Electrical Engineering and Computer Science

Graduate Program Policies and Procedures

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A. Introduction

A 1) Aims and Scope: The EECS program at UC Merced offers MS and PhD degrees.

A 2) Admissions Requirements: A person seeking admission to EECS Graduate Group must have earned a bachelor's degree (with a minimum GPA of 3.0) and must submit three letters of recommendation, official transcripts, GRE scores, TOEFL or IELTS score (if applicable) and the graduate online application with fee by the stated admission deadline. Incomplete applications might not be evaluated by the Admissions Committee and therefore might be rejected without further consideration, at the discretion of the Admissions Committee. Applicants are encouraged to specify their research interests in their statement of purpose, possibly linking them to the activities of current EECS faculty members. Admission decisions are made on a case-by-case basis. Meeting some or all of these criteria does not guarantee admission, but merely eligibility. Completed applications are reviewed by the EECS Admissions Committee which makes recommendations for admission (generally, on the basis of available space and the competitiveness of applicants compared to the eligible pool) to the Vice Provost and Dean of the Graduate Division, who makes final decisions on admission. An applicant to EECS may be granted provisional admission, pending remedial actions (e.g., receipt of GRE scores, classes that would enable the student to take EECS graduate classes, etc.).

A 2 b) Prerequisites: There are no general prerequisites for admission. However, if the bachelor's degree of an applicant is not in CSE, ECS, EECS, Applied Mathematics, or a related area, he or she may be required to take some basic undergraduate computer science courses to make up for the coursework deficiencies. There is no specified list of these courses and specific situations are handled on a case-by-case basis.

A 2 c) Deficiencies: Coursework deficiencies should be made up by the end of the first academic year following initial enrollment by earning a letter grade of "B" or better in each course.

A 3) General Committees: The EECS Graduate Group has two standing committees: Executive Committee and Admissions Committee.

A 3 a) Executive Committee: The Executive Committee (EC) shall, in consultation with the faculty and relevant Senate commitees, determine and implement policies for the good of the graduate studies, establish and guide the educational requirements, and represent the interests of EECS to University, the Senate and other agencies.

A 3 b) Admission 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 the Graduate Division, exploring graduate student support mechanisms, and allocating intramural financial assistance.

B. MS Requirements

There are two options for obtaining an MS in EECS: the Thesis option and the Non-Thesis (Comprehensive Examination / Project) option. Each has minimum coursework requirements. Each requires a minimum of two semesters in academic residence. The

capstone requirement is satisfied by either a written thesis or a comprehensive examination or project.

B 1) MS (Thesis Option): In addition to an approved thesis, a minimum of 30 semester units in course work is required which must satisfy the following criteria:

- At least 20 units must be earned in EECS 200-level (or EECS-approved) graduate courses.
- All courses taken to satisfy this 20-unit requirement must be taken for a letter grade.
- Any credit earned for thesis research and any units earned for courses with EECS 290 and above cannot be counted towards these 20 units.
- In addition, 2 semester units must be earned by attending the EECS seminar (EECS 290).
- The coursework for the remaining units must be approved by the graduate advisor, and can include units from undergraduate courses or courses with EECS 290 and above.

B 1 a) Program Learning Outcomes (PLOs): There are six PLOs for the EECS MS (Thesis Option):

1. *Research Ability*. Able to conduct supervised research in electrical engineering and computer science and are able to situate this research in the contexts of current research literatures.
2. *Core Knowledge*. Able to apply their knowledge of computing, mathematics, science, and engineering to the design and implementation of solutions, under appropriate guidance, to technological problems.
3. *Experimental Ability*. Able to conduct experiments and computational simulations for the purpose of evaluating and comparing proposed solutions on the basis of empirical evidence.
4. *Lifelong Learning*. Possess the characteristics of lifelong learners, able to acquire and use new techniques, skills, and engineering and scientific tools for research and development practice in electrical engineering and computer science.
5. *Ethical Practice*. Practice a high standard of professional ethics, including integrity in the conducting and writing of research.
6. *Communication and Presentation*. Communicate effectively through oral, visual, and written means, effectively addressing a broad range of technical audiences.

B 1 b) Course Requirements: There are no core and elective course requirements. Students are free to choose any eligible graduate course with the approval of the graduate advisor. A minimum course load of 12 units must be carried each academic semester.

B 1 c) 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. A student's GPA must be at least 3.0 in all the courses taken to advance to candidacy. A committee to evaluate the final MS thesis must be established when advancing to candidacy. The committee follows the same requirements as for establishing the Thesis Committee.

B 1 d) Thesis Requirements: Research for the MS thesis is to be carried out under the supervision of the graduate advisor and must represent a contribution to knowledge in the field. The thesis research must be conducted while the student is enrolled in the program. The candidate and the graduate advisor should meet at least once a year with the other members of the thesis committee to discuss progress and any changes in research objectives. The thesis is submitted to the thesis committee at least 30 days before the scheduled defense. The defense may be organized as a public seminar, presenting the results of the work. However, a public seminar is not a requirement, and the final decision about the form of defense rests with the committee. All committee members must approve the thesis in its entirety and sign the title page before the thesis is submitted to the Graduate Division for final approval. Should the committee determine that the thesis is unacceptable, even with substantial revisions, the program Chair may recommend the student for disqualification from the program.

B 1 e) Thesis Committee: A Thesis Committee is comprised of a minimum of three members, including the chair of the committee, at least two of whom must be members of the EECS Graduate Group. The student, in consultation with the graduate advisor and graduate group chair, nominates two faculty members to serve on the Thesis Committee. The graduate advisor is the 3rd member and serves as the chair. This committee shall approve the subject, pass on the content of thesis, and administer the general examination. Usually one of the committee members directs the work.

B 2) MS (Non-thesis Option): In addition to the comprehensive examination or project approval, a minimum of 30 semester units in course work is required, which must satisfy the criteria:

- At least 24 units must be earned in EECS 200-level (or EECS-approved) graduate courses.
- All courses taken to satisfy this 24-unit requirement must be taken for a letter grade.
- Any credit earned for thesis research and any units earned for courses with EECS 290 and above cannot be counted towards these 24 units.
- In addition, 2 semester units must be earned by attending the EECS seminar (EECS 290).
- The coursework for the remaining units must be approved by the graduate advisor, and can include units from undergraduate courses or courses with EECS 290 and above.

B 2 a) Program Learning Outcomes (PLOs): There are five PLOs for the EECS MS (Non-Thesis Option):

1. *Core Knowledge*. Able to apply their knowledge of computing, mathematics, science, and engineering to the design and implementation of solutions, under appropriate guidance, to technological problems.
2. *Experimental Ability*. Able to conduct experiments and computational simulations for the purpose of evaluating and comparing proposed solutions on the basis of empirical evidence.

3. *Lifelong Learning*. Possess the characteristics of lifelong learners, able to acquire and use new techniques, skills, and engineering and scientific tools for research and development practice in electrical engineering and computer science.
4. *Ethical Practice*. Practice a high standard of professional ethics, including integrity in the conducting and writing of research.
5. *Communication and Presentation*. Communicate effectively through oral, visual, and written means, effectively addressing a broad range of technical audiences.

B 2 b) Course Requirements: There are no core and elective course requirements. Students are free to choose any eligible graduate course with the approval of the graduate advisor. A minimum course load of 12 units must be carried each academic semester.

B 2 c) 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. A student's GPA must be at least 3.0 in all the courses taken to advance to candidacy. A three-person committee to administer the final examination or evaluate the final project or project report must be established when advancing to candidacy. The committee follows the same requirements as for establishing the Comprehensive Examination Committee.

=>Similar fixes were added to the respect B 1 sections.

B 2 d) Comprehensive Examination: The comprehensive examination can be based on a paper that synthesizes two or more topics typically covered in a class or a set of classes, or on a development project or project report, and will incorporate and satisfy the capstone requirement for the MS degree. The EECS Chair will serve as the single coordinator to ensure consistent quality and scope of projects or written papers.

The Comprehensive Examination may result in one of three possible outcomes: Pass, Partial Pass, or Fail. Unanimous agreement of the committee is required. The student may be allowed to make minor modifications prior to submitting the results of the examination. If a student does not pass, the committee may recommend that the student be reexamined one more time on the entire examination or on the failed components (Partial Pass). The second exam must take place within six months of the first exam. The examination may not be repeated more than once. A student who does not pass on the second attempt is subject to disqualification from further graduate work in the program.

B 2 e) Comprehensive Examination Committee: A Comprehensive Examination Committee consists of at least three members, including the chair of committee, at least two of whom are members of the EECS Graduate Group. The student, in consultation with the graduate advisor and graduate group chair, nominates two faculty members to serve on the Comprehensive Examination Committee. The graduate advisor is the 3rd member and serves as the chair. These nominations are submitted to the Graduate Division for formal appointment in accordance with Graduate Council policy. This committee shall approve the subject, pass on the content of examination, and administer the examination. Usually one of the committee members directs the work.

B 3) Advising: Upon enrollment at UC Merced, each student pursuing an MS in EECS is assigned a *graduate advisor,* who supervises the student's research and possibly thesis. The graduate advisor must be a faculty member of the EECS Graduate Group. An affiliate

member of EECS may supervise an MS student if approved by the Executive Committee. Graduate advisors, appointed by the EECS Chair, are a resource for information on academic requirements, policies and procedures, and registration information until the Thesis or Comprehensive Committee is formed.

B 4) Normative Time: Normative Time to complete all requirements for the MS is two years, assuming that the student is engaged in full-time study and making adequate progress.

B 5) Typical Timeline: Below is a typical plan of study:

Year One	*Fall*	*Spring*
	Take 12 units of *Graduate courses*	*Take 12 units of Graduate courses*
		Take 1 unit of EECS 290.
Year Two	*Fall*	*Spring*
	Take 12 units of Graduate courses	*Take 12 units of Graduate courses*
	Take 1 unit of EECS 290.	*Complete and defend MS Thesis, or complete Comprehensive Examination*

B 6) Sources of Funding: Graduate students who received a funding offer with their admissions offer will have their financial support according to the terms of the funding offer. Funding will come through a combination of Teaching Assistantships, graduate Research Assistantships, and/or Fellowships. Master's students are typically not expected to be funded by such means; but they may receive a funding offer with their admissions offer. More information on financial support can be found in the Graduate Policies and Procedures Handbook.

C. Doctoral Degree Requirements

C 1) Program Learning Outcomes (PLOs): There are six PLOs for the EECS PhD:

1. *Research Ability*: Able to identify novel and significant open research questions in electrical engineering and computer science and are able to situate such questions in the contexts of current research literatures.

2. *Core Knowledge*: Able to apply their knowledge of computing, mathematics, science, and engineering to the analysis of technological problems, as well as to the design and implementation of viable solutions to those problems.
3. *Experimental Ability*: Able to design and conduct experiments and computational simulations for the purpose of evaluating and comparing proposed solutions on the basis of empirical evidence.
4. *Lifelong Learning*: Possess the characteristics of lifelong learners, able to acquire and use new techniques, skills, and engineering and scientific tools for research and development in electrical engineering and computer science, as well as develop new methods and make new discoveries.
5. *Ethical Practice*: Practice a high standard of professional ethics, including integrity in the conducting and writing of research.
6. *Communication and Presentation*: Communicate effectively through oral, visual, and written means, effectively addressing a broad range of technical audiences.

C 2) Course Requirements: A Ph.D. student must complete a minimum of 32 units in graduate course work, satisfying the following requirements:

- At least 24 units of required letter-grade coursework must be from EECS courses numbered EECS 200-289.
- The remaining 8 units of required letter-grade graduate coursework must be approved by the advisor.
- Normally, up to 16 units from the required 24 units of EECS 200-289 courses taken for a letter grade can be waived with the approval of the EECS Executive Committee (for graduate courses taken at other institutions). Under exceptional circumstances, more than 16 of these units may be waived with approval of the Executive Committee.
- At least 3 additional units (beyond the 32 required letter grade units) must be earned in the EECS Seminar (EECS 290).

C 3) Teaching Requirement: All students pursuing a PhD degree in EECS are required to complete at least one semester as Graduate Student Instructor (also known as Teaching Assistant or TA).

C 4) Seminar Requirement: All students pursuing a PhD degree in EECS are required to give at least two open technical seminars 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. 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 PhD defense may be counted as one of the required seminars.

C 5) Advising and Mentoring: The Graduate Advisor is the faculty member who supervises the student's research and dissertation. The Graduate Advisor must be a core member of the EECS Graduate Group. To ensure satisfactory progress toward the degree, each student pursuing a PhD must meet with the faculty research advisor on a regular basis. After advancing to candidacy every student is expected to meet at least once per year with the

thesis committee. The responsibility to organize this meeting rests with the advisor. Such meetings shall happen before the annual evaluation by the EECS faculty. The EECS annual evaluation of progress takes place for all Ph.D. students, normally during the Spring term. For this 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 in EECS, 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 the graduate research advisor

C 7) Committees

C 7 a) Candidacy Committee: The Candidacy Committee is charged with determining the fitness of the student to proceed with the doctoral dissertation through a formal Qualifying Examination. The Candidacy Committee is comprised of at least three members, at least two of whom are core members of the EECS Graduate Group. The student, in consultation with the graduate advisor, nominates three faculty members to serve on the Candidacy Committee. Students must be in good academic standing and registered for the semester in which the examination is held.

C 7 b) Dissertation Committee: The Dissertation Committee shall supervise the preparation and completion of the dissertation and the final examination. The Dissertation Committee is a three-member committee selected by the Candidacy Committee, in consultation with the graduate student, the doctoral committee chair (usually the graduate advisor), and the EECS Chair. The Dissertation Committee may be the same as the Candidacy Committee. At least two members of the Dissertation Committee must be core members of the EECS graduate group. The role of the Dissertation Committee is to advise the doctoral student on the research topic and methods, and then to review the final completed dissertation for acceptance. Students are expected to meet with the Chair of the committee regularly. Committee members are expected to read and comment on a dissertation within four weeks of its submission. The student and doctoral committee members will coordinate a timeline for the student to present the thesis to the doctoral committee. This timeline must allow all doctoral committee members enough time to fulfill their responsibilities within the indicated deadline.

C 8) Advancing to Candidacy: Before advancing to candidacy for a doctoral degree, a student must have maintained a minimum GPA of 3.0 in all course work undertaken, and must have passed unanimously the Qualifying Examination. Normally, students advance by the end of six semesters, depending upon the area of specialization.

C 9) 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 Candidacy Committee will select one member to chair the committee. The dates for the examination are arranged between the student and the committee chair. The composition of the committee must be approved by the graduate dean.

At least four weeks before the intended date for the Qualifying Examination, the student will provide to the committee a written *research proposal* that describes a research topic, summarizes progress to date, and outlines what is proposed, 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.

The Qualifying Exam may be taken only after the student's written research proposal has been approved, and the exam will focus on the student's research proposal, but may cover any related field of interest. It should evaluate both general preparedness in the discipline, and specific competence to pursue the proposed dissertation topic. In its deliberation, the Committee ordinarily will review the student's academic record, preliminary examinations and evaluations by other faculty. The Committee may conduct any other examination it deems appropriate. The Committee ordinarily will review an outline of the proposed dissertation project, and will determine by oral examination the student's competence in that area. When, by unanimous vote, the Committee decides the student is qualified for the dissertation phase, it shall recommend advancement to candidacy.

Outcome of the Exam. The committee conducts the examination, and immediately thereafter evaluates the exam and informs the student of the outcome. The committee members should include in their evaluations of the student such factors such as: relevant portions of the previous academic record, performance on the examination, and an overall evaluation of the student's potential for scholarly research as emerged during the examination. Possible outcomes of the examination are:

- **Pass** - A student has passed when the Qualifying Examination Committee unanimously votes that the student passed the entire examination with scholarship that is at least acceptable. If agreed unanimously by the committee the student may be allowed to make minor modifications prior to submitting the results of the examination.
- **Fail** - A student has failed when the Qualifying Examination Committee votes unanimously that the student failed the entire examination. The second examination may have a format different from the first, but the substance should remain the same. A student whose performance on the second attempt is also unsatisfactory, or who does not undertake a second examination within a reasonable period of time, is subject to academic disqualification. A third examination may be given only with the approval of the Graduate Group committee and the Vice Provost and Dean of Graduate Education.
- **Partial Pass** - A student has partially passed when the Qualifying Examination Committee votes unanimously that the student passed some components but failed others. In this instance, the following apply:
    - The student has the option of taking a second examination as detailed above on the components failed; and
    - The chair of the committee must write a letter to the student, with a copy to the Graduate Division, conveying the information about the student's performance (pass, fail, or partial pass) on each of the components covered 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. In those cases when it is not possible for the members to resolve their differences and reach a unanimous decision, 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 EECS Executive Committee, who will use these individual reports to adjudicate the result, possibly including the opinion of additional experts as necessary.

As soon as a decision is reached, the committee shall inform the student of its decision in one of the forms listed above. If the decision is "Partial 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 "Partial Pass" decision, the committee must include in its report a further statement of its terms and inform the student of those terms. 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 and Graduate Dean, 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 Qualifying Examination is normally a closed event. Under exceptional circumstances one of the Ph.D. committee members may petition for an examination open to the general public. The final decision rests with the student. If the student agrees to have an open examination, the decision must be recorded in writing with the student's signature, and the signed document will be filed together with the report.

C10) Dissertation

Final Examination. A final examination, the focus of which is the content of the doctoral dissertation, is required and the Dissertation Committee supervises this examination. Ordinarily, the final examination will be given just prior to the completion of the dissertation and while the student is in residence during a regular academic session. Administration of the final examination is subject to the policies of the Graduate Council governing critical examinations. Upon completion of the final examination (if required) and approval of the dissertation, the Doctoral Committee recommends, by submission of the Report on Final Examination of the Ph.D. Degree Form, the conferral of the Ph.D. subject to final submission of the approved dissertation for deposit in the University Archives. The Committee recommendation must be unanimous.

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 and the date must be reported to the Dean of Graduate Studies. 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. 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. In those cases when it is not possible for the members to resolve their differences and reach a unanimous decision, 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 and the Graduate Dean. The Council and the Dean will use these individual reports to adjudicate the result.

The 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.

C 11) Normative Time: Normative Time for a PhD degree in EECS is 6 years. (This may be different for students entering with master's degrees versus those who pursue the PhD directly after the bachelor's degree.)

C 12) Typical Timeline : Below is a typical plan of study:

Year One	*Fall*	*Spring*
	Take 12 units of graduate work	*Take 12 units of graduate work*
	Register for 1 unit of EECS 290	*Register for 1 unit of EECS 290*
Year Two	*Fall*	*Spring*
	Take 12 units of graduate work	*Take 12 units of graduate work*
	Register for 1 unit of EECS 290	
Year Three	*Fall*	*Spring (advancement to PhD candidacy)*

	Take 12 units of graduate work	*Take 12 units of graduate work*

	Qualifying Exam Preparation	*Defend Qualifying exam*
Years Four-Six	*Dissertation work*	

C 13) Sources of Funding: Graduate students who received a funding offer with their admissions offer will have their financial support according to the terms of the funding offer. Funding will come through a combination of Teaching Assistantships, graduate Research Assistantships, and/or Fellowships. Master's students are typically not expected to be funded by such means; but they may receive a funding offer with their admissions offer. More information on financial support can be found in the Graduate Policies and Procedures Handbook.