum, heat and mass transfer) associated with processes related to design, fabrication, and analysis of mechanical devices and systems. Today, Mechanical Engineers and Applied Mechanicists develop applications in biomedical, space, energy, materials, computational sciences, and many other fields. The Mechanical Engineering and Applied Mechanics (MEAM) Graduate Group at UC Merced offers a multidisciplinary research and training program for MS and PhD-seeking students who want to be at the forefront of the newly-available methods of solving mechanical problems at various length and time scales. Research projects are available on topics ranging from fundamental mathematical methods to advanced applications, and coursework will provide a background in the latest techniques in analytical, computational, and experimental methods in Mechanics.

1.1 MEAM faculty members and relevance of the program

The graduate program in MEAM is the most closely related graduate program to the Mechanical Engineering undergraduate program at UC Merced, which is currently projected to be one of the top two largest enrollment majors in the School of Engineering. The School of Engineering (SoE) at UC Merced currently enrolls about 20% of the students on campus, and if this ratio is preserved (as currently projected) at full build-out (25,000 students), the UC Merced SoE will be one of the largest schools of engineering in the UC System. At a projected rate of 3 graduate students/faculty, the program is expected to enroll more than 30 graduate students in the next 5 years, and over 60 in the next 10 years.

The inaugural faculty members of the MEAM graduate program are:

1. Francois Blanchette, Assistant Professor of Natural Sciences (Applied Math, Fluids, Sedimentation)
2. Stefano Carpin, Assistant Professor of Engineering (Robotics, Artificial Intelligence)
3. Carlos Coimbra, Associate Professor of Engineering (Memory-Intense Mechanical Systems, Fluids)
4. Gerardo Diaz, Assistant Professor of Engineering (Thermal Systems, Energy, Controls)
5. Ajay Gopinathan, Assistant Professor of Natural Sciences (Polymer Physics, Biophysics)
6. Marcelo Kallman, Assistant Professor of Engineering (Motion Planning, Geometric Modeling)
7. Michael Sprague, Assistant Professor of Natural Sciences (Applied Math, Hydroelasticity)
8. Jian Q. Sun, Professor of Engineering (Vibrations and Controls, Mechanical Systems)
9. Roland Winston, Professor of Engineering and Natural Sciences (Solar Energy, Particle Physics)

The Lead Dean for the MEAM program is Dean Jeff Wright, School of Engineering, UC Merced.

2. Program

The MEAM graduate program will offer opportunities for students interested in multidisciplinary projects at the interface between Applied Math, Complex Analysis, Mechanis, Manufacturing, Bio-Inspired Engineering, Biomimetics, Applied Computational Sciences, Robotics, Mechatronics, Advanced Materials, Energy Conversion, and Controls. Our inaugural faculty group is composed of Mechanical, Electrical, Chemical and Bio-Engineers, Computer Scientists, Applied Mathematicians and Physicists, but the group is expected to grow substantially in size and scope as the School of Engineering and the School of Natural Sciences at UC Merced continue to grow.

2.1 Admissions Procedures and Requirements

All persons seeking admission to graduate standing must submit a formal application for admission. We encourage applicants to utilize the on-line application to streamline the process. Applications are reviewed bythe Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of Graduate Studies makes final decisions on admission.

2.1.1 Application Deadlines for Admission

The deadline for receipt of applications is January 15. Normally applications will be accepted for Fall semester only, enrollment in other semesters will be considered on an individual basis, with applications due no later than seven months prior to the beginning of the semester when the student would like to begin graduate studies. Applicants are encouraged to contact individual faculty members to discuss their research interests before applying for graduate study.

2.1.2 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;
* 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) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

Applicants are encouraged to contact individual faculty members to discuss their research interests before submitting a full application.

2.1.3 Admission Criteria

The minimum requirement for graduate admission to UCM is a bachelor's degree, with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum will be waived only under circumstances where the applicant has demonstrated strong academic skills subsequent to their undergraduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a

minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Academically qualified students may also be required to complete a telephone or in-person interview with one or more of the MEAM faculty members. Finally, the match of the candidate's skills and interests to MEAM research programs will be considered. For this reason applicants are encouraged to contact participating faculty before applying. As a guideline, MEAM graduate students should have adequate background in Mechanical Sciences, which typically involve higher division classes in Fluid Mechanics, Solid Mechanics (Rational Mechanics, Classical Mechanics, Dynamics or equivalent), and adequate Mathematics background (Linear Algebra, Differential Equations, Numerical Methods, etc.). A graduate student in MEAM can be granted conditional admission pending remedial classes that would allow the student to take the graduate classes in the program.

2.2 General Requirements for Advanced Degrees

2.2.1 Residency

In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. M.S. students must be registered as a full- time student for at least one semester before advancement to candidacy. M.S. students must be in residency for at least one semester after advancement to candidacy before conferral of the degree. For the purposes of determining residency, only the Fall and Spring semester will be counted; however, the summer semester may be counted in evaluating students on academic probation. Residency is established by satisfactory completion of at least 12 units of graduate coursework (including research) per term. Ordinarily, a graduate student shall not receive credit for more than 12 units of graduate courses in any semester. The MEAM graduate group only accepts full time students. Exceptions will only be granted for students in the non-thesis Masters Degree program (Section V.B.) with the permission of the graduate group Chair, in consultation with the MEAM Executive Committee.

2.2.2 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 graduate advisor or faculty committee, will be placed on academic probation. The student will then be allowed a maximum of one semester to make up the deficiencies and be returned to good academic standing (beyond the semester they go on probation). Otherwise, the student will be dismissed from the graduate program.

Specific scholarship requirements are as follows:

1. Only courses in the 100 and 200 series in which the student receives grades of "A", "B", or "S" may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a "C" or "D" or lower cannot be used to satisfy the unit requirement for the degree but will count in determining the grade point average.

2. Candidates must maintain an average of at least three grade points per unit in all upper division and graduate courses elected during their residence as graduate students at the University of California. Students must maintain an average grade point of 3.0 for advancement to candidacy and conferral of the degree.

3. Courses graded "S/U" will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their graduate research advisor.

2.2.3 Faculty Committees for Advanced Degrees in MEAM

All students in the MEAM graduate group must have a graduate research advisor and committee. The student's graduate research advisor (see section 2.4.3), normally in consultation with the student, the graduate group and other 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 on these committees rests with the Dean of Graduate Studies.

Advanced degree committees in the MEAM group typically consist of three members, although additional committee members are permitted if warranted by the student's research project. One is the student's graduate research advisor and the two or more others are UC Merced faculty members in the group (one of whom is appointed as Committee Chair). Under some circumstances one of the committee members can be a UC Merced faculty member from outside the group or 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 research 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 vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the MEAM graduate group for review and subsequent approval by the Executive Committee.

All members of the committee must be in attendance for Ph.D. qualifying examinations and thesis defense. 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 graduate advisor in consultation with the student should recommend a new committee member, giving the reason for the change. The change must be reviewed and approved by the Executive Committee.

2.3 Master's Degree (thesis option, Plan I; non-thesis option, Plan II)

Students may be admitted to the graduate program in MEAM to work towards a Masters Degree (M.S.). Additionally, a Ph.D. student who has been in residence for at least two semesters, is in good academic standing, and has completed the two core courses (MEAM 201 Advanced Dynamics and MEAM 202 Transport Phenomena) 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 MEAM group has established the following requirements for the M.S. degree. Each M.S. student has a committee with at least three members (see description for Doctoral committees below), and students writing a masters thesis have a graduate research advisor. The committees are responsible for designing a plan of study

detailing all classes to be taken by each student. This coursework plan is to be submitted to the Graduate Chair for approval. Two different tracks are recognized:

PLAN I

 Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;

 Complete at least three of the group's graduate courses[1] with a letter grade of at least "B";

 Complete at least 20 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 12 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining 8 hours may be research or similar courses;

 Prepare an acceptable thesis describing relevant research in the field and successfully defend the thesis in the presence of the thesis committee.

PLAN II

 Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;

 Complete at least four of the program's graduate courses with a letter grade of at least "B";

 Complete at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining 8 hours may be research or similar courses;

 Pass a comprehensive qualifying oral examination administered by the faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

2.3.1 Combined B.S./M.S. IN Mechanical Engineering and Applied Mechanics

The MEAM Graduate Group offers undergraduate students in the UC Merced Mechanical Engineering degree programs the opportunity to continue study beyond their bachelor's degree to achieve a M.S. degree. This degree requires at least two additional semesters of full-time academic residence at UC Merced beyond completion of all requirements for the B.S. degree. Students accepted for the combined B.S./M.S. degree may begin taking graduate courses and research as soon as they are admitted into the program. Candidates for the combined degree program should submit an application to the Dean of Engineering and the Dean for Graduate Affairs. Students may begin joint B.S./M.S. studies in either the Fall or Spring Semester. The application deadline is January 5 for the Fall semester and July 1 for the Spring semester. Candidates for the combined B.S./M.S. program may choose either Plan I or Plan II described above.

2.4 Doctoral Degree

2.4.1 Significance

The Doctor of Philosophy degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also

[1] Program graduate courses include all MEAM graduate courses plus all courses selected by the graduate committee and approved by the Graduate Chair. At most 12 credits of 100-level classes will be accepted towards completion of a graduate degree in MEAM.

signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study.

2.4.2 Requirements

The Mechanical Engineering and Applied Mechanics graduate group has established the following requirements for the Ph.D. degree. Students must:

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Earn a passing grade in at least five graduate courses of at least three units (exclusive of research, and/or transferred units) (see section IV.D);
- Complete all graduate courses with a letter grade of at least "B";
- Serve as a Graduate Student Instructor (GSI) for at least one semester;
- Pass a qualifying oral exam (see section IV.F.)
- Present an open technical seminar at least twice while in residence; (see section IV.H)
- Publish at least one scientific paper in the peer-reviewed literature (see section IV.I.);
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field. (see section IV.J.)

The Executive Committee will treat exceptions to this rule on a case-by-case basis.

2.4.3 Selection of Graduate Research Advisor

The heart of the MEAM Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all faculty in the group as early as possible, and select a graduate research advisor early during the first year of study. Selection of a graduate research advisor must be approved by the graduate group and must occur before the student's faculty committee can be constituted. The student and the graduate research advisor 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 graduate research advisor must be a member of the MEAM group. Students will be assigned an initial advisor when they first enroll, unless the student has already chosen an advisor.

2.4.4 Coursework Requirements

All graduate students in the MEAM group are required to take two courses, Advanced Dynamics (MEAM 201) and Transport Phenomena (MEAM 202), or equivalent, that exposes them to the necessary background to initiate research studies in the field. These are 3-unit per semester courses consisting of three hours of discussion per week and significant out-of-class reading, problem-solving activities and study.

All students in the group must also successfully complete (grade of B or better) at least three additional courses (two of which must be graduate level courses numbered 200-299 and worth at least three units each) exclusive of research (MEAM 295) that are appropriate to the student's research area. Suggested courses include **Continuum Mechanics, Rheology, Thermal Radiation, Solar Power, Energy Utilization, Turbulence, Aerodynamics and Aeroelasticity, Complexity Analysis, Biomimetics, Viscous Flows, Boundary Layer Theory, Elasticity and Plasticity, Multi-Scale Modeling, Linear Control Systems, Robotics and Mechatronics.** Other graduate-level courses appropriate to the student's specific field of research, including Directed Independent Study (MEAM 299) may be used to meet the two-course minimum requirement with consent of the student's faculty committee. Normally these courses should be taken during the first year of graduate study. 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 student's graduate research advisor. Exceptions of these requirements due to transference from another graduate program will be analyzed on an individual basis.

2.4.5 Research Proposal

Before the qualifying exam, the student will provide to the degree committee a written document (typically five to ten pages of a research proposal) 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 will review this document with the student and determine if the student has outlined a project that is appropriate for a Ph.D. If not, the student is given a month to rewrite the research plan. Once the research plan is approved the student may take the oral portion of the Qualifying Examination.

2.4.6. Ph.D. Qualifying Examination

All students in the MEAM Ph.D. program are required to pass a qualifying examination before advancement to candidacy for the Ph.D. degree. Students are expected to take and pass the qualifying examination within the first 2 years of graduate study unless they successfully petition the graduate group chair to take it at a specific later date. The examination committee is the same as the student's faculty committee, selected by the chair of the graduate group in consultation with other committee members, and with ultimate approval of the Dean of Graduate Studies. The members of each student's examination committee will select one member to chair the examination committee. The dates for the examination are arranged between the student, their graduate research advisor, and the examination committee chair.

The qualifying exam may be taken only after the student's written research proposal has been approved by the student's committee (Section 2.4.5). The exam will focus on the student's research proposal, but may cover any related field of mechanical sciences or engineering (including biology, chemistry, physics, fluid mechanics, thermodynamics, heat and mass transfer, controls, behavior of materials, electronics, and kinetics), and will typically last three hours. The committee conducts the examination, and immediately thereafter submits the results of the examination to Graduate Studies. Possible outcomes are:

1. Pass

2. Conditional pass (additional assignment or course may be required by the committee)

3. Fail, with an option to retake the examination once within a specified time period

The committee members should include in their evaluations of the student 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. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is "Conditional Pass" or "Fail", the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining its decision and must inform the student of its decision. In the case of a "Conditional Pass" decision, the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Chair of the graduate group. The Chair, in consultation with other members of the graduate group, will use these individual reports to adjudicate the result.

Upon recommendation of the examination committee, a student who has not passed the examination may repeat the qualifying examination after a preparation time of no more than six months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate advisor, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree.

2.4.7 Advancement to Candidacy

Upon successful completion of the examinations and approval of a research plan, 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 research advisor, 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.

2.4.8 Seminars

All students in the MEAM group are required to present an open technical seminar at least twice during their residence in the graduate group. The topic of the seminar 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 seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open presentation given as part of the Ph.D. defense may be counted as one of the required seminars.

2.4.9 Publication Requirement

The final confirmation of the quality of a PhD dissertation is the ability to publish the research results in a peer-reviewed journal. The research field may influence the timing and work required to publish research results, making it difficult to define the number of publications required for each dissertation. For this reason, whether a student has made sufficient progress for the PhD will ultimately be determined by the student's advisor and thesis committee. However, it is expected that the research project should be sufficiently complete to support publication of at least one full manuscript. The MEAM Executive Committee may determine if having simply submitted a manuscript is sufficient to warrant completion of the PhD requirements, although in most cases, acceptance of the manuscript by the journal will be expected (i.e. manuscript "in press" or "in print").

The publication requirement should encourage the student to view submission of manuscripts as the ultimate goal of any research project, and to teach the student how to organize research projects and write scientific manuscripts. The process of writing the manuscript will be undertaken with the assistance and guidance of the student's research adviser. Manuscripts should be available to the graduate committee for perusal at the time of the student's thesis defense.

The Executive Committee will treat exceptions to this rule on a case-by-case basis.

2.4.10 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 will serve as the basis for publication(s) in a peer-reviewed journal. 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 and abstract may be obtained from the Graduate Studies office.

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 are 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 date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination.

The Ph.D. final examination consists of an open seminar on the dissertation work 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A simple majority is required for a pass. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the graduate research advisor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies. All members of the degree committee must sign the final dissertation.

2.5 Time to Degree and Annual Evaluation of Progress

The MEAM Graduate Group places a nominal time limit of two years from entrance to completion of the M.S. and five years for completion of the Ph.D. Extensions beyond these limits can be permitted by the Executive Committee.

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. (For Ph.D. students these meetings occur each year after advancing to candidacy.) At least two members of the committee must be present. The committee will review the student's progress toward the degree during the past year and develop a timetable, mutually agreeable among student, graduate research advisor, 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 (Section III.B.)

2.6 Teaching and Research Assistantships and Stipends

Graduate students in the MEAM group are normally offered stipend support in the form of either Graduate Student Instructor positions (GSIs) or Research Assistantships (RAs). Students in their first semester of residence usually serve as GSIs for appropriate courses in the schools of Natural Sciences or Engineering. After the first semester, support may be offered through either a funding as a GSI or an RA in the graduate research advisor's laboratory or research group. GSI stipends are set by the schools while RA stipends are determined by the Graduate Group. Graduate students with external fellowships are still required to satisfy the one semester teaching requirement and will be paid by the school for teaching.

While every effort will be made to provide employment as a GSI or RA for all graduate students in residence, admission to graduate study carries no guarantee of financial support. Financial support for Masters Degree students will be addressed on a case-by-case basis.

3. Demand for the Program and Job Prospects

The MEAM program is expected to draw students from Mechanical, Aerospace, Electrical, Chemical and Bioengineering programs, as well as from Mathematics and Physics. The largest pool of applicants is expected to be from Mechanical Engineers interested in pursuing research beyond their undergraduate experiences. In 2000, there were 249 accredited programs in Mechanical Engineering, and 273 in Electrical Engineering, which produced around 13,000 degrees in ME and 12,500 degrees in EE. These two majors alone are responsible for more than 40% of the total number of engineering degrees awarded each year in the U.S. Although the ME program at UC Merced is in its first year, the number of applications for admission at the ME undergraduate program in AY 2007 is already responsible for 23% of the total number of applications for the School of Engineering. The number of applications for the Applied Mathematical Sciences program in AY 2007 accounts for 9% of the total number of applications in the School of Natural Sciences. As these two young programs grow, the demand for a graduate program in MEAM will too. In fact, Mechanical Engineers account for 15% of the Engineering workforce in the U.S., with more than 220,000 Mechanical Engineers current employed (http://www.bls.gov/oes/current/oes172141.htm). Four out of the five top paying metropolitan areas for Mechanical Engineers are located in the state of California (San Jose-Sunnyvale-Santa Clara; Vallejo-Fairfield; SLO-Paso Robles; and Oakland-Fremont-Hayward), and many of the jobs in these areas are available only to Mechanical Engineers with advanced degrees. The ability to produce MEAM graduates will be a direct measure of the success of the UC Merced campus, and its projected impact in the Central Valley.

Within the UC Merced campus, there is a very strong synergy between the MEAM and the Applied Math graduate programs in the sense that MEAM will be offering more advanced "applications" classes in Mechanical Sciences and Engineering instead of offering the usual Engineering Analysis sequence that most ME graduate programs offer. Conversely, MEAM would be offering classes that would serve both the MEAM students and the Applied Math students (depending on the research topic or grant, it is expected that faculty members from both research programs will enroll students in the program that better suits their students' needs).

Job prospects for MEAM graduates are excellent since advanced degrees in the field are rewarded with substantially better salaries and opportunities. The industry job market of Mechanical Engineers is one of the most reliable measures of growth in an economy. Advanced degrees in the field are well correlated with job security and also job satisfaction. MEAM graduates will find employment in industry, academia, national laboratories, and with research and government contractors. Healthy enrollments in all related graduate programs (see Table 1) in the University of California system suggest that there is ample student demand for the MEAM graduate program. Out of the nine undergraduate campus of the University of California, only UC Santa Cruz does not offer degrees in Mechanical Engineering. The other campuses offer a variety of ME-related graduate degrees.

The unique feature of UC Merced's MEAM program is the interdisciplinary nature of the program with its strong emphasis in mathematical and computational methods. In terms of research focus, the proposed MEAM program resembles more closely other successful programs in the U.S. (the Theoretical and Applied Mechanics program at University of Illinois, Urbana, or the Mechanical Engineering and Applied Mechanics at the University of Pennsylvania) and abroad (the Applied Mathematics and Theoretical Physics program at the University of Cambridge, England), than the more traditional, and also very successful, programs offered by the sister campuses of University of California system (see Table 1).

Table 1 – Sample Programs in ME related fields offered by the UC System

Campus	Undergraduate Major	Graduate Major
UCB	Mechanical	Mechanical
UCI	Mechanical and Aerospace	Mechanical and Aerospace
UCSB	Mechanical and Environmental	Mechanical and Environmental
UCSD	Mechanical and Aerospace	Mechanical and Aerospace
UCLA	Mechanical and Aerospace	Mechanical and Aerospace
UCD	Mechanical and Aeronautical	Mechanical and Aeronautical
UCR	Mechanical	Mechanical
UCM	Mechanical (School of Engineering) Applied Math (Natural Sciences) Physics (Natural Sciences)	Mechanical Engineering and Applied Mechanics

4. Faculty

The inaugural faculty members of the MEAM program are affiliated with the School of Engineering (SoE) and the School of Natural Sciences (NS):

1. Roland Winston, Professor of Engineering and Natural Sciences (Solar Energy, Particle Physics)
2. Gerardo Diaz, Assistant Professor of Engineering (Thermal Systems, Energy, Controls)
3. Carlos Coimbra, Associate Professor of Engineering (Memory-Intense Mechanical Systems, Fluids)
4. Michael Sprague, Assistant Professor of Natural Sciences (Applied Math, Hydroelasticity)
5. Francois Blanchette, Assistant Professor of Natural Sciences (Applied Math, Fluids, Sedimentation)
6. Stefano Carpin, Assistant Professor of Engineering (CSE, Robotics, Artificial Intelligence)
7. Marcelo Kallman, Assistant Professor of Engineering (CSE, Motion Planning, Geometric Modeling)
8. Ajay Gopinathan, Assistant Professor of Natural Sciences (Polymer Physics, Biophysics)
9. Jian Q. Sun, Professor of Engineering (Vibrations and Controls, Mechanical Systems)

All faculty members listed above have active research programs in some area of Mechanical Sciences and Engineering, and all of them publish regularly in traditional MEAM journals. This number of 9 initial faculty members is expected to grow substantially as UC Merced recruits more faculty to its ranks.

5. Courses

Below is a catalog description of sample graduate classes that we expect to offer in the coming years within the context of the MEAM program:

CORE

MEAM 201 Advanced Dynamics (4)
Lecture course on rigid-body dynamics. Topics include: dynamical systems; motion representation and constraints; Newtonian mechanics; Lagrangian mechanics; Hamilton's principle; stability analysis; introduction to multibody dynamics.

MEAM 202 Transport Phenomena (4)
Systematic analysis of fluid flow, heat transfer, and mass transfer phenomena.

SAMPLE MEAM ELECTIVES (not including AM and PHYS classes)

MEAM 203 Elasticity and Plasticity (3)
Fundamentals and general theorems of the linear theory of elasticity. Plasticity theory. Formulation of static and dynamic boundary value problems. Application to torsion, flexure, and bending. Creep. Plastic deformation.

MEAM 210 Linear Control Systems (3)
Concepts related to Feedback Control, State-Space Representation of Dynamic Systems, Dynamics of Linear Systems, Frequency-Domain Analysis, Controllability and Observability, Linear Observers, Compensator Design, Linear Quadratic Optimum Control.

MEAM 220 Continuum Mechanics (3)
Cartesian tensors in mechanics, coordinate transformations, analysis of stress and strain, principal values, invariants, equilibrium and compatibility equations, constitutive relations, field equations. Problems in elasticity. Computational Methods.

MEAM 221 Rheology (3)
Basic concepts (forces, displacements, stress, tensor, strain, etc.), linear and nonlinear elastic solids, linear viscous fluid, linear viscoelastic fluid and solid and certain topics in nonlinear viscoelastic behavior.

MEAM 233 Thermal Radiation (3)
Thermal radiation properties of gases, liquids, and solids; the calculation of radiant energy transfer in non-participating and participating media. Computational methods in radiation: DOM/DOT, Monte-Carlo method.

MEAM 251 Viscous Flows (3)
Formulation and properties of the Navier-Stokes equations; exact solutions; creeping flows; lubrication theory; laminar boundary layers; laminar stability, and transition to turbulence; turbulent boundary layers.

MEAM 252 Turbulence. (3)
Physics of turbulence. Summary of stability and transition. Description of turbulence phenomena. K41 Theory. Homogeneous turbulence, shear turbulence, rotating turbulence. Engineering models, LES and DNS.

We have faculty at UC Merced who could teach a good number of the sample classes above, and we are including in future hires in our strategic plan who could contribute to most of the other classes.

6. Resource Requirements

6.1 Faculty FTEs

The MEAM graduate group is represented in UCM's strategic planning process through allocations requested by the School of Engineering and the School of Natural Sciences for the Mechanical Engineering and Applied Math programs. At the 2006-2007 Strategic Plan, the following positions were requested:

6.1.1) Theoretical and Applied Mechanics (MEAM and Applied Math)

This position has been identified as an excellent complement between the Mechanical Engineering and Applied Mathematics programs. The areas of interest include, but are not limited to, computational mechanics, fluid dynamics, nonlinear systems, solid mechanics, continuum mechanics, rheology and tribology. The proposed position will benefit Mechanical Engineering undergraduate teaching needs in courses such as fluid mechanics, strength of materials, heat transfer and vibrations and controls. It will benefit the Applied Mathematics program in numerical methods I and II, Mathematical Modeling and a host of cross-listed graduate classes. The proposed position will also benefit strongly both graduate programs since the expectation is that the new hire will act as bridge between the AM and the MEAM graduate groups. The space needs are expected to be adequate for a junior level position in the dry lab area.

6.1.2) Complex and Intelligent Systems

Mechanical Engineering sees a need for an FTE working on research in one or more areas of the emerging domain of complexity analysis. This Senior position will add an important and strategic area of research in ME to broaden and strengthen its actual capabilities. This position will focus in complex and intelligent systems with an emphasis in cognitive and computational sciences applied to physical systems. Areas of interest include, but are not limited to: autonomous intelligent vehicles and systems, prognostics, self-repairing systems, low cost exploration machines, control of objects moving in formation, bio-mimetics, networks, and human-robot interaction. This includes macro and micro scale applications. Mechanical Engineering and the MEAM Graduate Group see such a hire as necessary to position the campus competitively in this promising area of research.

The undergraduate program in Mechanical Engineering will benefit with courses such as mechatronics (ME 142), vibration and controls (ME-140), and the capstone design (ME-170). The graduate program will benefit with courses in the particular areas of research of this FTE. Natural synergies with other programs include Applied Mathematics, Computer Science and Engineering,, Electrical Engineering, and Cognitive Science and Engineering. The space needs are expected to be adequate for a senior level position in the dry lab area.

6.1.3) Controls

This position will address combined research interests in two of the current engineering majors, i.e. Mechanical Engineering and Computer Science and Engineering. Once Electrical Engineering is launched in 2008, this position will also fulfill very well some of the teaching needs at the undergraduate and graduate levels in that major. This position will significantly benefit the undergraduate program in ME with courses such as mechatronics, vibration and controls, capstone design, kinematics and dynamics and several technical electives. This position will also contribute to the graduate program in a substantial way, since it represents a discipline that is common to both Mechanical and Electrical Engineering. The space needs are expected to be adequate for a junior level position in the dry lab area.

6.1.4) Multi-Scale Modeling

This position addresses teaching and research needs in BIOE, ME, MSE, EnvE; and could also fill similar needs in the School of Natural Sciences. It is proposed that the position be split between BIOE and ME, but it could also be considered as a split position between Engineering and Natural Sciences. This faculty member could teach undergraduate classes in bioengineering, mechanical engineering, materials engineering and graduate classes in the MEAM/ES/QSB/BEST graduate groups. The requested multiple-scale modeling position will be at junior level and the space need for this position is expected to be dry lab space around 400 sq ft..

With regard to BIOE and ENVE, the faculty member is expected to collaborate with current faculty members to link various research areas to study specific biological/ecological issues from the system point of view. This position will develop quantitative modeling and simulation methods that faithfully represent the complexity of biological/ecological systems based on experimental data and deal creatively with the hierarchical and nonlinear nature of living systems. It will integrative knowledge from various research fields to serve as a focal point for faculty members from NS, Env Eng and BIOE to collaborate on projects that cannot be addressed from the view point of a single discipline.

This position also addresses multiscale physics and modeling techniques pertinent to Mechanical Engineering and Applied Mechanics. It will complement the existing areas of research in the MEAM program and will have synergy with research currently being done in the schools of Engineering and Natural Sciences.

6.2 Library Acquisition

The UC Merced library has complete access for students and faculty to the combined collections of all of the University of California Libraries, which amount to more than 32M bound volumes, microfilm and sound recordings. Electronic access to archival journals is available to all UC faculty and students through the California Digital Library.

We expect the MEAM faculty to be engaged with the Library in order to guide acquisitions in the area. The current support for electronic submission is outstanding, with large compounded databases such as Science Direct and the ISI Web of Science. The traditional journals in field (Journal of Fluid Mechanics, Physics of Fluids, Physics of Plasmas, Journal of Vibrations and Control, IEEE Journals, AIAA Journals, ASME Journals, etc.) are available electronically from any computer on campus.

6.3 Computing

Several high performance computational clusters have been developed by the School of Natural Sciences and the School of Engineering at UC Merced, and are readily available for use of the MEAM faculty and students. Additional computational facilities dedicated to the MEAM graduate students will be available in SE 381.

6.4 Equipment

Computing facilities represent a large fraction of the needs for the MEAM program, but not all the equipment needed to progress in the field. In fact, we expect to hire a number of faculty members who will dedicate, at a minimum, a substantial portion of their research time to the pursuit of experimental results. Prof. Winston has a large solar power testing facility at the Castle facility (Atwater, CA), with more than 1 acre of field space for the development of solar concentrator technologies. The current Mechanical Engineering faculty members are engaged in the process of acquiring a small-scale wind tunnel and a water tank (flume) that will double as both undergraduate and graduate education facility. Profs. Coimbra and Sun will be requesting NSF funds for the development of a biomimetic flight stand equipped with a 2-D laser Doppler vibrometer to test the design and performance of micro-aerial vehicle wings. Prof. Coimbra is developing precision machining capability to prototype some of the GA-designs currently under development for the MAV wings. Prof. Diaz is developing a small scale AC controlling test stand to be housed in SE 381. It is expected that many other dedicated research facilities will be developed in the next few years. Equipment will be acquired with a combination of startup funds and federal and private research grants.

6.4 Space and Capital Facilities

The MEAM faculty is housed in the short-wing of the Science and Engineering I building of the UC Merced campus. The SE1 building consists of over 100,000 ASF with laboratory and office space for 92 faculty and laboratory and desk space for graduate and

postdoctoral researchers and collaborators. It also contains core facilities that are available for graduate students in both natural and engineering sciences. Rooms SE 381, 385 and 387 are designated space for the ME faculty members, which is sufficient to accommodate graduate students and research labs for the first years of the ME and MEAM programs, but will not be able to support the space needs in the long run. The current ME faculty is also working with the SoE Dean's office to request approximately 1,500sf of laboratory space at the Castle facility for the next few years, until the SE 2 building is available.

7. Graduate Student Support

The MEAM program has the ultimate goal of providing four years of stipend support to all its graduate students accepted into the doctoral program. Ideally, central support (such as IGERT-type assistantships) would be available for a student's first year in the program. Currently, there is a shortage of teaching assistants at UC Merced, and some faculty have taken advantage of this by placing students into these slots, while others are using their start-up funds to support student until grant monies become available. The surplus in TA positions is expected to disappear as other graduate programs develop at UC Merced.

In the year 2005-06, approximately $90,000 in fellowship money was made available for UC Merced across all disciplines (in the previous academic year there were no fellowships available). This level of support is obviously insufficient for a campus in start-up mode. We need to devise a way to make large block grant allocations available to our graduate students at UC Merced in order to assist recruitment and retention of UC-quality graduate students. Beyond early support, the MEAM faculty will assume responsibility for the stipend and fees of their graduate students through a combination of startup and research grant funds.

Funding aside, many faculty members at UC Merced feel that there are already supporting as many students as they can, given the high administrative and service overhead that is required in a startup campus. Space, support personnel and administrative support are more likely to be bottlenecks in the near future than the ability to support graduate students interested in the MEAM graduate program.

Appendix A

Mechanical Engineering and Applied Mechanics Bylaws

2006-2007 BYLAWS
Mechanical Engineering and Applied Mechanics
Administrative Home: Graduate Division

Article I: Objective

The graduate emphasis in Mechanical Engineering and Applied Mechanics (MEAM) is organized to establish and administer a program of instruction and research leading to M.S. and Ph.D. degrees in conformance with the regulations of the Graduate Council and the Division of Graduate Studies at the University of California, Merced. The Graduate Group is responsible for establishing standards and requirements for the M.S. and Ph.D. degrees and certifying satisfactory completion by candidates.

The Group function is to provide a focus for graduate training in Mechanical Engineering and Applied Mechanics by facilitating the research interactions of graduate students and faculty. Graduate study in MEAM is an interdisciplinary enterprise that draws on a variety of disciplines such as applied mathematics, computational sciences, bio-mimetics, mechatronics, materials sciences, energy systems, plectics, etc. Initial focal areas of the MEAM graduate group reflect the expertise of the current faculty (neural networks and adaptive control; thermal systems; fluid-structure dynamics; non-linear, fractional, variable-order and stochastic mechanics; bio-mechanics and ergonomics; computational methods in fluid mechanics, heat and mass transfer; etc), but additional areas will be pursued with the addition of new faculty to the group.

Article II: Membership

Membership shall be open to faculty who are actively involved in scientific inquiry and scholarship in the multidisciplinary field encompassed by the theoretical, applied and computational mechanical (including thermal) sciences and engineering. Membership may include affiliated members from other UC campuses and adjunct faculty from other institutions.

Members of the University faculty wishing to be appointed to the graduate faculty in the Group must submit a written request to the Chair indicating their interest in participating in the Group. This should be accompanied by a current CV. Materials will be evaluated by the Executive Committee for the appropriateness of the appointment to the MEAM graduate faculty. The Executive Committee will make a recommendation to the Group, and applicants will be admitted to the Group if their application receives a majority vote of the full Group.

Faculty will be expected to actively participate in the program. The faculty member is responsible for providing the Membership Committee with appropriate documentation of performance. Each member will be reviewed by the Committee every four years, and the Committee will make a recommendation to the Group for continuation or termination of the individual's membership. Termination of a current member will require a two-thirds vote of the full Group.

Article III: Organization and Administration

The Executive Committee will consist of a minimum of three members who will serve rotating terms of five years. The Group chair will serve as an *ex officio* member of the Committee. It will be the responsibility of the Executive Committee to prepare an annual slate of nominees that will be put before the membership for election to serve on the Executive Committee. Members can be re-elected and serve two consecutive five year terms but must sit out one election cycle before running for a third term. The Executive Committee will make appointments to the standing committees from the membership of the Group.

Article IV: Graduate Group Chair

The Executive Committee will name a nominating committee of three members who will solicit the names of nominees for the Group chair. The names of nominees indicating a willingness to serve will then be submitted to the Group's faculty and students for comments. All comments and votes will remain confidential. The Nominating Committee will forward two names to the Dean of Graduate Studies along with comments received on the nominees. The Committee may express a preference and should indicate the basis for the determination. After interviewing the nominees The Dean of Graduate Studies, in consultation with the candidate's Academic Dean, will appoint the Graduate Group Chair. The normal term of appointment will be three years.

The Chair's responsibilities are:

1) Call and preside at meetings of the Executive Committee
2) Preside over the Group meetings in the Fall and Spring semesters.
3) Appoint standing committees and their chairs in consultation with the Executive Committee
4) Act as the administrative liaison between the Group and the Division of Graduate Studies.

Article V: Committees

The Executive Committee and Graduate Group chair will appoint members to the following standing committees at the beginning of the Fall term. The Executive Committee and Chair may choose to not constitute a particular committee as a separate body, in which case the Executive committee and chair will assume the responsibilities of that committee. Committee formation and appointments will be reviewed on an annual basis.

1) <u>Executive Committee</u>
   The Executive Committee (EC) shall, in consultation with the faculty, determine and implement policy for the good of the Group, establish and guide the educational requirements of the Group, and represent the interests of the Group to University and other agencies. To ensure broad participation and input every effort will be made to have EC membership from at least two Schools. The EC will make appointments to the other committees and approve membership in the MEAM graduate Group.

2) Membership Committee
The Membership Committee will be responsible for reviewing applications from faculty who wish to be part of the Group. In addition, the Committee will review the membership of the Group every four years. The Membership committee will recommend approval or denials for membership to the EC.

3) Educational Policy Committee
The Committee on Educational Policy (EPC) is responsible for establishing and guiding the educational programs of the Group. The EPC will be formed by the Executive committee as needed and will periodically conduct reviews of the programs, including the five-year review. The EPC in consultation with the group faculty will determine changes in programmatic requirements of the MEAM graduate group.

4) Admissions Committee
The Admissions committee is charged with the development of recruiting materials for the Group, reviewing applications for admissions, making recommendations for admissions to the Dean of Graduate Studies, exploring graduate student support mechanisms, and allocating intramural financial assistance.

Article VI: Graduate Student Representative

A graduate student representative will be included in all deliberations that revolve around issues having to do with educational policy and curriculum. The Group chair will choose the student representative from the MEAM Graduate Group after soliciting all active graduate students in the program for their interest. Students will serve a one-year term and can be reselected for a second term.

Article VII: Initial Graduate Advisors

Initial Graduate Advisors who will advise students until such time as they have a graduate research advisor will be chosen from the Group faculty. These will be faculty members with a broad knowledge of the faculty research interests within the MEAM. These individuals will be responsible for the initial advising of graduate students, including dealing with coursework requirements and assisting students to identify research advisors matching their interests.

Article VIII: Meetings

The membership of the Group should meet once during the fall and spring semesters. The Group chair is responsible for calling all regular and special meetings of the membership. Faculty can request additional meetings.

Article IX: Quorum

Issues that require a vote need to have a quorum of at least 50% of the total membership participating in the voting. Voting may be done electronically so as to accommodate members who are off campus for extended period of time. A positive or negative decision requires a simple majority of the vote.

Article X: Order of Business

At all regular meetings the suggested order of business shall be as follows:

1) Reading of the minutes of the preceding meeting
2) Reports from the Chair of the Executive Committee
3) Reports from each of the Standing Committees
4) Old Business
5) New Business

Article XI: Amendments

Amendments to the By-Laws require approval by two-thirds of the voting members of the Group. Written notice of the proposed amendment shall be sent to each member at least five working days prior to the meeting at which the amendment is to be discussed. All amendments must also be submitted to Graduate Council for review and final approval.

University of California, Merced

Graduate Group in Physics and Chemistry

Policies and Procedures

2009–2010 (proposed)

SCOPE OF RESEARCH

Research in the Physics and Chemistry Graduate Group spans the traditional disciplines of chemistry and physics and related interdisciplinary fields.

GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to utilize the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of Graduate Studies 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 Council 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 TOEFL exam of 580 (paper version) or 92 (internet-based version). Students from non-English speaking countries will normally be interviewed by telephone by a member of the Admissions Committee 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 graduate adviser or 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 dismissed from the graduate program.

FACULTY COMMITTEES FOR ADVANCED DEGREES

The graduate adviser, normally in consultation with the student, the major professor 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 on these committees rests with the Dean of Graduate Studies.

Advanced degree committees in the Physics and Chemistry group normally consist of 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 adviser 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 adviser, a curriculum vitae and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Dean of Graduate Studies for review and approval.

All members of the committee must be in attendance for Ph.D. qualifying and final examinations. 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 graduate adviser 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 Graduate Studies.

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 Physics and Chemistry 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 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);
- 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 (Physical Chemistry and Organic Chemistry emphases only);
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

SELECTION OF A MAJOR PROFESSOR

The heart of the Physics and Chemistry Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a faculty research advisor (major professor) early during the second semester of study. Selection of a major professor must be approved by the graduate adviser and 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 Physics and Chemistry 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 physics, physical chemistry, and organic chemistry; each student should take the exam that most closely corresponds to his or her research area. 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

once each time it is offered, but 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 may be subject to dismissal.

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:

● Physics

The Physics courses offered include both core and elective courses. The current list:

Quantum mechanics I (core, PHYS 237)
Quantum mechanics II (PHYS 238)
Electrodynamics and Optics I (core, PHYS 210)
Classical Mechanics (PHYS 205)
Statistical Mechanics (core, PHYS 212)

The course requirements include completion of 3 core courses within the first 4 semesters, and 3 electives anytime within the duration of the PhD study. In addition, we require attending 4 semesters of PHYS 293, which is the Physics Seminar series.

The requirements along with a timeline are summarized here:

	1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR
Prelim Exam	Must be completed				
Core courses	PHYS 237, 210, 212 must be completed				
Candidacy		Advance to candidacy			
Electives	Can be completed at any time				
Seminar	Four semesters of Phys 293				

The electives include PHYS 238, PHYS 205 and any other PHYS 2xx courses which may be offered in the future. Courses offered by other graduate programs (Applied Math, QSB, BEST, etc.) may also be included in the list of electives. Any elective must be at least 3 units and we require at least one elective be a course outside the student's primary research area, which can be selected by discussion with the student's thesis advisor or the graduate group advisor for Physics.

A student may ask for postponement/extension of the timeline shown above but to do so will require the permission of the graduate group advisor for Physics.

If a student would like to attain a waiver for any of the courses above, the rules are:

1. No waiver will be granted unless the student has passed the preliminary exam.
2. For waivers regarding elective courses, a student can only ask for a waiver on one elective course. All core courses can be waived if competency is demonstrated.
3. For a waiver on any of the courses, the student will need to attain the waiver from the faculty member who taught the course most recently. The faculty member granting the waiver will only do so if the student can successfully complete an exam in the course. This exam can be given at any time at the faculty and student's convenience, any time of the year.
The final decision to grant the waiver will be taken by the Graduate Division.

Special circumstances for 2007 and 2008 admits: Graduate students admitted in Fall 2007 and Fall 2008 to the graduate program may substitute QM II (Phys 238) or Classical Mechanics (Phys 205) in place of one of the three core courses. This substitution will not be allowed for any admissions hereafter.

● Physical Chemistry
Quantum mechanics or quantum chemistry (CHEM 212 or PHYS 237)
Thermo/stat mech (CHEM 213 or PHYS 212)
Molecular spectroscopy (CHEM 231)
One graduate course elective (numbered 2xx and at least 3 units)
Four semesters of graduate seminar courses

● Organic Chemistry
Advanced organic synthesis (CHEM 200)
Reaction mechanisms (CHEM 201)
Two graduate course electives (numbered 2xx and at least 3 units each)
Four semesters of graduate seminar courses

Course electives must be regular graduate courses (not independent study). Courses offered by other graduate programs may be taken as electives but require approval of the major professor. 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 Physics and Chemistry 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 Graduate and Research Council 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 (three core courses for the Physics track). 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 Graduate Studies. 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 at least three months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate adviser, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree.

ADVANCEMENT TO CANDIDACY

Upon successful completion of the examinations, 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 adviser 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 Chemistry group are required to present an open technical seminar at least once each year. The topic of the seminar 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 seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open presentation given as part of the Ph.D. defense may be counted as one of the required seminars.

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 will serve as the basis for publication(s) in a peer-reviewed journal. 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 and abstract may be obtained from the Graduate Studies office.

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 date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination.

The Ph.D. final examination consists of an open seminar on the dissertation work 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 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. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies.

MASTER'S DEGREE

SIGNIFICANCE

Students are normally admitted to the graduate program in Physics and Chemistry 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 Physics and Chemistry group has established the following requirements for the M.S. degree. Two different tracks are recognized:

PLAN I

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least 20 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 12 semester hours must be from regular, letter-graded lecture and discussion courses, while the remaining 8 hours may be research or similar courses;
- 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 at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture or discussion courses, while the remaining 8 hours may be research or similar courses;
- Pass a comprehensive oral examination administered by the faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

TIME TO DEGREE AND ANNUAL EVALUATION OF GRADUATE STUDENT PROGRESS

The Physics and Chemistry 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 four members of the committee 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 will normally be supported as graduate TAs during their first two semesters in residence. After that, students will be supported as either TAs or GSRs depending on availability of TAships and the research advisor'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 research advisor. The conditions of appointment will be the same as in #3 and #4 below. Normally all students will be required to TA for at least one semester as long as a suitable TA position is available. TA experience at other institutions could satisfy this requirement.

3. Graduate students serving as GSRs during the academic year will be 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 will be no additional or reduced pay during break periods.

4. Graduate students serving as GSRs during the summer will be appointed at the step determined in #3 above. The appointment will be 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 research advisor, the graduate group chair, and the graduate dean.

University of California, Merced

Graduate Group in Quantitative and Systems Biology

Policies and Procedures

2008–2009

I. SCOPE OF RESEARCH

The life sciences are undergoing a vast and fundamental metamorphosis from a discipline based on qualitative observation and description, into a quantitative science based on comprehensive datasets and predictive models. The Quantitative and Systems Biology Graduate Group at UC Merced offers a multidisciplinary research and training program for masters degree and doctoral students who want to be at the forefront of this revolution the biological sciences. Research projects are available on topics ranging from intercellular signaling to computational molecular biology, and coursework will provide a background in the tools of modern biology, including computational biology, genomics and advanced instrumentation. The graduate group will offer opportunities for students interested in multidisciplinary projects at the interface between biology, computer science, and bioengineering.

II. GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to utilize the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of Graduate Studies makes final decisions on admission.

II. A. APPLICATION DEADLINES FOR ADMISSION

The deadline for receipt of applications is January 15. Normally applications will be accepted for Fall semester only, enrollment in other semesters will be considered on an individual basis, with applications due no later than seven months prior to the beginning of the semester when the student would like to begin graduate studies. Applicants are encouraged to contact individual faculty members to discuss their research interests before applying for graduate study.

II.B. 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;
* 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) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

Applicants are encouraged to contact individual faculty members to discuss their research interests before submitting a full application.

II.C. ADMISSION CRITERIA

The minimum requirement for graduate admission to UCM is a bachelor's degree with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum will be waived only under circumstances where the applicant has demonstrated strong academic skills subsequent to their undergraduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Each academically qualified student will also have a telephone or in-person interview with one or more QSB faculty members. Finally, the match of the candidate's skills and interests to QSB research programs will be considered. For this reason applicants are encouraged to contact QSB faculty before applying.

III. GENERAL REQUIREMENTS FOR ADVANCED DEGREES

III.A. RESIDENCY

In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. M.S. students must be registered as a full- time student for at least one semester before advancement to candidacy. M.S. students must be in residency for at least one semester after advancement to candidacy before conferral of the degree. For the purposes of determining residency, only the Fall and Spring semester will be counted; however, the summer semester may be counted in evaluating students on academic probation. Residency is established by satisfactory completion of at least 12 units of graduate coursework (including research) per term. Ordinarily, a graduate student shall not receive credit for more than 12 units of graduate courses in any semester. The QSB graduate group only accepts full time students. Exceptions will only be granted for students in the non-thesis Masters Degree program (Section V.B.) with the permission of the graduate group Chair, in consultation with the Executive Committee.

III.B. 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 graduate advisor or faculty committee, will be placed on academic probation. The student will then be allowed a maximum of one semester to make up the deficiencies and be returned to good academic standing (beyond the semester they go on probation). Otherwise, the student will be dismissed from the graduate program.

Specific scholarship requirements are as follows:

1. Only courses in the 100 and 200 series in which the student receives grades of "A", "B", or "S" may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a "C" or "D" or lower cannot be used to satisfy the unit requirement for the degree but will count in determining the grade point average.

2. Candidates must maintain an average of at least three grade points per unit in all upper division and graduate courses elected during their residence as graduate students at the University of California. Students must maintain an average grade point of 3.0 for advancement to candidacy and conferral of the degree.

3. Courses graded "S/U" will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their graduate research advisor.

In the event that the adviser feels that a student is not making adequate progress in their research or is encountering other serious difficulties in their graduate studies, the adviser will notify the student in writing describing this concern and spelling out specific actions and timelines for improvement. If the progress continues to be inadequate, the adviser will arrange a meeting with the QSB Executive Committee to review the case and recommend future action. The outcome of this meeting will be either a memo to the student requesting additional corrective action or a recommendation that the student be dismissed from the QSB graduate group. The student will be notified in writing of this decision. In the event of dismissal, the student's advisor and the QSB Chair will write a memo the Graduate Dean describing the reasons for the dismissal.

If a graduate student is having difficulties in their graduate studies that they cannot resolve with the assistance of their graduate adviser, they may bring this up with the other members of their graduate committee or the QSB Chair who will work to resolve the issues with the adviser. Any formal grievance processes will be handled by the Graduate Division.

III.C. FACULTY COMMITTEES FOR ADVANCED DEGREES

All students in the QSB graduate group must have a graduate research advisor and committee. The student's graduate research advisor (see section IV.C.), normally in consultation with the student, the graduate group and other 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 on these committees rests with the Dean of Graduate Studies.

Advanced degree committees in the Quantitative and Systems Biology group typically consist of three members, although additional committee members are permitted if warranted by the student's research project. One is the student's graduate research advisor and the two or more others are UC Merced faculty members in the group (one of whom is appointed as Committee Chair). Under some circumstances one of the committee members can be a UC Merced faculty member from outside the group or 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 research 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 vita and a letter from the proposed appointee indicating a willingness to serve must be submitted to the Chair of the Quantitative and Systems Biology graduate group for review and approval by the Executive Committee.

All members of the committee must be in attendance for Ph.D. qualifying examinations and thesis defense. 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 graduate advisor in consultation with the student should recommend a new committee member, giving the reason for the change. The change must be approved by the Chair of the Quantitative and Systems Biology graduate group with consultation form the Executive Committee.

IV. DOCTORAL DEGREE

IV.A. SIGNIFICANCE

The Doctor of Philosophy degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study.

IV.B. REQUIREMENTS

The Quantitative and Systems Biology graduate group has established the following requirements for the Ph.D. degree. Students must:

- Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced;
- Earn a passing grade in at least four graduate courses of at least three units (exclusive of research) (see section IV.D);
- Complete all graduate courses with a letter grade of at least "B";
- Serve as a Graduate Student Instructor (GSI) for at least one semester;
- Pass a qualifying oral exam (see section IV.F.)
- Present an open technical seminar at least twice while in residence; (see section IV.H)
- Publish at least one scientific paper in the peer-reviewed literature (see section IV.I.);
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field. (see section IV.J.)

IV.C. SELECTION OF A GRADUATE RESEARCH ADVISOR

The heart of the Quantitative and Systems Biology Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. To this end, each student should discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a graduate research advisor early during the first year of study. Selection of a graduate research advisor must be approved by the graduate group and must occur before the student's faculty committee can be constituted. The student and the graduate research advisor 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 graduate research advisor must be a member of the Quantitative and Systems Biology group. Students will be assigned an initial advisor when they first enroll, unless the student has already chosen an advisor.

IV.D. COURSEWORK REQUIREMENTS

All graduate students in the Quantitative and Systems Biology group are required to take a two semester course, Current Topics in Quantitative and Systems Biology (QSB 290) that exposes them to current, cutting-edge research directions in the field. This is a 3-unit per semester course consisting of three hours of discussion per week and significant out-of-class reading and study. The course format emphasizes student-led presentation, analysis, and discussion of reading assignments from the current and recent scientific literature.

All students in the group must also successfully complete (grade of B or better) at least two additional graduate courses (courses numbered 200-299 and worth at least three units each) exclusive of research (QSB 295) that are appropriate to the student's research area. Suggested courses include Bioinformatics and Computational Biology, Biophysics and Proteomics Laboratory, Genomic Biology, Cell Signaling and Networks, Developmental Biology, and Immunology. Other graduate-level courses appropriate to the student's specific field of research, including Directed Independent Study (QSB299) may be used to meet the two-course minimum requirement with consent of the student's faculty committee. Normally these

courses should be taken during the first year of graduate study. 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 student's graduate research advisor.

IV.E. RESEARCH PROPOSAL

Before the qualifying exam, the student will provide to the degree committee a written document 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 format of the research proposal will be determined by the student in consultation with their adviser and committee; however the proposal must follow the format of a research proposal to a major funding agency in the student's area of research. The committee will review this document with the student and determine if the student has outlined a project that is appropriate for a Ph.D. If not, the student is given a month to rewrite the research plan. Once the research plan is approved the student may take the oral portion of the Qualifying Examination.

IV.F. PH.D. QUALIFYING EXAMINATION

All students in the Quantitative and Systems Biology Ph.D. program are required to pass a 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 graduate group chair to take it at a specific later date. Students entering the Ph.D. program with a M.S. degree may request to take their qualifying exam during their first year, provided their graduate research committee approves. The examination committee is the same as the student's faculty committee except that the graduate research advisor is replaced by another member of the group, selected by the chair of the graduate group in consultation with other members. The members of each student's examination committee will select one member to chair the examination committee. The dates for the examination are arranged between the student, their graduate research advisor, and the examination committee chair.

The qualifying exam may be taken only after the student's written research proposal has been approved by the student's committee (Section IV.E.). The exam will focus on the student's research proposal, but may cover any related field of science, and will typically last three hours. The committee conducts the examination, and immediately thereafter submits the results of the examination to Graduate Studies. Possible outcomes are:

1. Pass (conditions may <u>not</u> be appended to a pass decision)

2. Not passed, with an option to retake the examination within a specified time period, or to satisfy specific other requirements

3. Fail

The committee members should include in their evaluations of the student 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. The committee should strive to reach a unanimous decision. If a unanimous decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is "Not Pass" or "Fail", the chairperson of the committee must include in a report a specific statement, which may include a minority report, explaining its decision and must inform the student of its decision. In the case of a "Not Pass" decision, the committee must include in its report a further statement of its terms and inform the student of those terms. In those cases when it is not possible for the members to resolve their differences, the student should be informed of the nature of those differences and each member should submit a detailed assessment of the student's performance to the Chair of the graduate group. The Chair, in consultation with other members of the graduate group, will use these individual reports to adjudicate the result.

Upon recommendation of the examination committee, a student who has not passed the examination may repeat the qualifying examination after a preparation time of no more than six months. The examination must be held by the same committee except that members may be replaced, with the approval of the graduate advisor, for cause such as extended absence from the campus. Failure to pass the examination on the second attempt means that the student is subject to disqualification from further study for the doctoral degree. After a second examination, a vote of NOT PASS is unacceptable; only PASS or FAIL is recognized by the Dean of Graduate Studies.

IV.G. ADVANCEMENT TO CANDIDACY

Upon successful completion of the examinations and approval of a research plan, 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 research, 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.

IV.H. SEMINARS

All students in the Quantitative and Systems Biology group are required to present an open technical seminar at least twice during their residence in the graduate group. The topic of the seminar 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 seminar may be presented as part of a regular seminar series or, if necessary, as a special seminar. The open presentation given as part of the Ph.D. defense may be counted as one of the required seminars.

IV.I. PUBLICATION REQUIREMENT

The final confirmation of the quality of a PhD dissertation is the ability to publish the research results in a peer-reviewed journal. The research field may influence the timing and work required to publish research results, making it difficult to define the number of publications required for each dissertation. For this reason, whether a student has made sufficient progress for the PhD will ultimately be determined by the student's advisor and thesis committee. However, it is expected that the research project should be sufficiently complete to support publication of at least one full manuscript. The QSB Executive Committee may determine if having simply submitted a manuscript is sufficient to warrant completion of the PhD requirements, although in most cases, acceptance of the manuscript by the journal will be expected (i.e. manuscript "in press" or "in print").

The publication requirement should encourage the student to view submission of manuscripts as the ultimate goal of any research project, and to teach the student how to organize research projects and write scientific manuscripts. The process of writing the manuscript will be undertaken with the assistance and guidance of the student's research adviser. Manuscripts should be presented to the graduate committee for examination and approval at the time of the student's thesis defense.

IV.J. 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 will serve as the basis for publication(s) in a peer-reviewed journal. 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 and abstract may be obtained from the Graduate Studies office.

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 are 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 date must be reported to the Dean of Graduate Studies, and one copy of the dissertation filed, no later than three weeks before the proposed date of the final examination.

The Ph.D. final examination consists of an open seminar on the dissertation work 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 written dissertation and the student's performance on the exam are of satisfactory quality to earn a University of California Ph.D. degree. A simple majority is required for a pass. Members of the committee may vote to make passing the exam contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the graduate research advisor, who will be responsible for approving the final version of the dissertation that is submitted to Graduate Studies. All members of the degree committee must sign the final dissertation.

V. MASTER'S DEGREE

V.A. SIGNIFICANCE

Students may be admitted to the graduate program in Quantitative and Systems Biology to work towards a Masters Degree (M.S.). Additionally, a Ph.D. student who has been in residence for at least two semesters, is in good academic standing, and has completed at least three of the core courses 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.

V.B. REQUIREMENTS

The Quantitative and Systems Biology group has established the following requirements for the M.S. degree. Each M.S. student has a committee with at least three members (see description for Doctoral committees above), and students writing a masters thesis have a graduate research advisor. Two different tracks are recognized:

PLAN I

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least three of the group's graduate courses with a letter grade of at least "B";
- Complete at least 20 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 12 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining 8 hours may be research or similar courses;
- Prepare an acceptable thesis describing original research in the field and successfully defend thesis to thesis committee.

PLAN II

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least four of the group's graduate courses with a letter grade of at least "B";
- Complete at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture courses (including the core courses), while the remaining 8 hours may be research or similar courses;
- Pass a comprehensive qualifying oral examination administered by the faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

V.C. FIFTH YEAR M.S. IN BIOLOGICAL SCIENCES

The Quantitative and Systems Biology Graduate Group offers undergraduate students in the UC Merced Biological Sciences and Human Biology degree programs the opportunity to continue study beyond their bachelor's degree to achieve a separate M.S. degree. This degree requires at least two additional semesters of full-time academic residence at UC Merced beyond completion of all requirements for the B.S. degree. Students accepted for the combined fifth year M.S. degree may begin taking graduate courses and research as soon as they are approved for future admission into the M.S. program. Students interested in the Fifth Year M.S. degree program should submit an application to the Dean of Natural Sciences and the Dean for Graduate Affairs. Students may begin M.S. studies in either the Fall or Spring Semester. The application deadline is January 5 for the Fall semester and July 1 for the Spring semester. Candidates for the Fifth Year M.S. program may choose either Plan I or Plan II described above.

VI. TIME TO DEGREE AND ANNUAL EVALUATION OF GRADUATE STUDENT PROGRESS

The Quantitative and Systems Biology Graduate Group places a nominal time limit of two years from entrance to completion of the M.S. and five years for completion of the Ph.D. Extensions beyond these limits can be permitted by the Chair of the Quantitative and Systems Biology Graduate Group in consultation with the Executive Committee. Ph.D. students entering with a M.S. Degree have a nominal time limit of four 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. (For Ph.D. students these meetings occur each year after advancing to candidacy.) At least two members of the committee 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, graduate research advisor, 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 (Section III.B.)

VII. TEACHING AND RESEARCH ASSISTANTSHIPS AND STIPENDS

Graduate students in the Quantitative and Systems Biology group are normally offered stipend support in the form of either Graduate Student Instructor positions (GSIs) or Research Assistantships (RAs). Students in their first semester of residence usually serve as GSIs for appropriate courses in the schools of Natural Sciences or Engineering. After the first semester, support may be offered through either a funding as a GSI or an RA in the graduate research advisor's laboratory. GSI stipends are set by the schools while RA stipends are determined by the Graduate Group. Graduate students with external fellowships are still required to satisfy the one semester teaching requirement and will be paid by the school for teaching.

While every effort will be made to provide employment as a GSI or RA for all graduate students in residence, admission to graduate study carries no guarantee of financial support. Financial support for Masters Degree students will be addressed on a case-by-case basis.

Memo

To: Graduate Research Council

From: Social and Cognitive Sciences Graduate Group

CC:

Date: 4/15/2008

Re: Response to feedback by GRC on SCS Graduate Group regulations

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Below please find our responses to the comments provided by the GRC. We appreciate the helpful feedback, and hope that our formal procedures can now be approved.

- GRC would like to know the nature of the changes made to the original version of the regulations

Before SCS had graduate students, in 2004-2005, GRC approved regulations for a psychology program based in SCS (see attached). These regulations did not cover all the disciplines within SCS, and in other ways the growth of the SCS graduate group (e.g., course offerings) has differed from what was written before opening day. Hence, the regulations submitted to GRC are needed to cover the whole SCS graduate group, and to formalize our procedures. In writing these regulations, we used the latest version of the Graduate Advisor's Handbook as a starting point, rather than the 2004-2005 SCS regulations.

- Course requirements for the Ph.D. degree are not included in the document.

The SCS Graduate Group consists of quite varied disciplinary (e.g., psychology, economics, political science) and interdisciplinary (cognitive science, public policy) areas. A core set of courses cannot be specified that are meaningful across all areas. Indeed, the expectations for amount of coursework differ among areas, e.g., a new graduate student in psychology or cognitive science would likely start a research project in the first year, whereas in other fields, more coursework would be expected in the first year. In addition, about half of our Ph.D. students have already done graduate level coursework elsewhere, and indeed in economics we have only admitted graduate students who have done the needed coursework elsewhere. Hence, there are no course requirements for the Ph.D. degree in the SCS Graduate Group that apply to <u>every</u> student. Rather, graduate study in the SCS Graduate Group is conducted under the supervision of recognized faculty groups in these areas, which in turn specify the

courses appropriate for an area. Progress in completing appropriate course work is evaluated for each student by his/her Faculty Advisor and Faculty Advisory Committee (see Sect. 3) biannually and by his/her Candidacy Committee when advancement to candidacy is evaluated. In this way, the SCS is very much in the spirit of an individualized graduate program. Moreover, we believe that the current structure of SCS helps to incubate nascent, more focused graduate groups that we expect will spin off soon and go up for CCGA approval.

- Page 7 of the document, under Plan I: "Complete at least three of the SCS Group's graduate courses with a substantive emphasis". GRC would like some clarification as to what is a "substantive emphasis"

The intent was to formulate a statement that specified that credits accumulated for research does not count, as now specified.

- Page 8: under Advancement to Candidacy, first sentence: "All graduate students are considered resident graduates, not candidates for a degree, unless admitted to candidacy by the Graduate and Research Council […]". Please replace "Graduate and Research Council" by "Graduate Division". The GRC does not admit students to candidacy.

This has been done.

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SCS Graduate Group Ph.D. Program Regulations

1. Admissions

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to utilize the on-line application to streamline the process. It is important to identify already in the application one or more faculty members whose research interests match well with those the applicant would like to pursue. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Studies; the Dean of Graduate Studies makes final decisions on admission.

1.1. Application Deadlines for Admission

The deadline for receipt of applications is January 15. Normally applications will be accepted for Fall semester only, enrollment in other semesters will be considered on an individual basis. Applicants are encouraged to contact individual faculty members to discuss their research interests before applying for graduate study.

1.2. 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;
- 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) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

1.3. Admission Criteria

The minimum requirement for graduate admission to UCM is a bachelor's degree, with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum

will be waived only under circumstances where the applicant has demonstrated strong academic skills preparing them for graduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Finally, the match of the candidate's skills and interests to SCS research programs will be considered. For this reason applicants are encouraged to contact SCS faculty before applying.

2. Student Advising and Mentoring

The heart of the Social and Cognitive Sciences Graduate Group Ph.D. program is for the enrolled students to develop the competencies required to become independent researchers who are able to contribute significant new knowledge. The primary demonstration of these competences to conduct independent research is the completion of a piece of original research in the form of an approved Doctoral Dissertation. This development of each student is led by a designated Faculty Advisor, who serves as the student's mentor. Additional mentoring and/or guidance is provided by members of the student's Faculty Advisory Committee initially and later by the Dissertation Committee. It is imperative therefore that a productive collaboration is maintained throughout graduate studies with one or more faculty mentors for a student to be able to progress towards earning the Ph.D. degree.

SCS faculty members have organized themselves into several disciplinary and interdisciplinary groups referred to as tracks. Although all SCS students follow the policies in this document, the tracks provide additional guidance to students regarding the structure of a graduate education program in a more focused area of study. From the student's point of view, the Faculty Advisory Committee, Candidacy Committee, and Dissertation Committee will be largely comprised of faculty in a particular track, and hence these faculty will be directly involved in setting detailed expectations for progress, monitoring progress, setting detailed expectations for Master's degrees, Candidacy Exam, candidacy, and the Doctoral Dissertation itself, and evaluating the accomplishment of these achievements.

2.1. Faculty Advisor

Usually, the student is admitted to the SCS Graduate Group with the intention to be mentored by a named Faculty Advisor. It is expected the student will immediately upon entry into the SCS Graduate Program begin engagement in graduate study under the guidance of a faculty member. At the same time, the student is encouraged as early as possible to explore research interests and possible focus for the Dissertation with a range of faculty within, and possible outside, his/her identified track.

The Faculty Advisor must be a member of the SCS Graduate Group. The student's selection is approved by the SCS Graduate Group Chair. The student and the Faculty Advisor will interact intensely and together develop research projects that will lead to a focus to be pursued in the student's Doctoral Dissertation. Research will typically occupy the majority of the student's time in the program from the start, but faculty in each track can establish the optimal role of research at different points in the program. The Faculty Advisor, in the role of a mentor, plans strategies that will support the development of required competencies and provides ongoing informal feedback regarding the student's progress. In addition, the Faculty Advisor conducts a formal evaluation of the student's progress in the program at least bi-annually (see Sect. 3.1). Therefore each graduate student must have a recognized Faculty Advisor at all times who agrees to take on this important role. A match in terms of research interests with a Faculty Advisor is crucial for progress towards the degree.

2.2. Changing Faculty Advisor

The faculty recognizes that under certain circumstances there may be valid reasons for a graduate student to want to change Faculty Advisor. Examples may include lack of funding, personality conflict, changes in research interests, and resignation of the Faculty Advisor from the faculty. If a student requests change in Faculty Advisor, the faculty members of the track and the SCS Graduate Group are expected to ensure a smooth transition that takes into account the needs of both the student and the faculty involved..

However, the student must understand that to the extent that assistantships or fellowships are connected to a specific faculty member, a change of advisor may result in a change in financial support. Likewise, a change in research direction that is likely to result from a change of Faculty Advisor may result in increased time required to complete the Ph.D. degree. Therefore, it is often useful for a student contemplating a change in Faculty Advisor to discuss this informally with one or more impartial faculty member, such as other faculty in the track and the SCS Graduate Group Chair. When a student decides a change in Faculty Advisor is in his/her best interest, he/she must obtain a clear commitment by the new Faculty Advisor to take on this responsibility.

The student then needs to inform the former Faculty Advisor and the SCS Graduate Group Chair of this change.

2.3. Faculty Advisory Committee

Additional mentoring and/or guidance of a student are provided by a Faculty Advisory Committee, which is chaired by the Faculty Advisor. This Committee is established jointly by the Faculty Advisor and student, prior to the end of the spring semester of the first year in the program. The student and members of this Committee can meet as often as is desired to provide the appropriate mentoring and/or guidance. This Committee is also charged with formally evaluating the student's progress in the graduate program at least annually, following the completion of each spring semester (see Sect. 3.1).

The Faculty Advisory Committee must include at least three faculty members, including the Faculty Advisor. The track may provide additional specification of the constitution and role of the Faculty Advisory Committee. For example, it may be replaced by the Dissertation Committee once that has been formed; or the track faculty may act as a committee of the whole for the students in the track. Regardless, a student will have a committee of faculty providing mentoring and/or guidance and conducting formal evaluations throughout the completion of the SCS Graduate Group Ph.D. program.

3. Monitoring of Student Progress

A graduate student is expected to maintain satisfactory progress toward the academic objectives defined by the SCS Graduate Group, and in accordance with policies of the Graduate Council and the University. The SCS Graduate Group places a nominal time limit of two years from entrance to completion of a Master's Degree, if applicable, and six years for completion of the Ph.D.. Extensions beyond these limits can be permitted by petition of the Faculty Advisor, approval of the Faculty Advisor Committee, and approval of the SCS Graduate Group Chair.

It is important that the performance of the student in all relevant areas be assessed each semester to confirm satisfactory progress and indicate, when relevant, what improvements are needed. Therefore, each student in the SCS Graduate Group shall be evaluated after each semester (fall and spring) in regard to progress in coursework and research, teaching, and other professional skills deemed important by the faculty of the relevant track.

3.1. Bi-annual Faculty Review

To this end, the student prepares a cumulative Progress Report at the end of each semester (a model progress report is in Attachment A). The Progress Report completed at the end of the fall semester can be reviewed by the Faculty Advisor alone, although the Faculty Advisor or student may request that the review be conducted by the student's Faculty Advisory Committee. The Progress Report completed at the end of the spring semester must be reviewed by the student's Faculty Advisory Committee, which is chaired by the Faculty Advisor. Bi-annual Faculty Review continues until the student has completed an approved Doctoral Dissertation.

A meeting is convened with the student and faculty member(s) conducting the review prior to the beginning of the following semester, in which feedback is provided to the student both orally and in writing (Attachment A also includes a model faculty evaluation report). As part of each review, a determination must be made whether the student's progress on the whole is Satisfactory or Unsatisfactory. This determination is then clearly communicated in written form and signed by the faculty member(s) who completed the review. The student also signs the evaluation indicating understanding of the evaluation and is given one copy. The original is placed in the student's official file.

3.2. Satisfactory Progress

Satisfactory progress is determined on the basis of both the student's recent academic record and overall performance. The *Graduate Advisor Handbook* (Sect. IV.A.1) outlines some criteria for Satisfactory Progress, mainly focused on coursework, but each track can specify additional criteria. These criteria are communicated clearly to the graduate students upon entry in the program and at various points thereafter by the student's Faculty Advisor. These criteria also provide the framework for the Bi-annual Faculty Evaluations.

3.3. Unsatisfactory Progress

Unsatisfactory academic progress is *in part* determined on the basis of explicit requirements, including those outlined in the *Graduate Advisor Handbook* (Sect. IV.A.2.a) and reproduced here.

- An overall grade point average below 3.0; or
- A grade point average below 3.0 in two successive semesters; or
- Fewer than 8 units completed and applicable toward the advanced degree requirements in the last two semesters; or
- Failure to complete required courses or examinations satisfactorily within the period specified by the graduate program; or
- Failure to pass Qualifying or Dissertation Final Examination in two attempts; or

- Failure to progress academically within the Normal Time to Degree framework specified for the student's graduate program; or
- The appropriate faculty committee's evaluation that there has not been satisfactory progress toward completion of the thesis or dissertation.

Note however, that the professional judgment of the faculty assigned the role to evaluate the student, upon review of all graduate work undertaken by that student, *is paramount*.

Communication of Unsatisfactory Progress

It is important to give students an early warning of potentially unsatisfactory progress. The bi-annual review specified above is a minimum. In addition, Faculty Advisors are encouraged to be direct in communicating orally, and in writing as necessary, with students demonstrating difficulties as soon as possible and on a continual basis. For example, course instructors are encouraged to engage in this communication as well, and to inform the Faculty Advisor when a student is experiencing difficulties during a course.

It is useful for the Faculty Advisor to keep a written record of all such communications. When notices of potential unsatisfactory progress are provided in writing to the student, a copy should also be retained in the SCS Graduate Group files and another copy sent to the Graduate Dean. The written communication should include specific details on areas that require improvement, provide an outline for future expectations of academic progress, and set meeting dates to maintain continuity in advisement. The purpose of the notice of potential unsatisfactory progress is to provide the student with a reasonable period of time (usually at least one academic semester) in which to make the necessary improvement in their academic status, and successfully complete their graduate study.

In the case of a formal determination of Unsatisfactory Progress following a bi-annual faculty review, criteria must be specified in writing detailing what the student will need to achieve to be removed from this status and the time table for doing so. This is included in the written feedback provided to the student as part of the formal review. Whenever a student has been deemed to make Unsatisfactory Progress, the student's whole Faculty Committee needs to review progress at the end of the subsequent semester and determine status at that time. The professional judgment of the Faculty Committee, upon review of all graduate work undertaken by that student, *is paramount* in determining whether the student can or cannot be removed from Unsatisfactory Progress status. While it is expected that the Faculty Advisor will communicate with the student when in this status to provide guidance and feedback on efforts to meet the specified criteria, it is ultimately the student's responsibility to achieve progress that can be deemed Satisfactory Progress.

3.4. Completion of a Terminal Master's Degree

A student admitted for the Ph.D. degree who is deemed to make Unsatisfactory Progress may be judged by the Faculty Advisory Committee not to be fit for Ph.D. studies. Such a student may be offered the opportunity to terminate the program following completion of requirements for the Optional Master's Degree (see Sect. 4). The student in that case must be notified in writing by the SCS Graduate Group Chair of this decision. A copy of the letter must be sent to the Graduate Dean. Likewise, a doctoral student may choose to leave the program with a Master's Degree only.

3.5. Academic Disqualification

Failure to meet specified criteria by the indicated time table following the determination of Unsatisfactory Progress will result in Academic Disqualification, as described in the *Graduate Advisor Handbook* (Sect. IV.A.2.a). The student's Faculty Advisory Committee makes this recommendation, after final review of the student's progress, to the SCS Graduate Group Chair, who petitions the Graduate Dean. Academic disqualification can only be officially communicated in writing by the Graduate Dean after consultation with the student's Faculty Committee and the SCS Graduate Group Chair.

Upon recommendation of Academic Disqualification, the student's academic record is reviewed carefully by the Graduate Dean in consultation with the student's Faculty Advisor. Unless there are indications of procedural error or other substantive mitigating factors to explain the student's unsatisfactory record, the Graduate Dean will notify the student of the impending action in writing, and will provide a reasonable opportunity for the student to alert the Graduate Dean as to erroneous information, to submit other relevant information or comments in writing, or to request a second review of their academic performance.

Important Due Process Requirements that must be followed and procedures for Student Appeal of Academic Disqualification are specified in the *Graduate Advisor Handbook* (Sect. IV.A.3.a-b)

4. Optional Master's Degree

Students are admitted to graduate studies in SCS Graduate Group with the intention of earning the Ph.D. Degree. The Master's Degree therefore is not required of a student working towards the Ph.D. However, a Ph.D. student who has been in residence for at least two semesters, has pursued graduate-level coursework for at least two semesters, and is in good academic standing, may apply for an Optional Master's Degree, which may be terminal or non-terminal. It is generally expected that the Master' Degree be

earned prior to Advancement to Candidacy (see Sect. 5). The recipient of a Master'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. Students are encouraged to discuss with their Faculty Advisor, Faculty Advisory Committee, and other faculty members in the track, the disciplinary expectations with regard to Master's Degrees and the requirements for obtaining such a degree. Courses applied toward a previous Master's or Ph.D. degree may not be applied toward this Master's Degree. Students who wish to apply courses completed in another graduate program that were not applied toward a previous degree must follow procedures outlined in the *Graduate Advisors Handbook* (Sect VII.G).

4.1. Requirements

The SCS Graduate Group has established the following requirements for the Master's degree. Each student has a Masters Degree committee with at least three members (see description for Doctoral committee below), including the Faculty Advisor. This Committee approves the student's specific plan for the Masters Degree, including courses and other requirements. There are two general options for the Masters Degree:

PLAN I

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least three of the SCS Group's graduate courses not including those providing credit for research;
- Complete at least 20 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 12 semester hours must be from regular, letter-graded lecture courses (including the SCS Group's graduate courses), while the remaining 8 hours may be research or similar courses;
- Prepare an acceptable thesis describing original research in the field and successfully defend thesis to Masters Degree committee.

PLAN II

- Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced;
- Complete at least four of the SCS Group's graduate courses not including those providing credit for research, with a letter grade of at least "B";
- Complete at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture courses, while the remaining 8 hours may be research or similar courses;

- Pass a comprehensive qualifying examination administered by the faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

5. Advancement to Candidacy

All graduate students are considered resident graduates, not candidates for a degree, unless admitted to candidacy by the Graduate Division after formal application. A student advances to candidacy for the Ph.D. upon successfully demonstrating a high level of scholarship in full-time study (12 units minimum per semester) at the Ph.D. level, and upon completing all preparatory work and demonstrating readiness to proceed to the dissertation phase.

Graduate students are nominated for advancement to candidacy for the Ph.D. degree by the SCS Graduate Group. Students are admitted to candidacy if they pass by unanimous vote a Candidacy Examination administered by a Candidacy Committee and meet other requirements set forth by the Faculty Advisory Committee and the SCS Graduate Group. The Candidacy Committee, in consultation with faculty members in the track, specify the requirements in more detail, which can for example include certain type and/or amount of coursework and completion of one or more research projects (e.g., Second Year Project). A Candidacy Examination is always part of those requirements.

Prior to convening a student 's Candidacy Committee, the Faculty Advisor, the SCS Graduate Group Chair, and the graduate student must sign the Statement on Conflict of Interest form that is included in the *Ph.D. Form I*.

5.1. The Candidacy Committee

A Candidacy Committee assigned to each student is charged with determining the readiness of the student to proceed with the doctoral dissertation. It does so by ensuring the student has completed all other requirements and is ready to complete the Candidacy Examination. This Committee then conducts and evaluates the student's Candidacy Examination.

The members of each student's Candidacy Committee are approved by the Chair of the SCS Graduate Group and the Dean of Graduate Studies prior to the start of its examination. The Committee consists of three faculty members at a minimum from within SCS or, by approval of the SCS Graduate Group Chair, from another Graduate Group. The SCS faculty can otherwise specify the constitution of Candidacy Committees, while adhering to the rules stipulated in the *Graduate Advisor Handbook*

(Sect. VII.H.4.). For example, it can be created by equating it with or expanding the student's Faculty Advisory Committee, which is chaired by the student's Faculty Advisor, or stipulating a common Candidacy Committee for a track within a given period of time.

5.2. Candidacy Examination

Final readiness to advance to candidacy for the Ph.D. degree is evaluated via a required Candidacy Examination, which students in the SCS Graduate Group usually complete during the third and prior the start of the fourth year in residency. Each Candidacy Committee, in consultation with faculty members in the track, must specify requirements that students must meet to be able to complete, procedures for conducting, and criteria for passing the examination, which meet at least the minimum indicated in the *Graduate Advisor's Handbook* (Sect. VII.H.).

Consequently, the Candidacy Examination consists of a written and an oral part. For example, the written exam can take the form of writing a position or review paper of publication quality, preparing a grant or dissertation proposal, completing responses to exam questions posed by the faculty within a limited period of time, or submitting a portfolio of products relevant to the student's disciplinary or interdisciplinary track...

Upon successful completion of the written exam, the student will meet for an oral exam with the Candidacy Committee. The oral examination can be taken no more than twice. Both the written and oral part of the Candidacy Examination provides the basis for the recommendation of the Committee to pass the student, which must be unanimous and unequivocal. The Committee concludes its examination when convened with the student, who is informed of the outcome. If the Committee decides to reexamine the student at a later date or does not pass the student for any reason, this must be reported to the Graduate Dean.

5.3. Recording Advancement to Candidacy

When the Candidacy Exam is passed, the student is recommended for Advancement to Candidacy as reported to the Graduate Division on the *Ph.D Form I: Report of the Ph.D. Candidacy Committee*, which must be signed by all Candidacy Committee members. This form is submitted even if the student failed the examination. If the unanimous recommendation of the Candidacy Committee is favorable, the student must pay the $65 Advancement to Candidacy Fee to the campus Cashier's Office, which will validate the *Ph.D. Form I.* The student must then submit the *Ph.D. Form I* to the Graduate Division (Attn: Enrolled Student Affairs Officer). The date the student submits the signed and validated *Ph.D. Form I* will be the official date of advancement. The

candidate and graduate program will be notified of formal advancement and the appointment of a Doctoral Committee.

6. The Doctoral Dissertation

The Doctoral Dissertation is the culmination of the Ph.D. program, in which the Doctoral Candidate demonstrates the capability to conduct research independently that makes an original contribution to knowledge of a quality that can be published in a reputable scientific journal. The planning and completion of the Dissertation is supervised by the Doctoral Committee Chair, who usually has been the Candidate's Faculty Advisor. The Doctoral Committee approves the Dissertation proposal and evaluates that it has been completed in accordance with the standards of the discipline in which it is conducted and those of the University. The Doctoral Committee may specify the nature, extent, and format of the Doctoral Dissertation, in consultation with faculty members in the track, while adhering to the specifications in the *Graduate Advisor Handbook* (Sect. VII.H.8).

6.1. The Doctoral Committee

The Doctoral Committee is nominated by the Candidacy Committee with the concurrence of the Candidate, the Doctoral Committee Chair, and the SCS Graduate Group Chair, using the *PhD Form I*. Final approval of the committee membership rests with the Dean of Graduate Studies. The Doctoral Committee is comprised of at least three voting members of the University of California Academic Senate—not necessarily the Merced Division. In consultation with faculty in the track, the Candidacy Committee may provide additional specification of the constitution and role of the Dissertation Committee, while adhering to the *Graduate Advisor Handbook* (Sect. VII.H.6)

6.2. Dissertation Proposal

The Doctoral Committee, in consultation with faculty in the track, may specify the role of a dissertation proposal in the completion of the Dissertation and how it is to be evaluated. For example, a Dissertation Proposal can be written as a grant proposal, defended in front of the Doctoral Committee in a public (or not) meeting or established through informal meetings with the members of the Doctoral Committee.

6.3. Dissertation Final Exam

The Doctoral Committee, in consultation with faculty in the track, may optionally require that a final exam of the Dissertation be conducted. If so, its nature and conduct must be specified to the student, preferably at the time the Dissertation Proposal is evaluated. For example, a Dissertation Final Exam may be a public (or not) presentation of the Dissertation and /or defense in front of the Dissertation Committee.

6.4. Final Approval and Report

The completed Doctoral Dissertation must be approved by the Doctoral Committee, who then recommends, by submission of *Ph.D. Form II*, the conferral of the Ph.D., subject to final submission of the approved Dissertation for deposit in the University Archives (see *Graduate Advisor Handbook,* Sect. VII.H.8). The Committee recommendation must be unanimous.

Attachment A: Model Graduate Student Progress Report

Name:
Last Semester/Year Completed in Program:
Semester/Year Entered Graduate Program at UCM:
Faculty Advisor:
Faculty Advisory Committee:

Major Steps in Program (as appropriate)	Planned for (Sem./Yr.)	Completed in (Sem./Yr.)
First Year Project		
Second Year Project		
Qualifying Exam/Admission to Candidacy		
Dissertation proposal defense		
Dissertation defense		

Research Activities since Last Progress Report:

Conference Presentations since Start of Graduate Studies (**bold** those added since last Progress Report):

Publications since Start of Graduate Studies (**bold** those added since last Progress Report):

Research Plans for Next 12 Months:

Content Courses Completed (**bold** those added since last Progress Report)	**Semester/Year**	**Grade**

Any additional information regarding completed courses and grades:

Courses to Complete in Next 12 Months:

Teaching/TA Activities Completed (bold any added since last Progress Report):

Teaching Plans for Next 12 Months:

***Inserting my name below indicates this is a true representation of my work*:**

_____ _____

Student's name Date

Faculty Evaluation Report

Student:
Semester/Year

Progress in	Unsatisfactory	Satisfactory	More than Satisfactory
Research			
Course work			
Teaching			
Overall			

In the case of *Unsatisfactory Progress*, the following needs to be addressed	By Date

Additional Information for Student:

	Signatures	Date
Student (indicating understanding)		
Faculty Advisor (every semester)		
Faculty Committee Member (yearly)		
Faculty Committee		

Member (yearly)		
Faculty Committee Member (yearly)		

University of California, Merced

Graduate Group in Social and Cognitive Sciences

Policies and Procedures

2005-2006

PROGRAM FOCUS AND SCOPE

The Graduate Group in Social and Cognitive Sciences offers two graduate training programs in psychology, a terminal M.S. program, and a Ph.D. program. Admission to the two programs occurs separately. Admission to the M.S. program does not imply admission to the doctoral program, so that students in the M.S. program who wish to pursue doctoral training must apply to a doctoral training program separately.

The terminal M.S. program is designed to meet the educational needs of students with several different kinds of goals, for example, obtaining a credential that may help them in their current employment, providing a chance for students with weaker undergraduate credentials to demonstrate the ability to pursue doctoral work, and providing a stimulating graduate education for community members interested in life-long learning. Students admitted to the terminal Master's Degree program are typically not provided with financial support, and may attend the program part-time.

The Ph.D. program is intended to prepare students for research careers. The Ph.D. program of study is highly flexible, with an emphasis on a solid grounding in basic coursework and extensive involvement in research from the first year onwards. Students in the Ph.D. program are typically provided financial support. The Ph.D. program is a full-time program, and students planning to attend on a part-time basis should not apply.

GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to use the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Council. The Dean of Graduate Studies makes final decisions on admission.

APPLICATION DEADLINES FOR ADMISSION

The deadline for receipt of applications for the doctoral program is January 31 for enrollment in the next Fall semester. The deadline for receipt of applications for the terminal master's program is April 15 for enrollment in the next Fall semester. Enrollment in other semesters will be considered on an individual basis.

MATERIALS TO BE SUBMITTED

1. Official application form
2. Application fee
3. Official transcripts from all prior university or college attendance
4. An official Graduate Record Exam (GRE) score report. Only the general tests are required
5. A statement of research interests and career goals

6. Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and promise as a researcher (letters from faculty are preferred)
7. Official score reports from the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE) if the applicant's native language or language of instruction is other than English.

Applicants are encouraged to contact individual faculty members about their research areas to assess the match between student and faculty interests.

ADMISSIONS REQUIREMENTS

The minimum requirement for graduate admission to UC Merced is a bachelor's degree and a grade point average no lower than 3.0 on a 4.0 scale. Performance on the GRE, distribution of undergraduate grades, 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.

Students with undergraduate degrees in economics, psychology, cognitive science, sociology, political science, public policy, or anthropology normally have a background that is well suited to the graduate programs in Social and Cognitive Sciences. Applicants with other degrees will be examined on a case-by-case basis.

GENERAL REQUIREMENTS FOR ADVANCED DEGREES

RESIDENCY

In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as a full-time student for at least two semesters. Residency is established by satisfactory completion of at least one graduate course of four units or more per term. Ordinarily, a graduate student shall not receive credit for more than 12 units of graduate courses in any term.

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 major professor or degree 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 may be dismissed from the graduate program. Specifically:

1. Only courses in 200 series in which the student receives grades of “A”, “B”, or “S” may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a “C” or lower cannot be used to satisfy the unit requirement for the Ph.D. degree but will count in determining the grade point average. Courses in the 300-500 series may be accepted if they have been approved by the Social and Cognitive Sciences faculty.

2. Candidates must maintain an average of at least three grade points per unit in all graduate courses elected during their residence as graduate students at the University of California. Students must have an average grade point of 3.0 for advancement to candidacy and conferral of the degree.

3. Courses graded “S/U” will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their major professor.

MASTER’S DEGREE

SIGNIFICANCE

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. Students may receive a terminal M.S. degree under either of two different conditions.

1. Students may be admitted directly to the graduate program in Social and Cognitive Sciences to work towards a terminal Masters Degree (M.S.).
2. A Ph.D. student who has been in residence for at least two semesters, is in good academic standing, has completed PSY 200, PSY 201, PSY 202, PSY 203 and PSY 204, and who chooses not to complete the doctoral program, may petition the Admissions Committee to pursue a terminal M.S. degree. In such cases, the student must meet all of the requirements for the M.S. degree prior to being awarded the degree.

SELECTION OF A MAJOR PROFESSOR

Students will be assigned an interim adviser when they first enroll, unless the student already has chosen a major professor. Otherwise, selection of a major professor must occur by the end of the first semester of the first year. The major professor, in consultation with the student and the appropriate faculty advisory committee as outlined below, will guide the student’s research and course selection.

REQUIREMENTS

The Social and Cognitive Sciences group has established the following requirements for the M.S. degree. Two different tracks are recognized:

THESIS OPTION

1. Complete at least two semesters of academic residence (24 units total) at UC Merced;
2. Complete PSY 200, PSY 201, PSY 202, PSY 203 and PSY 204 with a letter grade of at least "B";
3. Complete at least 32 semester hours of graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture courses, including PSY 200, PSY 201, PSY 202, PSY 203 and PSY 204 while the remaining 16 hours may be research or similar courses;
4. Prepare an acceptable thesis describing original empirical research.

NON-THESIS OPTION

1. Complete at least two semesters of academic residence (24 units total) at UC Merced;
2. Complete PSY 200, PSY 201, PSY 202, PSY 203 and PSY 204 with a letter grade of at least "B";
3. Complete at least 36 semester hours of graduate course work with a cumulative grade-point average of at least 3.0. At least 20 semester hours must be from regular, letter-graded lecture courses, while the remaining 16 hours may be research or similar courses;
4. Pass a comprehensive written and oral examination administered by a faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level.

MASTER'S THESIS

The student pursuing the thesis option will organize a master's thesis committee of three faculty members, one of whom must be from outside the SCS graduate group faculty. The major professor will chair the committee. A written thesis prospectus will be presented to this committee, which will then meet with the student to discuss the prospectus, and which will then vote to approve the prospectus or not. A vote to pass the prospectus must be unanimous.

The master's thesis must be creative work that can stand the test of peer review. The expectation is that the material will serve as the basis for publication(s) in a peer-reviewed journal. The work must be original and defensible, and it may either be the student's independent work, or represent a collaboration between the student and the major professor in the latter's program of research.

The student must submit a copy of the thesis to each committee member at least two weeks prior to the scheduled final examination. The thesis may consist of either of the following two formats: (1) a series of chapters, each written specifically for the thesis, or (2) a published or in press journal article bound together with an introduction and conclusion. In the latter case, the student must be a co-author on the journal article. Approval of the thesis must be unanimous. Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the thesis. In this case, the committee will select one member, normally the

major professor, who will be responsible for approving the final version of the thesis that is submitted to Division of Graduate Studies. All members of the degree committee sign the final thesis.

MASTER'S COMPREHENSIVE EXAMINATION

The student pursuing the non-thesis option will form a committee of three faculty, one of whom must be from outside the SCS graduate group faculty. The major professor will chair the committee.

The master's comprehensive examination consists of a written and an oral part. The written part shall consist of written answers to one question from each of the three examiners. Upon successful completion of the written exam, the student will meet for an oral exam with the committee. The oral examination can be taken no more than twice.

TRANSFER CREDIT

Though ordinarily all work for a graduate degree is done in residence, some work taken elsewhere may be credited toward the degree. The normal limit for such transfer work is four semester units or six quarter units from another institution or up to one-half of the unit requirement from another campus of the University of California, provided the units were not used to satisfy the requirements for another degree. The following regulations apply:

1. Units of work taken elsewhere than the University of California may not be used to reduce the minimum residence requirement.

2. Requests for transfer credit must be made prior to either the master's degree oral examination for terminal master's students, or prior to advancement to candidacy for doctoral students. Requests must be approved by the Major Professor and the Dean of Social Sciences, Humanities, and Arts.

Courses applied toward a previous Master's or doctorate degree may not be applied toward a UC Merced Social and Cognitive Sciences graduate degree.

CHANGES IN COMMITTEE MEMBERSHIP

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 research 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. Changes in committee membership must be approved by the Dean of Graduate Studies.

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 SCS group has established the following requirements for the Ph.D. degree:

1. Complete at least four semesters of full-time academic residence (12 units minimum each semester) at UC Merced
2. Complete Social and Cognitive Sciences courses with an average letter grade of at least "B"
3. Completion of the first year statistics sequence: PSY 202 and PSY 203
4. Completion of the first year methods course: PSY 204.
5. Complete a year long seminar on current topics in Social and Cognitive Sciences: PSY 200 and PSY 201
6. Pass the oral Ph.D. qualifying examination
7. Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

SELECTION OF A MAJOR PROFESSOR

Students will be assigned an interim adviser when they first enroll, unless the student already has chosen a major professor. Otherwise, selection of a major professor must occur by the end of the first semester of the first year. The major professor, in consultation with the student and the appropriate faculty advisory committee as outlined below, will guide the student's research program. Interdisciplinary research programs are highly encouraged, as are research collaborations with faculty or senior scientists outside UC Merced.

SECOND YEAR PROJECT

First year: Planning. Every student will register for PSY 299 in the second semester of the first year, with the goal of planning the second-year project by frequently meeting with the major professor. The project may take the form of a theoretical or an empirical inquiry. A brief written proposal (2-5 pages) for the second-year project must be approved by the major professor and a second reader from the SCS faculty by the end of the second semester of the first year.

Second year: Execution. Every student will register for PSY 299 in both semesters of the second year, with the goal of carrying out the second-year project with frequent consultation with the major professor. A paper describing the completed project will be prepared. The paper should be brief (15-25 pages), and should be written in publication style. This paper should be completed by the end of the second semester of the second year, and must be approved by the major professor and a second reader. The purpose of this paper is to provide exercise in the planning, conduct, and write-up of a brief research project.

PH.D. QUALIFYING EXAMINATION

Students will sit for the Qualifying Examination in the third year. The Qualifying Examination cannot be taken if there are any outstanding grades of Incomplete, or if any of the required first and second year courses have not been taken. The examining committee will consist of four faculty, one of whom must be from outside the SCS graduate group faculty. The major professor will chair the committee.

The Qualifying Examination consists of a written and an oral part. The written part may be completed in either of two ways: a Major Area Paper or a formal written examination. The Major Area Paper shall be a critical review paper, produced in APA publication format and suitable in quality and substance for submission to a major journal appropriate to its topic. The written examination shall consist of written answers to one question from each of the four examiners. Upon successful completion of the written exam, the student will meet for an oral exam with the committee. The oral examination can be taken no more than twice.

ADVANCEMENT TO CANDIDACY

Upon successful completion of the Qualifying Examination, the student must fill out an application for advancement to candidacy that is signed by the major professor and the degree committee, and submitted to the Dean of Graduate Studies. Upon advancement to candidacy for the degree, the degree committee is then charged to guide the student in research and in the preparation of the dissertation. Advancement to candidacy must occur no later than the end of the eighth semester of residence in the SCS program, or the candidate will be automatically terminated from graduate study in the Ph.D. program. Graduate students who are terminated by this policy and who wish to appeal termination may do so only after they have been terminated, and must then prepare an appeal with a rationale for why termination should not occur, and with an explicit timetable for completion of advancement to candidacy. Reversal of the termination after appeal must be approved by the student's major professor, by the Graduate Advising Committee of the Graduate Group in Social and Cognitive Sciences, and by the Dean of the School.

DISSERTATION AND FINAL EXAMINATION

Upon advancement to candidacy, the student will organize a dissertation committee of four faculty members, one of whom must be from outside the SCS graduate group faculty. The major professor will chair the committee. A written dissertation prospectus will be presented to this committee, which will then meet with the student to discuss the proposal, and which

will then vote to approve the prospectus or not. A vote to pass the prospectus must be unanimous.

The Ph.D. dissertation must be creative and independent work that can stand the test of peer review. The expectation is that the material will serve as the basis for publication(s) in a peer-reviewed journal. The work must be the student's, and it must be original and defensible.

The student must submit a copy of the dissertation to each committee member at least two weeks prior to the scheduled final examination. The dissertation may consist of either of the following two formats: (1) a series of chapters, each written specifically for the dissertation, or (2) several related published or in press journal articles bound together with an introduction and conclusion. In the latter case, the student must be first author on all the journal articles. Approval of the dissertation must be unanimous. Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the dissertation that is submitted to Division of Graduate Studies. All members of the degree committee sign the final dissertation, which must occur by the end of the sixth year of residence in the SCS program.

OPTIONAL MASTER'S DEGREE FOR PH.D STUDENTS

The Master's Degree is not required of candidates for the Ph.D. However, a student may qualify and apply for the Master's degree after satisfactory completion of eight courses (32 units) in the doctoral program, including:

1. PSY 200
2. PSY 201
3. PSY 202
4. PSY 203
5. PSY 204
6. The second year project

Courses applied toward a previous MA or Ph.D. degree may NOT be applied toward this Master's degree. Students who wish to apply courses completed in another graduate program that were not applied toward a previous degree must follow procedures outlined under the transfer credit section in the Master's degree program above. An overall GPA of 3.0 is required in the courses applied toward the Master's degree.

University of California, Merced

Graduate Group in World Cultures

Policies and Procedures

Revised: September 14, 2007

PROGRAM FOCUS AND SCOPE

The Graduate Group in World Cultures offers a terminal M.A. program, and a Ph.D. program. Admission to the two programs occurs separately. Admission to the M.A. program does not imply admission to the doctoral program, so that students in the M.A. program who wish to pursue doctoral training must apply to a doctoral training program separately.

The terminal M.A. program is designed to meet the educational needs of students with several different kinds of goals, for example, obtaining a credential that may help them in their current employment, providing a chance for students with weaker undergraduate credentials to demonstrate the ability to pursue doctoral work, and providing a stimulating graduate education for community members interested in life-long learning. Students admitted to the terminal Master's Degree program are typically not provided with financial support, and may attend the program part-time.

The Ph.D. program is intended to prepare students for research careers. The Ph.D. program of study is highly flexible, with an emphasis on a solid grounding in basic coursework and extensive involvement in research from the first year onwards. Students in the Ph.D. program are typically provided financial support. The Ph.D. program is a full-time program, and students planning to attend on a part-time basis should not apply.

GRADUATE ADMISSIONS

All persons seeking admission to graduate standing must make formal application for admission. We encourage applicants to use the on-line application to streamline the process. Applications are reviewed by the Admissions Committee, which makes recommendations on admission to Graduate Council. The Dean of Graduate Studies makes final decisions on admission.

APPLICATION DEADLINES FOR ADMISSION

The deadline for receipt of applications for the doctoral program is January 15 for enrollment in the next Fall semester. The deadline for receipt of applications for the terminal master's program is April 15 for enrollment in the next Fall semester. Enrollment in other semesters will be considered on an individual basis.

MATERIALS TO BE SUBMITTED

1. Official application form
2. Application fee
3. Official transcripts from all prior university or college attendance
4. An official Graduate Record Exam (GRE) score report. Only the general tests are required
5. A statement of research interests and career goals
6. Three letters of recommendation from instructors or supervisors who can comment on the applicant's scholarly ability and promise as a researcher (letters from faculty are preferred)

7. 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.

Applicants are encouraged to contact individual faculty members about their research areas to assess the match between student and faculty interests.

ADMISSIONS REQUIREMENTS

The minimum requirement for graduate admission to UC Merced is a bachelor's degree and a grade point average no lower than 3.0 on a 4.0 scale. Performance on the GRE, distribution of undergraduate grades, 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.

Students with undergraduate degrees in English, Foreign Languages, History, and Spanish, would normally have a background that is well suited to the graduate programs in World Cultures. Applicants with other degrees will be examined on a case-by-case basis.

GENERAL REQUIREMENTS FOR ADVANCED DEGREES

RESIDENCY

In accordance with SR 682 and 686, the minimum residency requirement for any advanced degree is two semesters. The minimum residency requirement for the Ph.D. degree is four semesters. Before advancement to candidacy Ph.D. students must be registered in regular University courses as full-time students for at least two semesters. .

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 major professor or degree 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 may be dismissed from the graduate program. Specifically:

1. Only courses in 200 series in which the student receives grades of "A", "B", and "C" (provided the student maintains an overall "B" average) or "S" may be counted in satisfaction of the requirements for advanced degrees. A course in which a student receives a "D" or lower cannot be used to satisfy the unit requirement for the Ph.D. degree but will count in determining the grade point average. Courses in the 300-400 series may be accepted if they have been approved by the World Cultures, Literatures, and History faculty.

2. Candidates must maintain an average of at least three grade points per unit in all graduate courses elected during their residence as graduate students at the University of California. Students must have an average grade point of 3.0 for advancement to candidacy and conferral of the degree.

3. Courses graded "S/U" will not be counted in determining grade point averages.

4. Students must make satisfactory progress on their programs of study as determined by their major professor.

MASTER'S DEGREE

SIGNIFICANCE

The recipient of a M.A. 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. Students may receive a terminal M.A. degree under either of two different conditions.

1. Students may be admitted directly to the graduate program in World Cultures to work towards a terminal Master's Degree (M.A.).
2. A Ph.D. student who has been in residence for at least two semesters, is in good academic standing, has completed the core courses, and who chooses not to complete the doctoral program, may petition the Admissions Committee to pursue a terminal M.A. degree. In such cases, the student must meet all of the requirements for the M.A. degree prior to being awarded the degree.

SELECTION OF A MAJOR PROFESSOR

Students will be assigned an interim adviser when they first enroll, unless the student already has chosen a major professor. Otherwise, selection of a major professor must occur by the end of the first semester of the first year. The major professor, in consultation with the student and the appropriate faculty advisory committee as outlined below, will guide the student's research and course selection.

REQUIREMENTS

The World Cultures group has established the following requirements for the M.A. degree. Two different tracks are recognized:

THESIS OPTION

1. Complete at least two semesters of academic residence (12 units total) at UC Merced;
2. Complete WC 201 (Research Proseminar) and 202 (Theories and Methods in the Study of Cultures) with a letter grade of at least "B";
3. Complete at least 34 semester hours of graduate course work with a cumulative grade-point average of at least 3.0. At least 18 semester hours must be from

regular, letter-graded lecture courses, including WC 200, 201 and 202, while the remaining 12 hours may be research or similar courses;

4. Prepare an acceptable thesis describing original research.

NON-THESIS OPTION

1. Complete at least two semesters of academic residence (12 units total) at UC Merced;
2. Complete WC 201 and 202 with a letter grade of at least "B";
3. Complete at least 40 semester hours of graduate course work with a cumulative grade-point average of at least 3.0. At least 24 semester hours must be from regular, letter-graded lecture courses, while the remaining 12 hours may be research or similar courses;
4. Pass a comprehensive written and oral examination administered by a faculty committee. This examination will test the student's understanding of the main concepts in the field at the graduate level. The written exam will last a maximum of 4 hours. Each member of the student's committee (except for the external member) will submit a question. The oral exam will last a maximum of 2 hours.

MASTER'S THESIS

The student pursuing the thesis option will organize a master's thesis committee of three faculty members, one of whom must be from outside the WC major faculty. The major professor will chair the committee. A written thesis prospectus will be presented to this committee, which will then meet with the student to discuss the prospectus, and which will then vote to approve the prospectus or not. A vote to pass the prospectus must be unanimous.

The master's thesis must be creative work that can stand the test of peer review. The expectation is that the material will serve as the basis for publication(s) in a peer-reviewed journal. The work must be original and defensible, and it may be the student's independent work.

The student must submit a copy of the thesis to each committee member at least two weeks prior to the scheduled final examination. Approval of the thesis must be unanimous. Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the thesis. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the thesis that is submitted to Division of Graduate Studies. All members of the degree committee sign the final thesis.

MASTER'S COMPREHENSIVE EXAMINATION

The student pursuing the non-thesis option will form a committee of three faculty, one of whom must be from outside the WC major faculty. The major professor will chair the committee.
The master's comprehensive examination consists of a written and an oral part. The written part shall consist of written answers to one question from each of the three examiners. Upon successful completion of the written exam, the student will meet for an oral exam with the committee. The oral examination can be taken no more than twice.

TRANSFER CREDIT

Though ordinarily all work for a graduate degree is done in residence, some work taken elsewhere may be credited toward the degree. The normal limit for such transfer work is four semester units or six quarter units from another institution or up to one-half of the unit requirement from another campus of the University of California, provided the units were not used to satisfy the requirements for another degree. The following regulations apply:

1. Units of work taken elsewhere than the University of California may not be used to reduce the minimum residence requirement.

2. Requests for transfer credit must be made prior to either the master's degree oral examination for terminal master's students, or prior to advancement to candidacy for doctoral students. Requests must be approved by the Major Professor and the Dean of Social Sciences, Humanities, and Arts.

Courses applied toward a previous Master's or doctorate degree may not be applied toward a UC Merced World Cultures graduate degree.

CHANGES IN COMMITTEE MEMBERSHIP

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 research 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. Changes in committee membership must be approved by the Dean of Graduate Studies.

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 WC group has established the following requirements for the Ph.D. degree:

1. Completion of at least four semesters of full-time academic residence (12 units minimum each semester) at UC Merced
2. Completion of World Cultures courses with an average letter grade of at least "B"
3. Completion of the core curriculum courses: WC 201, and 202
4. Completion of a minimum of 24 hours in the student's chosen concentration (e.g. History, American and Anglophone Literatures, Literatures of the Spanish-Speaking World, and Museum/Preservation Studies)
5. Completion of a minimum of 12 hours in appropriate elective courses outside the student's concentration
6. Demonstrate proficiency in one foreign language (a second foreign language may be required depending on area of specialization)
7. Pass the oral Ph.D. qualifying examination
8. Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

SELECTION OF A MAJOR PROFESSOR

Students will be assigned an interim adviser when they first enroll, unless the student already has chosen a major professor. Otherwise, selection of a major professor must occur by the end of the first semester of the first year. The major professor, in consultation with the student and the appropriate faculty advisory committee as outlined below, will guide the student's research program. Interdisciplinary research programs are highly encouraged, as are research collaborations with faculty outside UC Merced.

FOREIGN LANGUAGE PROFICIENCY

Proficiency in a language other than English must be demonstrated before advancement to candidacy by passing an upper division language course with a grade of B or better, or by passing a language examination.

Language exam procedures:

a. Languages from which and to which to translate must be approved by the student's committee
b. Text to be translated will be one page taken from a professional journal in the discipline most relevant to the student's research, or from a university press book in that discipline
c. the student will be allowed to use a dictionary
d. the student will not be allowed to use any electronic devices (including laptops and computers)
e. the exam will last for a maximum of 2 hours
f. the students' committee chair (or his/her delegate) will grade the exam

PH.D. QUALIFYING EXAMINATION

Students may take the Qualifying Examination during their fourth semester. Successful completion of the Qualifying Examination is contingent upon clearance of any outstanding grades of Incomplete, and/or "in progress" courses. Ph.D. students should select a Qualifying Examination committee, in consultation with their Major Professor, by the end of their second semester. The examining committee will consist of four faculty, one of whom must be from outside the WC major faculty. The major professor will chair the committee.

The Qualifying Examination consists of written and oral components, both of which require a unanimous vote of the committee for successful passage. All questions will be based on a reading list prepared for each student by the WC members of his/her Examination Committee. This list should be finalized by the end of the third semester, at the latest.

The written part of the exam may be completed in either of two ways: a Major Area Paper or a formal written examination. The Major Area Paper shall be a critical review paper, produced in an appropriate publication format and suitable in quality and substance for submission to a major journal appropriate to its topic. The paper must include a thorough, critical review of the appropriate literature, drawing from and reflecting the breadth of the student's reading list; the paper cannot be a seminar paper in scope nor length. The written examination shall consist of written answers to one question from each of the WC graduate faculty examiners. The exam will last for a maximum of four hours. Each member of the student's committee (except for the external member) will submit a question.

Upon successful completion of the written exam, the student will schedule an oral exam with the committee. If the student chooses to write a major area paper, the oral exam will be scheduled after the paper has been approved by the committee, but no sooner than ten working days after submission of the paper. The oral examination will last two hours. All committee members may ask questions to the student based on his/her written exam and/or her/his reading list. At her/his discretion, the external committee member may waive his/her right to ask questions. The oral examination can be taken no more than twice.

ADVANCEMENT TO CANDIDACY

Upon successful completion of the Qualifying Examination, the student must fill out an application for advancement to candidacy that is signed by the major professor and the degree committee, and submitted to the Dean of Graduate Studies. Upon advancement to candidacy for the degree, the degree committee is then charged to guide the student in research and in the preparation of the dissertation. Advancement to candidacy must occur no later than the sixth semester of residence in the WC program.

DISSERTATION AND FINAL EXAMINATION

Upon advancement to candidacy, the student will organize a dissertation committee of four faculty members, one of whom must be from outside the WC major faculty. The major professor will chair the committee. A written dissertation prospectus will be presented to this committee, which will then meet with the student to discuss the proposal, and which will then vote to approve the prospectus or not. A vote to pass the prospectus must be unanimous.

The Ph.D. dissertation must be creative and independent work that can stand the test of peer review. The expectation is that the material will serve as the basis for publication(s) in peer-reviewed journals or as a monograph. The work must be the student's, and it must be original and defensible.

The student must submit a copy of the dissertation to each committee member at least two weeks prior to the scheduled final examination. Approval of the dissertation must be unanimous. Members of the committee may vote to make conferral of the degree contingent on corrections and/or revisions to the dissertation. In this case, the committee will select one member, normally the major professor, who will be responsible for approving the final version of the dissertation that is submitted to Division of Graduate Studies. All members of the degree committee sign the final dissertation, which must occur by the end of the sixth year of residence in the WC program.