July 12, 1999

TO: Subhash Risbud, Chair  
Chemical Engineering and Materials Science

FROM: David Gilchrist, Chair  
Graduate Council

SUBJECT: Graduate Program in Materials Science & Engineering – Degree requirements

At its meeting of June 24, 1999, the Graduate Council considered and approved the graduate program in Materials Science and Engineering's degree requirements, as submitted by Associate Dean Zuhair Munir in the spring of 1999. These are the degree requirements presented in the Materials Science and Engineering Graduate Student Handbook for the academic year 1998-99, preliminary edition – November 1998.

/lsw

c: C. González  
J. Hedrick  
R. Kraft  
R. Montero
MATERIALS SCIENCE AND ENGINEERING
GRADUATE STUDENT HANDBOOK

Department of Chemical Engineering and Materials Science
University of California
Davis, CA

ACADEMIC YEAR 1998-99
PRELIMINARY EDITION - NOVEMBER, 1998
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I. ACADEMIC INFORMATION

Graduate education is one of the most important elements of an outstanding academic program. For that reason, the Materials Science and Engineering program at UC Davis strives to create an environment that nurtures and promotes collegial interaction between the graduate student body and the faculty. It is our philosophy that graduate students should be treated as junior colleagues. The faculty are clearly committed to providing outstanding dissertation advising, necessary financial support for the students, and the needed resources required for the active pursuit of research objectives. Graduate students, in turn, are expected to apply their intellectual and creative skills to achieve the advanced degree objectives set before them. The Materials Science and Engineering program is committed to the goal that all graduate students making satisfactory progress toward their degree objectives receive ample advising and adequate financial support.

The purposes of this document are to describe the degree requirements for the Ph.D. (Doctor of Philosophy) and M.S. (Master of Science) in Materials Science and Engineering (MSE), to outline the major milestones in each program, to delineate the responsibilities of the faculty and students, and to familiarize graduate students with departmental procedures and policies. It is important to note that the University (through the Graduate Council of the Academic Senate and the Office of Graduate Studies), the College of Engineering, and the Department each have their own sets of requirements and that a student must satisfy all three sets. In this document, the most restrictive requirements of the three sets are defined to provide the most useful, concise and thorough guidelines. The student must not be misled, however, by less stringent requirements found in other documents. Students may satisfy degree requirements in effect at the time of their admission or requirements in effect at any time during their graduate studies. If you have any questions, concerns or comments about this handbook please contact the MSE Graduate Adviser, Professor Jeffery Gibeling, 2019 Engineering II, Tel. No. 752-7037 Email: jcgibeling@ucdavis.edu.

A. FACULTY RESOURCES

1. Graduate Adviser

The Graduate Adviser for Materials Science and Engineering in the Department of Chemical Engineering and Materials Science is a resource for all graduate students in the program to provide information and advising on academic requirements, policies and procedures (Graduate Studies, College, and Departmental). The Graduate Adviser’s signature is required on a number of important documents such as the student’s Program of Study, and petitions related to coursework, PELP and Advancement to Candidacy. The Graduate Adviser serves on the Departmental Graduate Admissions Committee and chairs the MSE Preliminary Examination Committee. The Graduate Adviser also serves as an intermediary in issues related to changing research advisers.

2. Major Professor

A student’s Major Professor (also formally the Chair of the Dissertation or Thesis Committee and informally called the research adviser) is the faculty member who assists the student in preparing a detailed study program and in supervises the research that forms the basis for the preparation of a thesis or dissertation. The Major Professor serves as the chairperson of the student’s Thesis or Dissertation Committee (see Sections C-3 and D-2 for discussion of these committees), and Guidance Committee, and is normally in charge of the EMS 290C and 299
research coursework taken. Master's and Doctoral students must select their Major Professor from among the members of the Materials Science and Engineering graduate faculty.

a) Responsibilities of Major Professors

Specific responsibilities of Major Professors include the following:

(i) It is the responsibility of the Major Professor to honor the financial offer made to first year graduate students. The Department will provide the details of the financial offer to the Major Professor; the faculty should not accept students on unfunded projects.

(ii) It is the responsibility of the Major Professor to inform the graduate student if extramural funding for the student's research project is in jeopardy. At least six months of advance notice should be given to the Department Chair and the student so that other funding alternatives can be explored. During a hiatus in extramural support, the Major Professor will consult with the Department Chair for a possible bridge loan or TA/AI funding.

(iii) The Major Professor must provide each graduate student with specific requirements for achieving his/her desired degree objective. This includes advice on courses for the program of study, a method of evaluation of student progress in research, and the faculty member's expectations for time spent on research for a given number of research units. In essence, the student and the faculty adviser should collaboratively "define success" for the project chosen. The Major Professor, when assigning an S/U grade for EMS 299 credits, must fill out the accompanying progress form for each student. Reasons for any unsatisfactory performance on dissertation/thesis research or recommended course work should be stated clearly to the student in a written evaluation.

(iv) The Major Professor and graduate student should arrive at and maintain a mutually agreeable schedule of advising conferences, including an annual review of the progress, direction, and duration of the project. The result of this annual review should take the form of a written report to the student (and placed in the student's file) summarizing the review.

(v) It is the responsibility of the Major Professor to ensure that the objectives regarding time-to-degree, outlined in this document, are attainable. For Ph.D. students, this shall include meeting with the student and the Dissertation Committee after the student's Qualifying Exam to discuss points raised by the Qualifying Exam committee regarding the direction of the research, and meeting with the student and the Dissertation Committee after the student has been in residence for 3 years to discuss the progress of research and what must be accomplished to complete the degree.

b) Selection of a Major Professor

One of the most critical decisions that a student makes in her/his career is the selection of a Major Professor. This choice and the selection of a research topic are important ones and require careful thought. Dissertation/thesis research is the principal activity of a graduate student, and often determines the future career directions of the student. Some graduate students will elect to attend UC Davis based on an agreement to work on a specific research project with a specific Major Professor. For those first year graduate students (FYGS) who have not selected a research project in advance, the following procedure will be followed in MSE:

(i) During the first week of Fall Quarter, the program will provide all first year graduate students with a list of topics for M.S. thesis and Ph.D. dissertation, and the status of funding for the listed projects.
(ii) Faculty members will have an opportunity during Fall Quarter to give a seminar to the FYGS as part of ECH 290 on research projects in their laboratories.

(iii) FYGS should make appointments to meet individually during Fall Quarter with faculty members with whom they wish to work to discuss specific details of proposed research projects.

(iv) FYGS have until the first Friday of December to submit to the Graduate Program Assistant a list with their first, second, and third choices for Major Professor and research topic. The Department expects FYGS to choose funded projects. The faculty will meet the week after the deadline to determine Major Professors for each FYGS. Normally, each student will receive her/his first choice for Major Professor and research project. However, such assignments may not always be possible, as extramural funding and the number of students who may have selected the same project must be taken into account when FYGS are matched with Major Professors. The program priority is to place all FYGS on funded projects.

(v) If a FYGS elects to pursue an advanced degree based on an unfunded project, then the Department Chair will advise the student that the initial financial offer of support is no longer binding.

c) Changing Major Professors

The faculty recognizes that under certain circumstances there may be valid reasons for a graduate student to want to change his/her Major Professor, e.g., lack of funding, personality conflicts, change in the direction of research project, or resignation of the Major Professor from the faculty. If a student requests a change in Major Professor, the program will make every effort to be helpful and to ensure that this is not a traumatic experience for the student. However, a change in Major Professor may result in a change in financial support for the student since the Department cannot always assure the student that a funded project will be available when the change is requested. Furthermore, such a change may increase the time required for completion of the degree. The following procedure should be followed when a graduate student wants to change his/her Major Professor:

(i) The graduate student must inform the Graduate Adviser in writing and give reasons for the requested change.

(ii) The Graduate Adviser will meet with the student within one week to discuss options available to the student and the possible consequences if the request is acted on, e.g., possible change in student stipend, time-to-degree, lab space, office space, etc. The Graduate Adviser will provide the student with a written summary of these discussions, and the student must acknowledge in writing that he/she understands the implications that may result from a change in Major Professor. The student has one week to decide whether to proceed with a change or request mediation to resolve any conflict with the Major Professor. All discussions between the student and the Graduate Adviser shall be confidential to this point.

(iii) After the Graduate Adviser has explored all the options available to the student and discussed them with the student, if the student wants to proceed with the request, the Graduate Adviser will inform the student's current Major Professor and the Department Chair, and then help the student identify a new Major Professor. Typically this should happen no later than two weeks after the student first notified the Graduate Adviser.

(v) Once a new Major Professor is identified, the student must be informed in writing what the dissertation topic will be, and the status of extramural funding and the expected time to degree.

(vi) The former Major Professor must be informed of the dissertation topic so that any
questions regarding intellectual property rights can be addressed before the student begins research with the new Major Professor.

(vii) Concerns regarding intellectual property rights and obligations to funding agencies should be resolved by the faculty members involved before the student begins work on his/her new dissertation topic. If the faculty members cannot resolve these matters among themselves, the Department Chair will review the facts and recommend further action. This may involve the appointment of an ad hoc committee of three objective third-party members including possibly two from other departments and one from the office of legal counsel on campus. Every effort should be made to resolve these issues expeditiously so that the student can proceed with his/her dissertation.

(viii) Once the new Major Professor has been identified (typically no longer than four weeks after the initial request for a change was made), all responsibility for the student's funding, laboratory space, desk space, and advising will be transferred to the new Major Professor. The graduate student is responsible for completing the orderly transition tasks that may include return of all lab notebooks, research records and reports including computer programs, experimental data, equipment, biological materials, and lab supplies associated with the former research project to the former Major Professor. The graduate student will be allowed to have access to data and other pertinent information in the lab notebooks and/or other research records if required for dissertation preparation or for publication purposes. Upon completion of the transition tasks the former Major Professor should transmit a signed note to the Graduate Adviser to notify him/her of the satisfactory completion of the transition tasks.

(ix) The above procedures may be followed when a faculty member resigns from the Department or is unable to carry out the necessary advising responsibilities because of a serious illness or death. If the Major Professor should resign and assume a position at another university, the student may have the opportunity to finish his/her research at either institution.
B. FOUNDATION COURSES IN MATERIALS SCIENCE AND ENGINEERING

The following courses are considered foundation courses in the Materials Science and Engineering curriculum. While there is not a fixed set of core courses that must be taken for a graduate degree, both the M.S. and Ph.D. require that a number of courses be selected from this list.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS 230</td>
<td>Fundamentals of Electron Microscopy</td>
<td>3</td>
<td>Winter (even years)</td>
</tr>
<tr>
<td>EMS 230L</td>
<td>Laboratory for Electron Microscopy</td>
<td>2</td>
<td>Winter (even years)</td>
</tr>
<tr>
<td>EMS 232</td>
<td>Advanced Topics in Transmission Electron Microscopy</td>
<td>3</td>
<td>Winter (odd years)</td>
</tr>
<tr>
<td>EMS 232L</td>
<td>Laboratory for Advanced Topics in Transmission Electron Microscopy</td>
<td>2</td>
<td>Winter (odd years)</td>
</tr>
<tr>
<td>EMS 240</td>
<td>Transport Phenomena in Materials Processes</td>
<td>4</td>
<td>Spring (odd years)</td>
</tr>
<tr>
<td>EMS 241</td>
<td>Principles &amp; Applications of Dislocation Mechanics</td>
<td>4</td>
<td>Winter (even years)</td>
</tr>
<tr>
<td>EMS 242</td>
<td>Advanced Mechanical Properties of Materials</td>
<td>4</td>
<td>Winter (odd years)</td>
</tr>
<tr>
<td>EMS 243</td>
<td>Kinetics of Phase Transformation in Engineering Materials</td>
<td>3</td>
<td>Spring (even years)</td>
</tr>
<tr>
<td>EMS 244</td>
<td>Interaction of Materials and Their Environment</td>
<td>3</td>
<td>Fall (even years)</td>
</tr>
<tr>
<td>EMS 245</td>
<td>Advanced Topics in Structure of Materials</td>
<td>4</td>
<td>Spring (odd years)</td>
</tr>
<tr>
<td>EMS-246</td>
<td>Current Topics in Electronic Materials Processing</td>
<td>3</td>
<td>Spring (even years)</td>
</tr>
<tr>
<td>EMS 247</td>
<td>Advanced Thermodynamics of Solids</td>
<td>3</td>
<td>Fall (odd years)</td>
</tr>
<tr>
<td>EMS 248</td>
<td>Fracture of Engineering Materials</td>
<td>3</td>
<td>Fall (odd years)</td>
</tr>
<tr>
<td>EMS 249</td>
<td>Mechanisms of Fatigue</td>
<td>3</td>
<td>Fall (even years)</td>
</tr>
<tr>
<td>EMS 250A-F</td>
<td>Special Topics in Polymer &amp; Fiber Science</td>
<td>3</td>
<td>Spring (odd years)</td>
</tr>
<tr>
<td>EMS 251</td>
<td>Applications of Solid State Nuclear Magnetic Resonance Spectroscopy</td>
<td>3</td>
<td>Spring (odd years)</td>
</tr>
</tbody>
</table>
C. REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE IN MATERIALS SCIENCE AND ENGINEERING

The awarding of a Ph.D. acknowledges an individual’s ability to perform original and creative research. A graduate student should be cognizant of the fact that earning a Ph.D. is not simply a matter of following the daily instructions of a Major Professor. A candidate for a Ph.D. is expected to demonstrate the ability to make independent and critical assessments of research in his/her field of study, to propose original ideas and to translate these ideas into hypotheses that can be tested through experiments or theory. The candidate for a Ph.D. is also expected to have demonstrated the ability to communicate his/her original research through written articles in peer-reviewed publications and/or oral presentations at scientific conferences.

1. General Requirements

The Doctor of Philosophy Degree in Engineering will be awarded by the University upon completion of the required coursework (and approval of the program of study) described below, passing the departmental Ph.D. preliminary exam, passing the Qualifying Examination, approval of a dissertation by the student’s Dissertation Committee, and a minimum of 6 quarters of academic residence after admission to the graduate program. A student is in academic residence when enrolled in at least 4 units of approved upper division or graduate courses, including research. However, normal full-time enrollment is for 12 units per quarter. Enrollment in at least 4 units of upper division or graduate level courses during two summer sessions may be counted as the equivalent of one quarter of academic residence. Residence for the M.S. degree can be used to satisfy requirements for a doctoral degree. Arrangements can also be made to satisfy part of a residence requirement by study on another campus of the University.

2. Coursework Requirements

Requirements for the Ph.D. program specify a minimum of 30 units of coursework in the major (Materials Science and Engineering) and 15 units of coursework in a minor (to be selected by the student in consultation with his/her Guidance Committee) for a total of 45 units exclusive of seminar and research units. At least 23 of the 45 units must be taken at UC Davis. Of the 30 units of major coursework, 20 units must be comprised of foundation graduate courses in Materials Science and Engineering listed in Section B. The minor must represent a set of coherent courses that complements the major. At least 24 of the 30 units in the major and at least 9 of the 15 units in the minor must be graduate level courses. Any undergraduate course required for the B.S. degree in Materials Science and Engineering at UC Davis cannot be used to fulfill the Ph.D. coursework requirements. However, upper division undergraduate courses that are not required for the B.S. may be applied to the Ph.D. requirements. Transfer credit for courses taken at other universities is discussed in Section F. The coursework taken by a Ph.D. student to satisfy these requirements is listed on the student’s Program of Study (See Section C-3 for a discussion of the Program of Study). All courses listed on the Program of Study must be taken for a letter grade.

Students pursuing graduate study in Materials Science and Engineering but who have a Bachelor’s degree in a field other than Materials Science, Metallurgy or Ceramics are required to take the core senior-level courses EMS 130, 132, 134 and 138 during their first year of graduate study in the program. Students will be exempt from this requirement if they can demonstrate that they have previously studied an essentially similar course. As noted above, these course taken to remedy deficiencies in academic background do not count toward the graduate program requirements. First year graduate students should meet with the Graduate Adviser prior to the start of instruction in Fall Quarter to review their schedule with regard to
background courses.

Courses for the minor may be selected from courses offered by the MSE program and/or from courses outside the program (e.g. other Engineering programs, Mathematics, Physics, Chemistry, Biological Sciences, etc.). All registered graduate students who have not yet advanced to candidacy must enroll in ECH 290, Seminar, each quarter during their graduate study; a passing grade will be contingent upon satisfactory attendance at the seminars. Once a Major Professor has been assigned, students should also enroll in EMS 299, Graduate Research, and EMS 290C, Graduate Research Group Conference each quarter. The minimum number of hours that a student is expected to devote to EMS 299 courses is about three hours of research per week per unit of 299. Course 299 may also be used to prepare for the Ph.D. Preliminary Examination or Qualifying Examination. EMS 290C is a one unit conference course designed to allow student groups to discuss their research progress with their research adviser in a group setting on a regular basis. In addition, all Ph.D. students are required to enroll in ECH 293, Graduate Student Seminar, twice during their graduate studies, typically during their second year and the fourth year of study. EMS 293 is a seminar course, graded satisfactory/unsatisfactory (S/U), in which graduate students present short (20 min.) descriptions of their research to the faculty and graduate students. Students appointed by the Department of Chemical Engineering and Materials Science as Teaching Assistants or Associates-In for MSE courses are expected to enroll in the course EMS 390, Teaching of Materials Science and Engineering, with the professor in charge of the assigned class each quarter (1 unit graded S/U; may be repeated once for credit up to 2 units).

Courses in addition to those needed to satisfy degree or program requirements (i.e. courses not included in the Program of Study) may be taken on a Satisfactory/Unsatisfactory grading basis if they are exploratory in nature. However, in accordance with Graduate Council policy, only one course per quarter may be taken on this basis. Only courses in which a grade of “C” or higher or “Satisfactory” is earned may be counted toward graduate program degree requirements. Grades in lower division courses (numbered 1 to 99) are not counted in determining graduate grade-point averages. However, all upper-division 100 series course grades are included, even if the course is one normally required for a Bachelor's degree and is being taken to complete background requirements. Any student may, with the consent of the appropriate Graduate Adviser and the Dean of Graduate Studies, repeat a course in which the student received a grade of C, D, F or Unsatisfactory up to a maximum of 9 units. In such repeated courses, only the most recently received grade and corresponding grade points shall be used in calculating a student's grade-point average, but all units attempted and grades received shall remain part of the student’s permanent record. Any repeated course, except for those only offered on a S/U basis, must be taken for a letter grade (A, B, C, D, or F).

3. Dissertation Committee Selection and Program of Study

The Guidance Committee for each student is comprised of three faculty members, including the Major Professor, and provides guidance to the student prior to the Qualifying Examination. The Dissertation Committee is also comprised of three members, and provides dissertation research guidance after the student passes the Qualifying Examination. The same faculty may serve on both committees for each student. During the Winter Quarter of the first year, after the student has selected a Major Professor, the student and Major Professor develop a Preliminary Program of Study and propose two additional faculty members to serve on the student’s Guidance and Dissertation Committees. At least two members of the Guidance and Dissertation Committees must be members of the graduate faculty in Materials Science and Engineering. The student should then contact these faculty to determine if they are willing to serve on these committees and discuss the proposed Program of Study (see Addendum 1 for a sample Program of Study form). With the advice of the Graduate Adviser and Guidance Committee, each student develops a relevant sequence of courses. The technical interests of the student are considered and the program is individually tailored in such a way that the
student obtains a strong over-all technical background at the doctoral level. The choice of
minor field of study is determined by the student in consultation with her or his Guidance
Committee. There is great flexibility in tailoring doctoral programs to meet the student's
objectives, but the College Graduate Study Committee may not approve the Program of Study
if the minor field is so loosely defined that the courses lack cohesiveness or if an inappropriate
fraction of the coursework is at the undergraduate level.

The Preliminary Program of Study must be submitted to the Graduate Adviser before the
student can take the Ph.D. Preliminary Evaluation (See Section 4 below). This should be
submitted to the Graduate Adviser by the last day of Winter Quarter of the first year. After a
student passes the Ph.D. Preliminary Evaluation, he or she must submit a formal Program of
Study, which must be approved by the College Graduate Study Committee before the student
can take the Qualifying Examination. Since Materials Science and Engineering Ph.D. students
are encouraged to take the Qualifying Exam by the end of the Winter Quarter of their second
year, the Program of Study must be submitted by the beginning of that quarter. Students
intending to take the Qualifying Examination during Fall Quarter should submit their Program
of Study during the Spring Quarter since the College Graduate Study Committee normally
does not meet during the Summer.

4. MSE Ph.D. Preliminary Evaluation

The Ph.D. Preliminary Evaluation is the first evaluation of prospective Ph.D. students by the
graduate faculty. The objective of this evaluation is to determine whether the student has
mastered the subject matter in Materials Science and Engineering at a level appropriate for the
Ph.D. and has an ability to integrate basic concepts across subject areas. The Ph.D.
Preliminary Evaluation includes an evaluation of the student's performance on written and oral
exams (described below), as well as course grades, previous performance in scholarly
activities and other pertinent factors. Students who intend to pursue a Ph.D. in Materials
Science and Engineering are required to take the MSE Preliminary Examination the first time
it is offered following their admission to the program. Masters students are also encouraged
to take the Ph.D. preliminary examination so that they may elect to pursue a Ph.D. at a later
stage. It is advisable to discuss the examination with the Graduate Adviser and your Major
Professor. In addition, copies of previous exams are available for review in the office of the
Graduate Program Coordinator.

The examination is given at the beginning of the Spring Quarter each year. FYGS must submit
their Preliminary Program of Study to the Materials Science and Engineering Graduate
Adviser by the end of Winter Quarter to be eligible to take the Ph.D. Preliminary Examination
in the Spring. The Preliminary Program of Study shows how the student plans to fulfill all
coursework requirements.

The Preliminary Examination consists of oral and written examinations in three areas: (1)
Microstructural Properties, (2) Thermodynamics and Kinetics, and (3) Mechanical and
Electronic Properties. These examinations test the student's knowledge at the senior
undergraduate level. The two hour written exams are given on three successive days, with the
oral exams scheduled for one or two subsequent days (depending on the number of
candidates). The third written examination, Mechanical and Electronic Properties, will have a
total of four questions equally divided between the two areas. The written portion of this exam
will involve answering three questions out of four. The Subject area of questions on the
subsequent oral examination will be weighted in proportion to the student’s choice on the oral
exam.

The student's performance in each oral and written exam will be assigned a grade on a scale of
1-10. The passing grade is an average of 7 for all six exams with a score no less than 5 on any
one exam. The exam results will be assessed along with the student's academic record in a
subsequent faculty meeting. The outcome will be one of three possibilities:
(i) PASS, with a recommendation that the student be permitted to continue in the Ph.D. program;

(ii) CONDITIONAL PASS, with a recommendation that the student be permitted to continue in the Ph.D. program subject to successful completion of specified conditions (e.g. additional coursework with a minimum letter grade of B).

(iii) FAIL, with a recommendation that the student terminate his or her graduate study at the M.S. level.

Each student will be informed of the outcome of the Preliminary Examination in writing not later than two weeks following the examination. This outcome is final and the exam cannot be taken again the following year. A student has the opportunity to appeal this decision for cause to the Materials Science and Engineering graduate faculty and subsequently to the Dean of Graduate Studies.

When necessitated by the outcome of the exam, the Graduate Adviser will assist the student in filing for a Change of Degree Objective. Students who elect to change their degree objectives to a M.S. after passing the Ph.D. Preliminary Evaluation must file a Change of Degree Objective Form, approved by the Graduate Adviser and Graduate Studies, and insure that they have met degree requirements for the M.S.

5. Qualifying Examination

After passing the Ph.D. Preliminary Evaluation the student should immediately begin preparing for the Qualifying Examination administered by a faculty committee appointed by the Dean of Graduate Studies. Students are required to take the Qualifying Examination at the time they have completed all course-work listed on the Program of Study, with the exception that they may be enrolled in one final course during the quarter of the exam. This oral exam tests the student’s level of preparation to pursue Ph.D. research. Students are expected to have a thorough understanding of the context of their proposed research, relevant literature and the appropriate theoretical and experimental approaches to their research problem. Successful completion of the examination does not require that the student have extensive research results. The Qualifying Exam is normally taken at the end of the Winter Quarter of the second year, but no later than the end of the Spring Quarter of the second year. A GPA of 3.5 in graduate course work is expected (minimum 3.25 is required) in order to take the Qualifying Examination.

Early in the Fall Quarter of the second year the student should meet with his/her Dissertation Committee to discuss the proposed research and finalize the Program of Study. During the Fall Quarter the student should prepare a research proposal to distribute to the Qualifying Examination Committee and the final Program of Study to be submitted through the Graduate Adviser to the College Graduate Study Committee for approval. The student will receive a copy of his/her approved program. The Qualifying Examination Committee consists of five members with at least one member being appointed from outside the MSE program; the chairperson and two other members of the committee must be members of the MSE graduate program. Students, in consultation with their Major Professor and Guidance Committee, suggest a list of faculty to the Graduate Adviser. The Graduate Advisor then recommends the members of the committee and areas of the examination to the Dean of Graduate Studies for approval. The Major Professor may not be a member of the Qualifying Examination Committee. Students must be registered during the quarter in which they take the Qualifying Examination.

Once a time and date have been agreed upon by the student and committee members (the student coordinates the scheduling), the student completes and submits to the Graduate Program Assistant the Application for the Qualifying Examination. The application will be processed and a conference room reserved. A student must not take the qualifying examination
prior to receipt of the Notice of Admission to the Qualifying Examination from Graduate Studies. It takes approximately four weeks for Graduate Studies to process the application and to notify the committee members of their appointment. An electronic memorandum will be sent by the Graduate Program Assistant to all committee members (with a copy to the student) informing them of the final arrangements of the Qualifying Examination.

At least one week prior to the Qualifying Examination, the student must submit to the Committee a dissertation proposal (approved by the Major Professor) including a preliminary bibliography. The Qualifying Examination will be limited to the areas listed on the Application for the Qualifying Examination and a critical evaluation of a dissertation proposal. Successful completion of the Department Ph.D. Preliminary Evaluation and an approved Ph.D. Program of Study will be considered by the Qualifying Examination Committee to represent successful completion of the comprehensive part of the Qualifying Examination. The format of the Qualifying Examination will consist of a 20 to 30 minute presentation by the student followed by proposal related questions, general questions in the exam areas, and feedback by the Committee. The normal examination time is three hours.

The committee will conduct the examination, and will immediately thereafter inform Graduate Studies and the Graduate Adviser of the results. The possible outcomes of the Qualifying Examination are:

(i) PASS, with a recommendation that the student be advanced to candidacy for the Ph.D.;
(ii) NOT PASS, with a recommendation that the student be permitted to retake the examination one time in part or in total. The format of a partial second examination may be substantially different from the first;
(iii) FAIL, with a recommendation that the student terminate his or her graduate study at the M.S. level and be disqualified from further graduate study at UC Davis.

Upon successful completion of the Qualifying Examination, the student must complete an Application for Advancement to Candidacy, which lists the dissertation topic and proposed members of the Dissertation Committee. When this form has been completed by the student and signed by the Graduate Adviser and proposed Dissertation Committee Chair, the student pays a candidacy fee at the campus Cashier's Office and submits the form to Graduate Studies for approval.

6. **The Ph.D. Dissertation**

A dissertation on a subject chosen by the candidate and Major Professor, bearing on the principal subject of study, and of such character as to show ability to pursue independent investigation, must be approved by the Dissertation Committee and by the Graduate Council before the degree will be recommended. The doctoral dissertation must be an original and substantial contribution to knowledge in the student's major field. It must demonstrate the ability to carry out a program of advanced and independent research and to report the results in accordance with standards observed in recognized peer reviewed scientific journals. Each student is expected to present the results of his or her dissertation research in a public seminar, which may be scheduled as part of the regular ECH 290 or ECH 293 seminars.

7. **Filing the Dissertation**

Filing of a dissertation with Graduate Studies is the last requirement satisfied by candidates for a Ph.D. The deadlines for completing this requirement are listed for each quarter in the campus General Catalog and the Class Schedule and Room Directory (available at the Bookstore). A candidate must be a regularly registered student or on filing fee status at the time of filing a dissertation with the exception of the period between the end of the Spring Quarter and the beginning of the Fall Quarter.
8. Commencement

Graduate Studies, together with the Graduate Council and the Graduate Student Association, hosts Graduate Commencement. The ceremonies are held on the last Thursday of the Spring Quarter in the evening at the University Recreation Hall. A reception is held immediately following the ceremony for the degree recipients, candidates, faculty, family and friends.

If you receive your graduate degree in September, December, March or in June, you are eligible and welcome to participate in commencement. If you are close to completion and will not be in Davis the following June, you are also eligible and welcome to participate. Graduate Studies will send you information about Commencement in February.

9. Summary of Milestones for Ph.D. in Materials Science and Engineering

The milestones described below are designed to help students finish their degree requirements for the Ph.D. within 4 years. This is the framework that will be considered when making evaluations for satisfactory progress.

First Year

(i) If you are a permanent resident of the United States, but not a California resident, see the Residency Deputy in the Registrar’s Office (Mrak Hall) to file a petition (October).

(ii) Complete coursework for the major, start coursework for the minor (Fall, Winter, Spring).

(iii) Select Ph.D. Major Professor (December).

(iv) Identify a Guidance Committee and initiate research on dissertation proposal (January).

(v) Prepare Preliminary Program of Study and submit it to the Graduate Adviser (March).

(vi) Take Ph.D. Preliminary Exam (April).

(vii) Continue research on dissertation topic (Winter, Spring, Summer).

Second Year

(i) Complete coursework for the minor, finalize and submit Program of Study (Fall).

(ii) Present a 20-minute seminar on dissertation research in ECH 293 (Fall or Winter).

(iii) Complete Research Proposal for Qualifying Exam (February).

(iv) Take Ph.D. Qualifying Exam (Winter or Spring).

(v) Identify Dissertation Committee and submit Application for Advancement to Candidacy (Winter or Spring).

(vi) Meet with Dissertation Committee for follow-up discussion of Qualifying Exam.

(vii) Dissertation research (Fall, Winter, Spring, Summer).

Third Year

(i) Dissertation research (Fall, Winter, Spring, Summer).

(ii) Complete optional coursework for breadth.

(iii) Meet periodically with Dissertation Committee to consolidate dissertation objectives and discuss progress toward degree.

Fourth Year

(i) Present a 20-minute seminar on research in ECH 293 (Fall or Winter).
(ii) Meet periodically with Dissertation Committee to consolidate dissertation objectives and discuss progress toward degree.

(iii) Complete dissertation research (Fall, Winter, Spring).

(iv) Present dissertation seminar (Spring, Summer, Fall).

(v) File dissertation (Spring, Summer, Fall).

10. **Responsibilities of Ph.D. Students**

The goal of the Department is that each student should have the opportunity to complete all degree requirements (course work and dissertation defense) within twelve academic quarters (not including summers) if they enter the graduate program at Davis with a B.S. degree in Materials Science and Engineering or nine academic quarters if they enter with an M.S. degree in Materials Science and Engineering. It is noted that individual time-to-degree goals may vary due to the very nature of advanced research and this framework should serve as a guideline under which the Major Professor and the student can work together towards a timely completion of the dissertation requirements.

For all Ph.D. students, satisfactory progress consists of:

(i) Completing course requirements as specified (including ECH 290 and ECH 293).

(ii) Taking the Ph.D. Preliminary Exam during the first year of graduate study.

(iii) Obtaining Satisfactory grades in EMS 299 and 290C.

(iv) Taking the Qualifying Exam by the end of the Winter Quarter of the second academic year.

(v) Maintaining an overall GPA of 3.5 or above (a minimum GPA of 3.25 is required).

(vi) Completing all degree requirements within twelve academic quarters beyond the B.S. or nine academic quarters beyond the M.S. (If a Ph.D. project extends beyond this time limit, the student may still be considered as making satisfactory progress if so determined by the Major Professor and the Dissertation Committee.)

All Major Professors must complete an EMS 299 advising evaluation form in consultation with each student. These evaluations along with the instructor evaluations are to facilitate communication between the student and the Major Professor regarding advancement toward degree objectives. In addition, graduate students are encouraged to present their research routinely at research group meetings and must present results of their research in ECH 293 at least twice during the four-year period.

Graduate students are subject to academic probation if their progress is judged unsatisfactory in their annual review, if, in any quarter, their cumulative grade point average is below 3.0 or if they accumulate more than 8 units of incomplete (I), failing (F) or unsatisfactory (U) grades. The Dean of Graduate Studies will inform the student if he/she is on academic probation and what must be done to return to regular status. A student is subject to disqualification (also known as dismissal) if he/she cannot meet the requirements for regular status. Disqualification of graduate students is at the discretion of the Dean of Graduate Studies as discussed in the Graduate Student Handbook.
D. MASTER OF SCIENCE DEGREE IN MATERIALS SCIENCE AND
ENGINEERING

The Master of Science degree program in Materials Science and Engineering allows students to take advanced coursework and develop the skills necessary to complete an independent research project. For the Master of Science degree, students must be in residence for a minimum of three quarters. A student is in academic residence when enrolled in at least 4 units of approved upper division or graduate courses, including research. However, normal full-time enrollment is for 12 units per quarter. Two regular six-week Summer Sessions may be counted as the equivalent of one quarter. Arrangements can be made to satisfy part of a residence requirement by study on another campus of the University.

1. Coursework Requirements

A Master of Science degree may be awarded upon completion of Plan I (thesis plan) in which a total of 36 upper-division and graduate course units and a thesis are required. Of this total, at least 18 units must be graduate level courses in engineering (exclusive of seminar and research units) and at least 12 of the 18 must be from the foundation Materials Science and Engineering courses listed in Section B. All courses included in the 18 units must be completed on a letter grade basis. M.S. students must also complete 2 units of research seminar courses (EMS 294, ECH 290 or ECH 293) during their M.S. degree program. The remainder of the 36 unit requirement can comprise an appropriate combination of thesis research (EMS 299) and/or upper-division or graduate technical electives. However, an undergraduate course, required for the B.S. degree in Materials Science and Engineering at UC Davis, cannot be used to fulfill the M.S. coursework requirements. Upper division undergraduate courses that are not required for the B.S. degree may be applied to the M.S. degree requirements. See also Section F for a discussion of transfer credit from other universities.

Students pursuing graduate study in Materials Science and Engineering but who have a Bachelor's degree in a field other than Materials Science, Metallurgy or Ceramics are required to take the core senior-level courses EMS 130, 132, 134 and 138 during their first year of graduate study in the program. Students will be exempt from this requirement if they can demonstrate that they have previously studied an essentially similar course. As noted above, these course taken to remedy deficiencies in academic background do not count toward the graduate program requirements. First year graduate students should meet with the Graduate Adviser prior to the start of instruction in Fall Quarter to review their schedule with regard to background courses.

Although work for the Master of Science degree can be completed in three quarters of full-time study, at least one calendar year to six quarters of full-time study is usually required to complete the M.S. research and thesis.

2. Thesis Committee Selection

During the Winter Quarter of the first year, after the student has selected a Major Professor, the student and Major Professor develop a Preliminary Program of Study and propose two additional faculty members to serve on the student's Thesis Committee. The Major Professor serves as Chairperson of this committee and at least one other member must be a member of the graduate faculty in Materials Science and Engineering. The student should then contact these faculty to determine if they are willing to serve on the committee and discuss the proposed Program of Study. With the advice of the Graduate Adviser and Guidance Committee, each student develops a meaningful sequence of courses. The technical interests of the student are considered and the program is individually tailored in such a way that the
student obtains a strong over-all technical background.

3. Advancement to Candidacy

Students must file an Application for Advancement to Candidacy with Graduate Studies after completion of at least one-half of the degree requirements and at least one quarter before completion of all requirements. Application for advancement to candidacy may be made if only if the GPA average is sufficiently close to 3.0 so that if the student is currently enrolled in course work, the successful completion will give the student the required GPA of 3.0. Even if advanced, the student must attain a minimum grade point average of 3.0 before the degree will be awarded. The names of the proposed Thesis Committee members and topic of the thesis are included in the Application for Advancement to Candidacy, which is endorsed by the Graduate Adviser and submitted for approval by the Dean of Graduate Studies.

4. The M.S. Thesis

Masters students are expected to begin work on their research immediately after they have chosen a topic and been assigned a Major Professor. New students should begin consultations with individual faculty members during their first quarter to discuss research topics. It is critical that the M.S. student complete coursework and research in a timely manner in order to finish within six academic quarters. Each student is expected to present the results of his or her thesis research in a public seminar, which may be scheduled as part of the regular ECH 290 or ECH 293 seminars.

5. Filing the M.S. Thesis

Filing of a thesis with Graduate Studies is the last requirement satisfied by candidates for Master's degrees. The deadlines for completing this requirement are listed for each quarter in the campus General Catalog and Class Schedule and Room Directory (available at the Bookstore). A candidate must be a regularly registered student or on filing fee status at the time of filing a thesis with the exception of the period between the end of the spring quarter and the beginning of the fall quarter.

6. Commencement

Graduate Studies, together with the Graduate Council and the Graduate Student Association, hosts Graduate Commencement. The ceremonies are held on the last Thursday of the Spring Quarter in the evening at the University Recreation Hall. A reception is held immediately following the ceremony for the degree recipients, candidates, faculty, family and friends.

If you receive your graduate degree in September, December, March or in June, you are eligible and welcome to participate in commencement. If you are close to completion and will not be in Davis the following June, you are also eligible and welcome to participate. Graduate Studies will send you information about Commencement in February.

7. Summary of Milestones for M.S. in Materials Science and Engineering (Plan I)

The milestones described below are designed to help students finish the requirements for the Master's degree within 2 years. This is the framework that will be considered when making evaluations for satisfactory progress.

First Year

(i) If you are a permanent resident of the United States, but not a California resident, see the Residency Deputy in the Registrar’s Office (Mrak Hall) to file a petition (October).

(ii) Complete required coursework (Fall, Winter, Spring).
(iii) Select Major Professor (December).
(iv) Identify a Thesis Committee (January).
(v) Prepare Preliminary Program of Study and submit it to the Graduate Adviser for approval (March).
(vi) Initiate research on thesis (Winter, Spring, Summer).

Second Year

(i) Submit Application for Advancement to Candidacy (Fall).
(ii) Complete research (Fall, Winter, Spring).
(iii) Present thesis seminar (Spring, Summer).
(iv) File thesis with Graduate Studies (Spring, Summer).

8. Responsibilities of the Master’s Student

For all Master’s students, satisfactory progress consists of:

(i) Completing course requirements as specified (including ECH 290 and ECH 293).
(ii) Obtaining Satisfactory grades in EMS 299 and 290C.
(iii) Taking the Qualifying Exam by the end of the Winter Quarter of the second academic year.
(iv) Maintaining an overall GPA of 3.25 or above (a minimum GPA of 3.25 is required).
(v) Completing all degree requirements within six academic quarters beyond the B.S. or (If a M.S. project extends beyond this time limit, the student may still be considered as making satisfactory progress if so determined by the Major Professor and the Thesis Committee.)

All Major Professors must complete an EMS 299 advising evaluation form in consultation with each student. These evaluations along with the instructor evaluations are to facilitate communication between the student and the Major Professor regarding advancement toward degree objectives. In addition, graduate students are encouraged to present their research routinely at research group meetings and must present results of their research in ECH 293 at least twice during the two-year period.

Graduate students are subject to academic probation if their progress is judged unsatisfactory in their annual review, or if, in any quarter, their cumulative grade point average is below 3.0 or if they accumulate more than 8 units of incomplete (I), failing (F) or unsatisfactory (U) grades. The Dean of Graduate Studies will inform the student if he/she is on academic probation and what must be done to return to regular status. A student is subject to disqualification (also known as dismissal) if he/she cannot meet the requirements for regular status. Disqualification of graduate students is at the discretion of the Dean of Graduate Studies as discussed in the Graduate Student Handbook.
E. FINANCIAL SUPPORT

The goal of the Materials Science and Engineering program is to provide a stipend equivalent to a 50% RA (Research Assistant) for 12 months per year up to 4 years for Ph.D. students making satisfactory academic progress. Depending on availability of faculty research support, appointments may be up to 100% during the summer. The financial offer made to the FYGS can be achieved through a combination of RA, TA/AI (Teaching Assistant/Associate-In), Fellowship, and PGR (Post Graduate Researcher) awards. However, it is the responsibility of the Major Professor, not the MSE program, to make all possible efforts to ensure that the commitment to the FYGS is met beyond the first quarter of enrollment.

Stipend awards to continuing students will be made on the basis of academic and research achievements at Davis, performance of assigned duties, promise of future productivity, and the demonstration of satisfactory progress as described above. The principal source of these stipends will always be extramural funding. Obtaining such support for his or her graduate students is a primary objective of each faculty member's research activities.

Students must make satisfactory progress toward their degree objectives to be eligible for continued support. Ph.D. students in residence for more than twelve academic quarters and M.S. students in residence for more than six academic quarters will not be eligible for TA/AI positions in the Department, Nonresident Tuition Fellowships (NRTF), and/or Department fellowships. Preference for departmental support will be given to those students who are making satisfactory academic progress. For those students who may be considered making satisfactory progress beyond the fourth year, support funds should come from extramural sources.

There are several categories of support, with some awards based on merit and others on financial need. These are funded by either the campus (through the Office of Graduate Studies), the program, or individual faculty members.

Individual Faculty

Research Assistantships and Post-Graduate Researcher positions are funded through non-departmental sources, usually extramural research grants and contracts awarded to individual faculty.

If a graduate student is not meeting the faculty member's expectations for timely academic progress toward achieving an advanced degree as reflected in poor performance reports, the faculty member has the right to terminate extramural funding. However, the graduate student must be informed in writing at least three months in advance that this is being considered, and the student must be informed of the conditions that must be met to avoid termination of funding. Other circumstances may arise that require funding to be terminated with less than three months notice, e.g., change of Major Professor, request for PELP, or gross neglect of research responsibilities. If less than three months notice is to be given, the Major Professor must apprise the Department Chair and Graduate Adviser before such action is taken.

Program

Departmental Fellowships, Block Grant Fellowships and Nonresident Tuition Fellowships are available to continuing students only under extraordinary circumstances. These funds are derived from extramural gifts to the Department and block grant funds received from the campus. Need-based federal Work-Study awards are made through the College of Engineering. All of these forms of support are used mainly for recruiting new students.

Teaching Assistantships (TAs), Associate-Ins (AIs), and Readerships are available. These are generally assigned on a quarter-to-quarter basis from funds allocated to the Department by the campus.
Campus

Centrally Administered Fellowships for continuing students are available on a competitive basis through the Office of Graduate Studies. The application deadline for these is usually January 15. The Office of Graduate Studies also provides extensive information on extramural fellowship opportunities via their Web site. Deadlines for these programs vary, but are often during Fall quarter. Need-based Financial Aid is available through the Financial Aid office. Eligibility for need-based support requires that students file the Free Application for Federal Student Aid (FAFSA), which is normal due the first week of March. All students should file the FAFSA in order to ensure their eligibility for a broad array of funding opportunities.

F. TRANSFER OF CREDIT FROM OTHER INSTITUTIONS

Ordinarily all work for the graduate degree is done in residence on the Davis campus. However, with the consent of the Graduate Adviser and the Dean of Graduate Studies, work taken elsewhere may be credited toward the degree.

Doctoral Program

Coursework taken at other academic institutions is not transferred to a student's UC Davis graduate record, although that coursework may be applied to the student's Program of Study. The department requires the doctoral student to complete a minimum of 23 units of coursework listed on the Program of Study to be taken at UC Davis.

Master's Program

A student transferring to the University of California, Davis during a Master's program may be allowed a maximum of 6 quarter units of credit for appropriate courses taken elsewhere. Credit so allowed cannot be used to reduce the minimum number of graduate course units (200 series) required for the master's degree. A student from another campus of the University of California may be allowed credit for up to 6 units required for a Master's degree for courses taken at the other campus.

There are additional Graduate Studies transfer credit regulations. These include:

1. Units of work taken elsewhere (other than another campus of the University of California) may not be used to reduce the minimum residence requirements or the 12-unit minimum requirement in the 200-series courses taken at the University.

2. Students who have been accepted into a double major program may transfer a total of 12 units overall between academic programs with the approval of the Graduate Adviser and the Dean of Graduate Studies.

3. Requests for transfer credit are usually done at the time of Advancement to Candidacy. The Graduate Adviser should make a request to the Dean specifying the units and courses involved.

4. Units to be so counted must have been taken at an accredited institution.

G. RESIDENCE AND REGISTRATION REQUIREMENTS

Registration Policies. Upon matriculation in a particular program, you are expected to register continuously until completion of the degree. However, leaves are readily granted for causes such as illness, family problems, and uncertainty regarding educational goals. If you do not register, and fail to have a leave approved, you are not guaranteed readmission at a later date.
Enrollment Policies. Students are expected to enroll each quarter for an academically appropriate number of units. The minimum is 12 units of upper division or graduate courses per quarter to be considered a full-time student. Units of EMS 299 may be assigned for students carrying out supervised research or preparing for the Ph.D. Preliminary Examination or the Qualifying Examination, and count toward the minimum 12 unit requirement.

H. FILING FEE STATUS

Doctoral and Master’s candidates will normally file a final approved copy of their dissertation or dissertation with Graduate Studies during their final quarter of residence on campus and must be registered at this time. Students who have completed all degree requirements, including all laboratory work and the preparation of a draft of their dissertation, and who may not require an additional quarter in residence to prepare the final dissertation manuscript, are eligible to pay a reduced fee of approximately $120 (for the filing of a dissertation and/or a formal final examination) rather than registering as a regular student.

To prevent abuses of the Filing Fee procedures, definite limitations on eligibility for the Fee have been established. Students in non-registered status (PELP or Filing Fee) will be allowed one quarter of appointment without request for exception. Exceptions beyond this one-quarter period rarely will be granted. Students are ineligible for PELP or Filing Fee if they are using University facilities to perform their research. Doctoral students must have completed all of their research to be eligible for Filing Fee status. In general, these limitations are based upon the principle that students using University facilities or faculty time, other than the time involved in the final reading of dissertations or theses, are not eligible to employ the Filing Fee procedure. Students paying only the Filing Fee are not registered students eligible for the privileges accorded regularly enrolled students. In particular, students using the Filing Fee:

a. May not make use of University educational facilities, such as the library or laboratories;

b. Are not eligible for the services of the University Health Center or for University housing;

c. May not take course work of any kind;

d. May not make use of faculty time except as noted above.

Students who plan to make use of Library or other facilities or to take courses must register as regular students. Students who plan to be away from the campus, but in an instructional relationship with faculty members must register as regular students (a student outside the State of California may be eligible to register for reduced fees). Students planning to take Qualifying Examinations for the Ph.D. degree must register as regular students. Completion of formal coursework or residency requirements does not entitle a student to apply for the Filing Fee unless the student will use no University facilities or faculty time except as noted above.

I. REGISTRATION

Register Students Via Phone (R.S.V.P.), the UC Davis telephone registration system, enables students to register via touch-tone phone from anywhere in the world. The voice of R.S.V.P. prompts you to enter the information required for each transaction. Using R.S.V.P., you can add or drop courses (including variable-unit courses), opt to take a course on a S/U grading basis, change the unit value for a variable-unit course, and hear a list of your courses complete
with locations and times. When you register through R.S.V.P. you know immediately about the status and availability of courses.

Students wishing to add courses which require instructor approval (290C, 299 and 390) must obtain the appropriate course reference number (CRN) from the instructor before calling R.S.V.P. ALWAYS REMEMBER: You must receive instructor approval before changing units. Failure to secure instructor approval before registering for a variable-unit course or changing units may result in disciplinary action, academic penalty, or both.

J. IMPORTANT DEADLINES

There are many important dates/deadlines that you need to be aware of such as the last date to pay fees, add/drop classes, file petitions, file theses. These deadlines are listed in the General Catalog (yearly), the Graduate Guide and in the Class Schedule and Room Directory (quarterly). Most deadlines are also posted at the Chemical Engineering and Materials Science Department office and on various bulletin boards throughout Bainer Hall, Engineering II and campus. Reminders are generally sent via e-mail, but the ultimate responsibility lies with the student — so always try to be aware of any impending deadline.