EECS Graduate Handbook: 2024-2025

Updated February 2024

1. Introduction

The Berkeley EECS Department is large, and you may feel intimidated being on a big campus like the University of California, Berkeley (affectionately known as Cal). But there is no reason to feel overwhelmed by the size of the department or the confusing and complicated Berkeley bureaucracy. The faculty and staff are here to assist you and this manual will help you to help yourself. Reading it is sure to save you a lot of time.

In the following sections, we provide some basic information that you need to know about the organization of the EECS Department. Please keep in mind that the information noted in the Handbook may change each academic year. In addition, the rules stated do not include every possible scenario. If a situation is not specifically stated, this does not necessarily mean that is possible or impossible. Please check with your Staff Graduate Advisor or your faculty advisor if you have questions regarding your academic progress.

2. General Orientation

The Department of Electrical Engineering and Computer Sciences

The Department of Electrical Engineering and Computer Sciences, or "Berkeley EECS," or just "EECS" is composed of two semi-autonomous divisions: the Computer Science Division (CS) and the Electrical Engineering Division (EE). The CS division consists of over 50 professors, about 225 graduate students, and over 1800 undergraduates who are split between the College of Letters and Science (L & S), the College of Engineering (COE), and the newly formed College of Computing, Data Science and Society (CDSS). CS faculty and grad students are housed mainly in Soda Hall, Sutardja Dai Hall, and Berkeley Way West.

The EE division has about 70 professors, approximately 350 graduate students, and about 500 undergraduates in the COE. EE is housed mainly in Cory Hall, with some spillover into Sutardja Dai Hall and Berkeley Way West. In this document, we use the "EECS" designation to refer to the department as a whole; EE or CS will refer to policies that specifically apply to Electrical Engineering or Computer Science respectively.

More detailed facts and information about the department are available on the By the Numbers department website.

Department Graduate Offices

Berkeley EECS is part of both the College of Engineering and the College of Computing, Data Science, and Society. Within the department, there are two Graduate Offices: one in Cory Hall and the other in Soda Hall. While you are a student at Berkeley, and until you return to the world outside academia, you will be doing business with one of these two offices.

Students are encouraged to turn to the staff for any assistance regarding policies, procedures, or even personal issues.

EECS Grad Affairs Staff

Name	Title	Office Location	Phone	Email
Antoine Davis, M.S.	Executive Director,	221 Cory Hall	(510) 642-3694	eecs-phd-funding@berkeley.edu

	Center for Student Affairs			
Judy Smithson, M.Ed.	Director of Grad Affairs, Electrical Engineering (EE) Grad Advisor	217 Cory Hall	(510) 643-8347	grads-ee@berkeley.edu
Carissa Caloud	Computer Science (CS) Graduate Advisor	367 Soda Hall	(510) 643-9413	grads-cs@berkeley.edu
Michael Sun	Master's Programs (EECS & CS) Graduate Advisor	215 Cory Hall	(510) 643-8107	msun86@eecs.berkeley.edu
Patrick Hernan	EE Graduate Admissions Officer	215 Cory Hall	(510) 642-9265	hernan@eecs.berkeley.edu
Glenna Anton, PhD	Computer Science (CS) Graduate Admissions Officer	215 Cory Hall	(510) 642-6285	ganton@eecs.berkeley.edu

Chair, Associate Chair, and Vice Chairs

The Department Chair is appointed by the Chancellor, upon the recommendation of the Dean of the College of Engineering, after soliciting recommendations from the faculty of the Department. S/he serves at the discretion of the Chancellor. Department chairs are responsible for all Department business, including the appointment of the Vice-Chairs for Graduate Matters. The Department Chair appoints Graduate Matters Vice-Chairs for each Division, EE and CS. We also have a Vice-Chair for Masters Programs.

The Vice Chairs for Graduate Matters are also interchangeably known as the Head Graduate Advisor. However, for most forms needing the attention of a Head Graduate Advisor, you are encouraged to route it through the Staff Graduate Advisor first.

Graduate Matters Committee

The Department Graduate Matters Committee is responsible for:

- Overseeing and reviewing department policy on graduate student requirements.
- Reviewing and approving changes to the structure of the graduate curricula.
- Assigning faculty members to serve as examiners on departmental preliminary exams and overseeing the execution of those exams.
- Handling all petitions and appeals regarding graduate student requirements.

The Vice Chair for Graduate Matters chairs the committee. The Grad Admissions Co-Chair is an ex-officio member of this committee. The Graduate Student Association Co-Presidents, representing the CS and EE graduate students, are involved in the Graduate Matters Committee.

The list of appointments to committees of the EECS faculty members is found on the faculty committee website.

ERSO

The Engineering Research Support Office (ERSO) provides all research administrative support services for the faculty in the College of Engineering and for the Operation Research Units (ORUs) within the College of Engineering. They will be working with you when you are hired as a Graduate Student Instructor or a Graduate Student Researcher, when you want to be reimbursed for money you've spent on research-related expenses or for travel reimbursement. Be sure to check with your Faculty Research Advisor before spending money that you want to have reimbursed.

3. Academic Policies and Procedures

Temporary Advisors

Every incoming graduate student in the department without a Faculty Research Advisor is assigned a Temporary Faculty Research Advisor. Your temporary advisor provides advice about courses and degree requirements, helping you design a tentative plan of study for your degree. Your Temporary Advisor will offer advice on finding a Faculty Advisor, providing all the necessary signatures until you find one.
If, for any reason, you would like to change your Temporary Advisor, see your staff Graduate Advisor.

Faculty Advisors

What is a Faculty Advisor? Faculty Advisors are an important part of the PhD program.

Your Faculty Advisor – also called your Research Advisor or Permanent Advisor - supervises and evaluates your research and decides when your thesis or project work is ready to be approved. A good advisor is your mentor, friend, confidant, supporter, and problem solver. Additionally, they are the first person to turn to for help with financial support. Without a permanent faculty advisor, students will be ineligible to get a degree.

Timing: Our doctoral students generally spend the first two semesters exploring research options before settling on a Permanent Advisor. Students are expected to declare their Permanent Advisor, or Research Advisor, at the end of that second semester. Because summer funding is often tied to the Research Advisor, it is important to settle on a Permanent Advisor before your first summer because your summer funding is generally tied to them. *In addition, students that are not able to finalize a permanent advisor will be ineligible to continue in the program.*

Finding a Research Advisor: To aid you in finding a Research Advisor, you will be assigned a Temporary Advisor at the time of your admission to the doctoral program. Your Temporary Advisor is a faculty member who can help you learn about the various research opportunities in the Department, help you choose courses that will be helpful to you in your first year, and provide advice on adjusting to graduate school in general. Some students end up selecting their Temporary Advisor as their Permanent Advisor, but you may also decide to pursue your doctoral research with a different faculty member. Either way, in your first year, we encourage you to start actively participating in research right away by attending various research group meetings and undertaking initial research projects. This will not only give you a taste of the research experience, but will provide you with the opportunity to get to know a faculty member well. We encourage you to discuss your various research interests and passions with your temporary advisor.

When evaluating potential Permanent or Research Advisors, you should:

- Read the faculty's personal webpages to find out about their current research projects
- Attend at least one research seminar regularly
- Attend your potential advisors lab meetings
- Talk with that faculty member and with their senior graduate students
- Consult with your Temporary Advisor

It is common for first-year students to select a faculty member other than their Temporary Advisor as their Permanent Advisor, and faculty understand this. Most students find their Research Advisor with little difficulty. For those who do have some trouble, the least common reason is a lack of qualifications. Professors are likely to be flattered by an invitation to supervise a student's research, even if they feel compelled to decline the invitation. So be assertive and flexible. The sooner you start the process of looking for a Research Advisor, the easier it will be to retarget your research interests, if necessary.

When approaching a faculty member about changing a research area, you should first

meet with the new advisor and discuss opportunities within the lab, including whether GSR funding is available for the next semester. If the advisor is willing to offer a position in their lab, but does not have the funding for the coming semester, we recommend you reach out to your Staff Graduate Advisor to discuss alternative funding options.

Before deciding on a Research Advisor outside the department, you should discuss your plan with a member of the EECS faculty in your research area and also meet with your Staff Graduate Advisor. This will help ensure that there are no huge administrative roadblocks, and provide you with a chance to think through the logistical issues, including the long-term (meaning, at least the duration of your grad study) availability of funding for your research. Many students may eventually choose a permanent advisor that is different from their temporary advisor.

Changing Advisors after the First Year: You are also free to switch your Research Advisor later on: quite a few students do this between the M.S. and Ph.D. degrees. However, it can be awkward to leave an advisor who has invested time, energy, and financial support in you. The best way to avoid awkwardness and misunderstanding is to openly communicate with your advisor. They should be informed of your intentions.

Note: The below-the-line affiliate faculty member cannot serve as a sole faculty advisor, but they can serve as a co-advisor.

Funding and Advisors: It is common for many first-year PhD students to receive support in the form of a Graduate Student Researcher (GSR) appointment, while others may be supported by fellowships.

PhD students should plan to discuss funding with their faculty advisors regularly as part of the EE or CS review process, including fall, spring and summer funding. Your faculty advisor may recommend that you serve as a GSI beyond the required 30 hours, or find a summer internship, for academic or financial reasons. However, this may not always be feasible and could potentially hinder your research progress. If at any time you are concerned about your progress due to funding, please reach out to your Staff Graduate Advisor for assistance. There is limited funding for doctoral students who are making satisfactory academic progress but whose advisor may be experiencing a temporary funding shortfall.

Declaring your Permanent Advisor: When you have decided upon your Permanent Research Advisor, simply email your Staff Graduate Advisor with the information, cc'ing both your temporary advisor and your Research Advisor.

Reminder: If you decide on a new Research Advisor or change your Research Advisor, send an email to your Staff Graduate Advisor with a CC to your current and new Advisors. Your Staff Graduate Advisor will update the database.

Policies & Rules for Declaring Research Advisors

Formally speaking, your Research Advisor will become the Chair of your dissertation committee. The Graduate Division's rules for constituting a dissertation committee are complicated -- see Sections F4.5 and F4.7 of Graduate Division Policy and Guidelines.

Here's a brief summary: You can ask any Academic Senate Representative (ASR) faculty member in the EECS department to be your Faculty Advisor - that includes assistant, associate, full professors, professors-in-residence, Assistant Teaching Professors, and Teaching Professors, as identified on the EECS Faculty List. Adjunct faculty members in EECS may also serve as Research Advisors, provided an exception has been approved with the Graduate Division. (Check with the faculty member or your Staff Graduate Advisor for the current status of Adjunct Professors.)

By special request, a Senate faculty member in another campus department can be your Research Advisor if appropriate expertise in your research area is not available in EECS. Also, by special request, an off-campus person of sufficient distinction may serve as your Research Advisor, provided a Senate faculty member serves as co-advisor. For example, such a person might be a faculty member at Stanford or a researcher at the Lawrence Berkeley Laboratory (LBL) or at the International Computer Science Institute (ICSI).

Master's Students

Master's of Engineering (M.Eng.) students are assigned a Faculty Advisor, determined by the area of concentration to which you were admitted.

5th year MS students and MS-only students are assigned to the EECS Faculty Advisor that helped advocate for their admissions application. This should be explicitly established prior to starting the MS program.

California Residency

Every entering student is classified as a resident or nonresident of California for tuition purposes. Detailed information of the Residency process (including important deadlines) can be found on the Registrar's website, https://registrar.berkeley.edu/tuition-fees-residency/residency-tuition-purposes.

Many California nonresident graduate students, with the exception of international students, can be re-classified as residents after one year of graduate school, an assessment that exempts them from paying nonresident tuition. All non-resident students eligible to establish California residency (e.g., U.S. citizens and permanent residents) are expected to establish residency after their first year. Students who do not wish to establish residency in California, or who were not eligible for California

residency because they failed to perform the steps to establish residency, will be responsible for paying their own Non-Resident Tuition after their first year.

To be classified as a California resident, you should meet the following general requirements:

Continuous presence. You must have established your residence in California for 366 days immediately prior to the residency determination date (the first day of classes of the semester for which you wish to be classified as a resident). Your physical presence in California must be demonstrated on a weekly basis. You are presumed to be present in the state of California during the academic periods you attend UC Berkeley. You should keep all dated material that proves your presence in the state, including:

- airline tickets
- paycheck stubs from work
- credit card receipts
- bank and credit card statements showing ATM, credit card, and debit card activity (the credit card receipts need not be signature copies)

Please note that the above items are primary indicators of physical presence and will be weighed heavily in determining your status. **Items such as copies of lease agreements, rent, or utility checks are much lesser indicators of physical presence and are not acceptable alone.** Your intent will be questioned if you leave California for more than 6 weeks during the period in which you are establishing resident status for tuition purposes. Graduate students doing research outside California for more than 6 weeks during non-academic periods should visit the Residence Affairs Office (39 Sproul Hall) to seek advice prior to leaving and filing for classification.

Intent to make California your permanent residence must be established for one full year immediately before the residency determination date. You must show proof of your intent by doing such things as:

- Registering to vote within 30 days of arriving and voting in California elections.
- obtaining a California driver's license or identification card within 30 days of arriving
- Registering your car in California within 30 days of arriving.
- Filing California resident tax forms.
- Establishing California bank accounts, remaining in California during non-academic periods, etc.
- Filing out-of-state income tax returns as a nonresident or part-year resident for income earned before arriving in California.
- Cutting the above legal ties with your home state.

Evidence of intent must be dated for one full year before the term for which you seek resident classification.

If these steps are delayed, the one year period will be extended until you have demonstrated both presence and intent for one full year.

Financial independence. You are presumed by law to be financially independent if you are at least 24 years of age by December 31 of the year for which you request residency. If your parents are not California residents, you must show evidence that you have been financially independent during the calendar year January-December immediately preceding the semester for which you wish to claim resident status and for the current calendar year. Any out-of-state student who is claimed as a dependent on someone else's income tax returns will continue to be classified as a nonresident. However, Graduate Student Instructors and Graduate Student Researchers appointed for a minimum of 48 percent time (or awarded the equivalent in University-administered funds, e.g. , grants, stipends, fellowships) for the semester for which they wish to be classified as a resident are exempt from meeting the financial independence criterion.

More detailed information on establishing residency and documenting financial independence is available online at UC Berkeley's Office of the Registrar's website. If you are not a U.S. citizen, you cannot be classified as a California resident unless you are a permanent resident of the U. S. or are in the process of adjusting your status to permanent resident (you must be in a valid immigration status during the entire adjustment process). **International students with F-1 or J-1 visas must pay nonresident tuition during their entire graduate careers.** Doctoral candidates, however, may be eligible for a 100% waiver of nonresident tuition for the three years after they advance to candidacy. Note: This summary is not a complete explanation of the law regarding California residence. Please note that changes may be made in the residency requirements, and we will do our very best to keep you apprised of any changes.

Note: For students that started in the fall 2020 semester, the Residency Office provided the following accommodations due to the Covid-19 pandemic.
The enrollment in courses for the 2020 Fall term delivered via remote instruction will serve as a replacement for physical presence if the following conditions are met: (1) the UC campus has extended the opportunity for remote instruction, and (2) the student may qualify for residency on their own without regard to a parent per Regents Policy 3105 I.C.2, or temporarily through a noncustodial California parent per Regents Policy 3105 I.D.4. Students will still need to acquire applicable legal indicia to prove their intent to stay in California, as they do now, and will have until the end of the Spring 2021 term to do so.

Registration

Students at Berkeley currently enroll in courses by using the CalCentral System, described on the Student Information System (SIS) website. CalCentral may also be used to add and drop classes through the third week of classes. Changes in your study list, including addition or deletion of classes, change of grading option or change in the number of units of a variable unit course (e.g. independent study courses) may be changed after the third week of classes by submitting an approved Graduate Petition To

Change Class Schedule form to one of the Staff Graduate Advisors.

New graduate students will be asked to meet with a Temporary Advisor assigned to them by the EECS Graduate Office. Prior to meeting with your Advisor, you should plan out a tentative schedule for your first year. For more information, consult with your Staff Graduate Advisor.

After your first semester as a graduate student at Berkeley, you will receive an email notification that CalCentral appointment times are available in late March (for Fall) and early October (for Spring). Notices announcing the dates for the CalCentral Enrollment Period will also be posted on departmental bulletin boards and in the campus newspaper.

Confirmed Class Schedules for continuing grads may also be viewed online using your CalCentral Dashboard. To assist you in making course selections, the Schedule of Classes lists all of the courses given for the semester, with the days, times and locations. Our department website has more information about EECS courses, including many of the links to course websites. The following web pages contain essential information regarding registration, enrollment and privacy rights:

- Berkeley Schedule of Classes
- Enrollment Rules and CalCentral Instructions and Information
- Information on EECS Courses
- Student Calendar
- Student Privacy Regulations

If you have any questions or issues regarding CalCentral or your registration status, please view the Registrar's website for your options to get support in resolving the issue.

Summer Registration

In most cases, students should not enroll in units during the summer. Summer registration is generally not required for students to maintain their status. Students who wish to enroll in courses or units during the summer will need to pay the appropriate fees charged by the Summer Sessions unit.

The most common scenarios for students that require summer registration are:

- Students who were on filing fee and did not file by the spring deadline. These students should plan to enroll in at least one unit of 299 research units with their Faculty Advisor.
- Students that had not been registered and intend to file their dissertation or MS thesis in the summer. These students should plan to enroll in at least one unit of 299 research units with their Faculty Advisor.
- International students who plan to work off-campus and need to enroll in units as part of their application for Curricular Practical Training (CPT). In this case, students should enroll in the zero units option of 297. Please note that 297 is only

used in the summer for CPT.

The Course Numbers needed to enroll in either 297 or 299 are found on the website, https://eecs.berkeley.edu/resources/grads/classes-scheduling. Students should enroll in the Course Number corresponding to their Faculty Advisor. Please note they are updated every semester and should not be used more than once.

In addition, the fees associated with summer session units either need to be paid directly by the student, or you can discuss payment with your faculty advisor.

Scheduling Changes after the Semester Deadline

Graduate students may petition to make changes to their class schedule through the last day of instruction each semester. After the third week of instruction, but before the last day of instruction, you may submit a Graduate Petition to Change Class Schedule to your Graduate Advisor. The petition must be approved by your Faculty Advisor **before you** submit it to your Staff Graduate Advisor for further processing. Fees associated with adding and dropping will be assessed to your Calcentral account. Students must maintain enrollment in a minimum of 12 units at all times.

It is more difficult to petition to change your class schedule after the semester has ended. However, if you find such a petition to be necessary, please see your Staff Graduate Advisor. ***Note: This petition's final decision will rest with the Graduate Division Dean's Office.***

Full-Time Status

All students must enroll in at least 12 units (including 299 research units) of upper division and graduate work each fall and spring semester they intend to be registered. For more information about full-time status, please refer to section E1.1 of the Grad Division's Guide to Graduate Policy. GSIs, GSRs, Readers and Tutors should also be sure to read the Graduate Division's guidelines on their appointments.

Entering students should be aware that most Faculty Advisors will expect their students to make progress at a rate which will discourage your continuing to work in industry while pursuing your graduate degree. This is particularly important at the beginning of your program while you are taking most of your graduate courses, preparing for the preliminary examination, and doing research. You should plan to commit the largest chunk of your time to your studies and research—at least until you are well established in our program.

Incomplete Grades

All Incomplete (I) grades must be replaced by a letter grade (or S/U where applicable)

before you submit an application for advancement to candidacy for any graduate degree. If a course with an incomplete grade is not necessary for the degree, your Advisor may specify in writing for each such "I" grade that work undertaken in that course is neither necessary for, nor closely related to, your degree and that the removal of the "I" grade by completing the course requirements would only impede your progress toward the degree. If no action is taken by a graduate student to change an "I" grade, the "I" will not change to an F as it would for an undergraduate, but will remain an "I" on the transcript until you do something to change it.

You do need to be aware, however, that the Graduate Division will block your employment as a Graduate Student Instructor or Researcher if you have more than two incompletes at one time. The Graduate Division, in addition, may place you on probation if you accumulate more than two "I" grades. If you're likely to exceed this limit, please notify your Staff Graduate Advisor for advice.

To have an incomplete replaced by a grade, do not register for the course a second time. Students should discuss with the instructor that assigned the incomplete grade a plan and timeline with mutually agreed upon parameters. Once those conditions have been met, the instructor of the course may submit a corrected grade change in Calcentral to replace the incomplete grade.

EECS Departmental Policy of Academic Dishonesty

Copying all or part of another person's work or using reference material not specifically allowed are forms of cheating and will not be tolerated. A student involved in an incident of cheating will be notified by the instructor and the following policy will apply:
The instructor may take actions such as:

- Requiring repetition of the subject work
    - Assigning an F grade or a 'zero' grade to the subject work
    - For serious offenses, assigning an F grade for the course (this is the recommended action).
- The instructor must inform the student and the Department Chair, in writing, of the incident, the action taken, if any, and the student's right to appeal to the Student Grievance Committee or to the Office of Student Conduct.
- The instructor must retain copies of any written evidence or observation notes.
- The Department Chair must inform the Office of Student Conduct of the incident, the student's name, and the action taken by the instructor.
- The Office of Student Conduct may choose to conduct a formal hearing on the incident and to assess a penalty for misconduct.
- The Department will recommend that students involved in a second incident of cheating be dismissed from the University.

Appeal Procedures

The EECS Department is committed to building a broadly diverse community and strives to create a welcoming and respectful learning environment for students. A list of resources is available on the EECS Student Concerns and Grievances page.

If you find that you have a grievance (if, for example, you believe that a degree requirement has been applied inappropriately or unfairly in your case), you should first present it to your Faculty Advisor, who will attempt to resolve the matter informally. If this does not resolve the matter, it should be brought to the attention of the Vice Chair(s) for Graduate Matters, also known as the Head Graduate Advisor, in the form of an appeal.

In order to appeal the matter, students must make an appointment directly with the Head Graduate Advisor of their division (CS or EE) to present their case and discuss possible ideas of a resolution. Students are encouraged to present their case in a written format, including any supporting documentation. The Graduate Matters Committee will discuss the issue and make a recommendation to the Chair of the department, who will ultimately decide.

Students have a total of 30 calendar days from when they were informed to appeal a decision at the departmental level. This includes time for departmental informal and formal resolution procedures. The EECS department will then have 60 calendar days to review and respond with a decision. NOTE: The timeline excludes the summer session and winter break. In other words, if the decision was made during the summer or winter break, the countdown will begin once the following semester starts.

If the student wants to further dispute the department's decision, it is possible to invoke a formal grievance and appeal procedure at the campus level within a limited time period (15 calendar days after you received the Department's decision). More information about this can be found in Section E1.9 of the Graduate Division's Guide to Graduate Policy.

Student Reviews

The Department undertakes a systematic review of the status of all MS/PHD, PHD graduate students each year. The faculty of the EE division conduct an annual review, generally in mid-April, as well as a late fall "mini-review" of students having academic difficulties and those whose spring review letters required some action on the student's part. The faculty of the CS division jointly reviews all CS students in mid-November and in mid-April.

Before the spring review, EE students meet with their Faculty Advisor, discuss their

progress and return a summary sheet to the Graduate Office. Each semester, CS students meet with their Faculty Advisor and submit their review forms to the Staff Graduate Advisor. At the review, the faculty jointly tries to confirm the status of each student. A primary concern is to identify students having problems: students who don't have a Faculty Advisor, those who have failed the department's oral preliminary examination, or who have been unable to make progress in research, or who have uncertain financial support, etc. After the review, most students are sent a letter through email summarizing what the faculty has concluded. If you do not receive a letter after the review, you should let the Staff Graduate Advisor know. For instructions and forms, see EE Review and CS Review.

Changing or Adding a Degree Goal

Beginning Fall 2016, the Graduate Division's policy is that any current graduate student wishing to change their department or add a degree in a different department (e.g. a Ph.D. student in Mechanical Engineering wishing to add the M.S. program in CS) must do so by submitting an application as though they were an incoming applicant.

The EECS Department asks that such applicants submit three letters of recommendation, including one from the faculty member who would be the student's advisor in the department; a current Berkeley transcript; an undergraduate transcript; a statement of purpose; and a personal statement. The letter from our faculty member should clarify what the funding source for this student will be. In general, M.S. students in our department do not receive funding.

The University of California does not support duplication of degrees, so you should be aware that students who already have an M.S. or a Ph.D. in a field closely allied to EECS will probably not be allowed to earn a second M.S. or Ph.D.

Withdrawal

The Graduate Division requires that students be registered continuously until a degree is completed. If you are enrolled in classes and you do not plan on attending that term, you must submit a Withdrawal Request Form in CalCentral > My Dashboard > Add a Withdrawal Request. Also, don't just vanish—notify your Graduate Advisor by email and bring them a withdrawal form.

If you are an international student, you must also see an advisor at the Berkeley International Office. If you do not have plans to return, you must complete the EECS Exit Survey.

If you submit your form before the first day of instruction for the term, your request will be processed as a Cancellation. You will be dropped from all classes, and all term fees will be de-assessed. There will be no notation of the cancellation on your transcript.

When you cancel or withdraw, you will no longer be eligible to attend for that semester or any future semester until you successfully complete the Readmissions process.

Please note that the percentage of refunds depends on the effective date of your withdrawal. More information is detailed on the Registrar website for Refunds After Withdrawal.

Students on a GSR or GSI appointment that receive fee remissions should also keep in mind that they should not file their dissertation or MS Thesis until near the end of the semester they plan to graduate. Filing too early in the semester can cause fee remissions to be revoked.

Readmission to the EECS Department

Note: Readmission is not guaranteed.
To apply for Readmission you will need to submit the following materials to an EECS Staff Graduate Advisor at least six weeks before the start of the semester you hope to return:

- A Statement of Purpose which includes:
  - What you believe has changed since you were last enrolled
  - What your plans for research and financial support are upon your return.
- If you plan to use courses more than 7 years old in fulfillment of degree requirements and do not already have an approved program of study (blue or white card) on file with the Department's Graduate Office, you must submit a petition justifying the use of these courses in your program of study.
- Official transcripts if you have attended school since you left Berkeley.
- A letter of academic, research and financial support from an EECS faculty member who will serve as your advisor.

Department Communication

UC Berkeley policy states that students are responsible for keeping their contact information current and for regularly monitoring their email for official communications from the University (see email policy).

Disabled Students' Program (DSP)

The Disabled Students' Program (DSP) promotes an inclusive environment for students with disabilities. They equip disabled students with appropriate accommodations and services to achieve their individual academic goals. Students seeking DSP services for the first time, should complete the application process.

Safety Resources for Campus and the Berkeley Community

UC Berkeley is located in a densely populated city. This means the reality is crime and theft can occur on campus and in the surrounding community. The university has prepared some resources to enhance the safety on campus and provide night safety services that we strongly encourage students to review and utilize.

In Times of Stress

UC Berkeley can be a demanding experience. To help students cope with a variety of situations and challenges, the EECS department maintains a list of useful resources for In Times of Stress.

4. Financial Support

EECS Doctoral students receive full financial support, see details below. Students in other EECS Graduate Programs may be eligible for fellowship support or for academic appointments, such as TA or GSR appointments. For more information on financial matters, students may email eecs-phd-funding@berkeley.edu.

Students must sign up for Direct Deposit as soon as possible before they start their program.

Doctoral Student Funding

In the first year, doctoral students may be supported by fellowships or by Graduate Student Researcher (GSR) appointments, or a combination of the two. This support provides an academic year stipend/salary, and full tuition and fees, including health and dental insurance. Nonresident tuition is also provided for international students and for first-year domestic students, if applicable. More information about establishing residency can be found on the Residency website, https://registrar.berkeley.edu/tuition-fees-residency/residency-tuition-purposes.

Financial support will continue for the duration of your PhD studies assuming good academic and research progress. In future years, this support will typically come as a research appointment, except for the required teaching appointments. During summers, most of our graduate students continue working on their research, funded by GSR appointments with faculty in the department. Others choose to spend one or more summers gaining additional research experience at an industrial or governmental research lab.

Effective 12/23/22, ratification of the ASE and GSR collective bargaining agreements

between the UC and the UAW updated some university policies. The current UAW Academic Student Unit contract is available on the Berkeley People and Culture website.

Stipends

Stipends may be given by faculty to doctoral students. Students may work with their Faculty Advisor to determine if stipends are available and appropriate.

Special Circumstances

PhD students should plan to discuss funding with their faculty advisors regularly as part of the EE or CS review process, including fall, spring and summer funding. Your faculty advisor may recommend that you serve as a TA beyond the required 30 hours, or find a summer internship, for academic or financial reasons. However, this may not always be feasible and could potentially hinder your research progress. If at any time you are concerned about your progress due to funding, please reach out to your staff advisor for assistance. There may be limited department funding for doctoral students who are making satisfactory academic progress but whose advisor may be experiencing a temporary funding shortfall.

Fees and Tuition

All registered students are liable for fees. The Office of the Registrar will block a student's registration unless fees are paid, either by the student or through some form of financial assistance.

While doctoral students should have full support for annual tuition and required fees - including SHIP - for the duration of their study contingent on good academic progress, it is the student's responsibility to monitor their own CalCentral accounts and discuss any issues with the EECS Graduate Matters advising team.

Fees are subject to change without prior warning. Please see the Registrar's website for up-to-date fee information and the Financial Aid Office's website for an estimated student budget.

Health Insurance

The fall SHIP provides major medical coverage from August 1 through December 31; the spring plan covers January 1 through July 31. Any questions about health coverage should be directed to University Health Services (UHS).

Nonresident Supplemental Tuition (NRST)

Nonresident tuition is charged to any registered student that is not considered a resident

of California. Continuing students that are U.S. citizens and permanent residents are expected to establish their CA residency status by the beginning of their third semester. Students who do not wish to establish residency in California, or who were not eligible for California residency because they failed to perform the steps to establish residency, will be responsible for paying their own Non-Resident Tuition after their first year. More information about establishing residency can be found on the Residency website, (https://registrar.berkeley.edu/tuition-fees-residency/residency-tuition-purposes).

Filing Fee

Filing Fee is a reduced fee (one-half of the University Registration fee) for graduate students who have completed all requirements for the degree except for filing the master's thesis or doctoral dissertation and are advanced to candidacy. The Filing Fee is not a form of registration or equivalent to registration. If students wish to use University services that are supported by registration fees, such as health insurance fees, they must pay those fees. Students that may need insurance coverage while on filing fee should make alternate plans for their coverage. A common option is the SHIP for Non-Registered Students. Students purchasing other insurance must do so before the end of the SHIP insurance period (July 31 or December 31) to avoid any lapse in coverage.

Students should submit the Filing Fee Application before the start of the semester they wish to file and graduate. The application must be submitted through Calcentral under "My Dashboard". On the right-hand side for "Student Resources", students will see an option to "Submit a Form". Please choose "Special Enrollment Petition" and then "Filing Fee Status".

Duration of Filing Fee
Filing Fee will apply for the length of the semester for which Filing Fee status has been approved. Generally, this is the last day of the semester.

Eligibility requirements for the Filing Fee
To use Filing Fee in the fall semester, the student must have been registered in the previous spring. To use Filing Fee in spring, the student must have been registered in the previous fall.

Students that did not manage to file their thesis or dissertation by the end of the semester they were on filing fee, must go through the readmissions process for the next spring or fall semester, or wait until the summer to file. Enrollment in at least one unit during the summer session would be required for students that plan to file in the summer. However, U.S. citizens and permanent resident students that were enrolled in the spring semester may file their M.S. thesis or Ph.D. dissertation in the summer session immediately following without being enrolled. International students must check with the Berkeley International Office first to see if they may be eligible for the same

benefit.

Limitations on Filing Fee status
Filing Fee may be used only once during a student's career. If a student does not complete the final degree requirements (filing the dissertation or thesis/report) during the semester for which the Filing Fee is approved, the student must pay regular registration fees during the semester in which the requirements are completed.

Filing Fee status and academic student appointments
Students are ineligible to hold an Academic Student Employee position Graduate Student Instructor or a Graduate Student Researcher while you are on Filing Fee.

Filing Fee status and international students
To avoid visa problems with the Immigration and Customs Enforcement, international students must contact the Berkeley International Office well before the beginning of the semester during which they will use the Filing Fee. Filing fee status can satisfy the registration requirement for international students only if the student has obtained the signature of the BIO student advisor.

Health insurance for students on Filing Fee or Withdrawal status
U.S. resident students on approved Filing Fee may purchase the Student Health Insurance Plan (SHIP) coverage if they have not already purchased it during a period of withdrawal from the university. For answers to questions about Filing Fee, please see the Graduate Division's FAQ. More information is available on the University Health Services site, SHIP for Non-Registered Students.

In Absentia

In absentia status is a form of registration available to academic and professional graduate students undertaking coursework or research related to their degree programs outside of California. *In absentia* registration replaces leaves taken for research purposes outside the state of California. Students registered *in absentia* are only assessed full health insurance fees, and 15 percent of the combined University Tuition and Student Services Fees. If applicable, students are also assessed nonresident tuition and/or professional school fees.

Doctoral students may only use *in absentia* registration for a maximum of four semesters; and must normally be advanced to candidacy by the time *in absentia* begins. Students may hold University fellowships and GSR appointments while registered *in absentia*, but may not hold GSI, Reader, or Tutor appointments. For further guidance please see the Guide to Graduate Policy D1.3: Registration Fees.

Students request *in absentia* registration by submitting the Special Enrollment Petition eForm through CalCentral.

Teaching Assistant (TA) Appointments - formerly known as Graduate Student Instructor (GSI) Appointments

Effective in 2023, the previously ubiquitous Graduate Student Instructor (GSI) term was replaced with the more formal Teaching Assistant (TA) title. However, it may be common that the two terms will be used interchangeably. The full Graduate Division policy on Teaching Assistant positions is found on the Graduate Division website, https://grad.berkeley.edu/financial/appointments/.

A half-time (20 hours per week) TA appointment typically entails responsibility for two discussion or three laboratory sections per week, holding office hours, preparation and grading of assignments and examinations, and other duties as assigned by the faculty member in charge of the course.

Appointments for courses are handled by the EECS Graduate Student Services staff and the appointed Faculty GSI/TA Adviser.

EECS graduate students will be notified by e-mail of the application deadline and assignments. The application is online on the Information for Prospective GSIs/TAs website. All hiring paperwork should then be completed with ERSO.

Minimum Requirements
In order to be a GSI/TA, you must:

- be registered and enrolled in a minimum of 12 units.
- have a GPA of at least 3.0.
- have no more than two Incomplete grades.
- be making satisfactory progress toward your degree goal.

Additional Requirements

- New ASE Orientation: If your GSI/TA appointment is also your first ASE (Academic Student Employee) assignment (i.e. you haven't been a GSI/TA, Tutor or Reader at UC before), you must attend a New ASE Orientation for the semester you have been appointed. These orientations are sponsored by the Office of Labor Relations. Failure to attend will make you ineligible for an ASE appointment in subsequent terms until you have attended this orientation.
- 300-level Seminar: All UCB students appointed as TAs must enroll in a 300-level seminar on teaching concurrent with or prior to your first appointment as a GSI/TA at Berkeley. These courses provide unit credit for your preparation for teaching. GSIs in EECS are required to complete the course EECS 375, while CS students must complete CS 375, Teaching Techniques for Electrical Engineering and Computer Sciences. Since most graduate students have never taught before, EE and CS 375 are invaluable tools, presenting effective teaching techniques, alternative forms of instruction, and special methods for teaching key

concepts to EECS undergraduates. EE and CS 375 take the form of weekly seminars and discussions led by departmental faculty and experienced GSIs/TAs.

- Teaching Conference: First-time GSIs/TAs must attend the Teaching Conference for new GSIs/TAs, offered by the Berkeley Graduate Division GSI Teaching and Resource Center, each semester before classes begin. International GSIs/TAs appointed for the first time must also attend the teaching conference for new international GSIs/TAs, offered in the fall semester before classes begin. Pedagogy is the focus of the conferences. If a GSI/TA misses the conference, then they need to do a makeup session listed on the Labor Relations site.
- Online Course: First-time GSIs/TAs must successfully complete a course in person or online on professional standards and ethics in teaching before they interact with students. To enroll in the online course, please go to the Graduate Division's GSI Teaching and Resource Center's website.

Materials relating to aspects of teaching, learning, and inventing are on reserve in the Engineering Library under the heading "Engineering GSI." Additional resources and information for GSIs/TAs can be found at the GSI Teaching and Resource Center in 301 Sproul Hall.

For detailed information regarding the GSIs/TAs appointment, please consult the Graduate Division Teaching and Research Appointments.

Test of Spoken English

The Graduate Division policy states that Prospective GSIs/TAs who do not speak English as a native language must satisfy the oral English proficiency requirement before they can be appointed to teach. Exempted from this policy are those who hold a B.A., B.S., or other bachelor's level degree from an institution in the United States. The policy applies to all prospective GSIs/TAs, whatever their citizenship, country of origin, or residency status, and whatever subject they will be teaching. Once the test is taken, it does not need to be re-taken unless one goes to a non-English speaking country for an extended period of time (two years or more).

Graduate students can satisfy the oral English proficiency requirement and be cleared to teach in one of the following ways:

- Achieve a TOEFL Speaking section score of 26 or above on the Test of English as a Foreign Language (TOEFL) taken within the last two years. Applicants for graduate study who take the TOEFL should have their official TOEFL score report sent directly to UC Berkeley.
- Achieve an IELTS Speaking section score of 8 or above on the International English Language Testing System (IELTS) test taken within the last two years. Applicants for graduate study who take the IELTS should have their official score report sent directly to UC Berkeley.
- Complete all of their undergraduate education (with the exception of a study

abroad year) and receive an undergraduate degree from a college or university in the U.S. or another country in which English is the sole language of instruction (with the exception of instruction in foreign language departments) and the primary spoken language of the community
- Take and pass the Oral Proficiency Test (OPT) administered on the Berkeley campus.

Fees and Tuition for GSIs/TAs
Graduate students who hold academic appointments (GSI/TA, GSR, Reader, Tutor) may be eligible for fee remissions. More information is available here: https://grad.berkeley.edu/financial/fee-remissions/. International doctoral students will have their NRST paid for by the Department when they GSI.

Combination TA/GSR Appointments
All students can work up to 50% time during the semester: this corresponds to a 20-hour appointment. If you're signing up for a TA position for less than 50%, you should consult with your faculty advisor regarding a combination TA/GSR appointment. Students may hold TA/GSR combination appointments, as long as they are in line with campus policies.

Summer Session Teaching Appointments
A limited number of teaching appointments are available for the Summer Session. Interested students should contact the instructors in charge of summer courses and submit an application. We can only consider applicants that submitted an official application. Verbal or email arrangements between a student and the instructor of the course are not considered official. The offers must come from ERSO.
Note: Summer TA appointments do not automatically count towards the Ph.D. teaching requirement. Students who wish to use service during their summer TA appointment towards their teaching requirement must fill out a general petition to be evaluated by the Head Graduate Advisor.

Payroll Forms for TA/GSIs
All teaching appointees must fill out payroll forms prior to beginning their duties. Without the proper forms being completed, students will not be able to be paid. Hiring instructions will be sent when students are offered a position.

Graduate Student Research (GSR) Appointments

In EECS, PhD students are typically supported by Graduate Student Research (GSR) appointments for the duration of their doctoral program, with a few exceptions such as students who are on fellowships or when students are fulfilling their teaching requirements. First-year students are typically supported by GSRs, fellowships, or a

combination of the two. First-year students should check their emails over the summer prior to coming to Berkeley for more details on their support packages. Questions may be directed to eecs-phd-funding@berkeley.edu.

Continuing PhD students should apply for GSRs directly through ERSO Student Hiring at: https://www.erso.berkeley.edu/gsr_new/beginGSRApptRequest.php. Questions on the hiring process, payment dates, or required paperwork may be directed to: ERSO Student Hiring <ERSOStudentHiring@erso.berkeley.edu>.

International students may not be employed more than 50% time without jeopardizing their visa status.

Summer GSR Appointments
Summer GSR appointments may be available to PhD students. Students should consult their faculty advisor each spring during the student review period to discuss summer funding.

Additional Resource: ERSO GSR Hiring Process Presentation

Graduate Division Fellowships

Students enter the EECS Department supported by a variety of fellowships. Doctoral students may receive Department Fellowships, University fellowships or external fellowships. Masters students may also receive fellowships at the time of admission. The Graduate Division maintains several different fellowships. For the most up to date list of available fellowships and their requirements, please refer to the Graduate Division Fellowships website.

External Fellowships

There are a number of external fellowship opportunities available for first-year continuing graduate students. Common external fellowships include federal fellowships (such as the NSF, NDSEG, Hertz, DOE CSGF, NPSC); industry fellowships (such as Apple, Facebook, Google, IBM, JP Morgan, Microsoft, NVIDIA, Qualcomm), or international fellowships (like the DAAD, Fulbright, KFAS, UC-MEXUS, NSERC, Samsung).

Supplementation of Fellowships

Many of our students apply for and win external, government or industrial fellowships, such as the NSF Graduate Fellowship. If you already have one of these fellowships, you are expected to use it towards your graduate education and it may be used to offset Department or campus support that would otherwise be available to you. Depending on

the terms of your fellowship, you may be allowed to serve as a TA or partial GSR in addition to your fellowship.

If you receive an external, governmental or similar fellowship, please email eecs-phd-funding@berkeley.edu.

GSR Salaries, Benefits and other Requirements

Students also should be aware that appointments above 50% time might cause them to be liable for Social Security taxes. You can check with the Graduate Division's Appointments Office for details about your situation.

Insurance Coverage

The University pays for major medical and dental insurance coverage for students who are employed 25% time or more as a GSI, GSR, Reader, etc. The remission will be activated when employment forms have been processed, so it is to your advantage to complete these forms as soon as your employment has been secured.

Withholding Tax

Salaries are paid monthly and are subject to Federal Withholding Tax. When the individual is on an immigrant (visa) status of F, J, M, or Q, Scholarship/Fellowship awards in excess of the qualified educational tuition and fees are subject to federal tax withholding at the rate of 14%, unless the student is eligible for a tax treaty exemption. More information is on the UC Berkeley Controller's Office website.

Work-Study for Research and Teaching Appointments

Some students may be eligible for work-study funds, and recent changes in federal regulations make it possible for students to be employed under work-study in GSI/TA and GSR positions. The student receives the normal salary when employed.

Students apply for work-study by submitting a Financial Aid Application, available on UC Berkeley's Financial Aid website.

Visa Requirements

Students with F-1 visas do not require permission for half-time employment with the university during the academic year. Consult with the Berkeley International Office (BIO) with any visa employment questions you may have.

International students hoping to work off-campus during the summer should check with the Graduate Office and with BIO for current procedures.

Loans

Subsidized Stafford Loan Program

These conditions and terms apply to new borrowers. If you already have outstanding Stafford, SLS, or PLUS loans, other conditions may apply. Please contact the Cal Student Central Office at 120 Sproul.

The Federal Direct Loan Program consists of two types of loans:

- Subsidized Federal Direct Loans. Borrowers of subsidized direct loans do not incur the interest during school and specified deferment periods.
- Unsubsidized Federal Direct Loans. Borrowers of unsubsidized loans are responsible for all interest charges. The interest accrues from the time the loan is issued, is capitalized once a year, and results in the compounding of interest during subsequent years in school.

Because unsubsidized loans can eventually accrue a lot of interest, the Financial Aid Office strongly encourages you to borrow as little as possible. Another strategy is to delay accepting your unsubsidized loan until later in the year, after you have a better idea of what you really need, and whether or not you will be receiving other resources (i.e. Department Awards, GSI or GSR appointments, etc.). The advantage of delaying your acceptance is that it will not accrue interest until the loan is disbursed.

Emergency Loans

Students may also be eligible for small emergency loans. More details are available on the Financial Aid website. There are two types available:

- **Living Expense Loan:** This loan is available to eligible registered students; the maximum amount is $2000. If approved, the loan will directly pay your fees and will be reflected in your Student Account. You can use your loan to help with short-term financial difficulties such as paying for rent, books, or travel while you are waiting for your financial aid to become available.
- **CoPayable Loan for Fees:** This loan is available to eligible unregistered students. This loan is to help you become registered by making the minimum payment toward your registration fees. The minimum registration amount is set each year in collaboration with the Registrar's Office. Once you sign for this loan, the money will be delivered to your student account for fees or through Direct Deposit.

Travel Funding

Many students receive travel support to present the results of their research at conferences.

- It is important to apply to the conference directly for financial support. Student travel funds are often available through the committee in charge of the

conference you will attend. Please note that you should apply directly for this support in a timely manner, as it may be allocated on a "first come, first served" basis.
- Research Advisors often sponsor student travel, through their grant money, for students to report on research performed under their supervision. Contact your advisor to ask for support.
- The Graduate Division offers conference travel grants. The grant amount awarded will depend on the location of the conference. https://grad.berkeley.edu/resource/conference-travel-grants/
- The UC Berkeley Graduate Assembly provides travel awards to students presenting outside the Bay Area. https://grad.berkeley.edu/resource/graduate-assembly-travel-award/

Graduate Student Parent Support

The Student Parent Center is committed to the holistic support and success of a highly motivated population of undergraduate and graduate students who are engaged scholars, as well as devoted parents at UC Berkeley.

The center is a centralized multi-purpose campus resource, where students can seek informed advice, develop leadership skills, engage in informal study groups, nurse babies, change diapers, celebrate achievements, recover from a setback, and form lasting friendships. More information is available on the website, https://studentparents.berkeley.edu/.

5. Degree Programs

Graduate Division

As the administrative arm of the Graduate Council, the UC Berkeley Graduate Division monitors the progress of about 13,000 graduate students enrolled in over 100 different graduate degree programs, from the time they are admitted to Berkeley until they complete their degrees. The individual units of Graduate Division include:
- The Office of the Dean
- Graduate Academic Services
- Graduate Admissions
- Graduate Appointments
- Graduate Communications & Events
- Graduate Degrees

- The Graduate Development Office
- The Graduate Diversity Program Office of Outreach and Retention
- Graduate Fellowships
- Graduate Student Instructor (GSI) Teaching and Resource Center

The Guide to Graduate Policy
The Graduate Division's Guide to Graduate Policy is the primary source of rules and regulations relating to graduate degrees and programs in the Department of Electrical Engineering and Computer Sciences. The EECS Graduate Student Handbook includes rules and regulations that augment the Graduate Division policies. All graduate advisors and graduate students should refer to the Graduate Division's Guide to Graduate Policy when necessary.

Master of Science (M.S.)

There are two types of M.S. degrees EECS students can be awarded:
- **Master of Science in Engineering (EECS)** —normally for EE students with a B.S. degree in engineering.
- **Master of Science in Computer Science** —normally for CS students with a B.S./B.A. in computer science.

The M.S. degree requires either a thesis (Plan I) or a project report (Plan II); the two options are quite similar.

Coursework
M.S. students must complete a total of at least 24 units of coursework (not including 298, 301, or 602 units), approved by their faculty Research Advisor within the following guidelines:
- At least 10 units must be graduate level (200 series) EE and/or CS courses, not including EE or CS 297, 298, or 299.
- Courses in the 300 series or higher do not count toward the unit requirements for either Plan I or Plan II Master's degrees.
- Under Plan I, between 4 and 10 units of independent research 299 (in either EE or CS, depending on your area), taken in conjunction with the writing of a thesis, are included as part of the 24 total units.
- Under Plan II, between 3 and 6 units of 299 (in either EE or CS, depending on your area), leading to an approved project report, are included.

The remainder of the units may be fulfilled by 100- or 200-level courses from any department as long as the Research Advisor signs off on the coursework. This excludes courses ending in -97, -98, or -99.

Grades
All courses, except for 299s, must be taken for a letter grade. 299s must be taken with the S/U grade option.

The cumulative GPA for the technical electives should be at least 3.5. The overall GPA must be at least 3.0 (computed for all 100 and 200 level courses taken up to the time that the M.S. is awarded).

The GPA threshold may be rounded to two digits; e.g., 3.45 for technical electives and 2.95 for the overall GPA would round to 3.5 and 3.0, respectively, and fulfill the criteria above.

Grades of "I" (Incomplete), "NR" (No Report), or "F" must be cleared or explained before you are advanced to candidacy or allowed to receive your degree.

Academic Residency
In order for a semester to count for academic residence, you must enroll for at least 4 units of 100 or 200 level courses. (These 4 units do not necessarily satisfy the requirements for full-time study.) The Department expects M.S. candidates to finish in 3 semesters unless they are continuing for the Ph.D., but Masters students must complete a minimum of 2 semesters in academic residence to receive the degree.

Advancement to M.S. Candidacy
Students should plan to Advance to Candidacy after completing at least half of the required coursework. Both Plan I and Plan II M.S. students need to complete the departmental Advancement to Candidacy form, have your Research Advisor sign it, and submit it to the Master's Graduate Advisor in 215 Cory by no later than the end of the second week of classes of your final semester.

If you are planning to use Plan I for your M.S. Degree, you also need to complete the Graduate Division's Advancement to Candidacy form. Your Faculty Advisor also needs to sign, then it must be submitted to the Masters Graduate Advisor in 215 Cory by no later than the end of the second week of classes of your final semester.

The Master's Staff Graduate Advisor will verify that your courses are acceptable for the degree before you are advanced to candidacy for the M.S. If you later make any changes to your coursework that will be applied for the degree, notify your Staff Graduate Advisor immediately. Please note that coursework listed on your Advancement form may not be more than 5 years old. Once you have officially been advanced, your candidacy is valid for 3 years.

Transfer of Credit for the M.S. Degree
Students are allowed to transfer a maximum of 4 semester units or 6 quarter units of credit earned while they were in graduate standing at another institution, provided:

- The credit was not applied toward satisfying the requirements of a previously conferred degree
- The credit was earned for coursework normally offered within your current program of study, and

- The credit will not be used to reduce the minimum requirement for 200-level courses.

Petitions are considered on an individual basis and should be completed before applying for candidacy. They will be granted only for students with high achievement (i.e., a GPA of at least 3.3 at both Berkeley and the original institution). If you were a UC Berkeley undergraduate and you took a graduate course for a grade during your final semester which did not count toward your undergraduate degree, you may be able to transfer this course towards your M.S. program. Consult your Staff Graduate Advisor for details about the process for "backdating graduate standing" and for the proper petition form.

Thesis or Project Report
You must be either registered or on Filing Fee the semester you submit your thesis or project report. The deadline to submit your thesis or project report is always the last day of the semester in which you plan to receive the degree.

In the EECS Department, Plan II's Project Report replaces the "Comprehensive Examination" referred to in university documents and forms. Likewise, there is no examination for Plan I. All fifth year M.S. students must submit a Plan II project report.

PLAN I

The thesis must be approved by your Research Advisor and 2 other members of the Berkeley Academic Senate (regular, Berkeley faculty). The 3-member committee, in turn, must be approved by the Graduate Division through your application for Advancement to Candidacy. It is recommended that at least one member of the committee be from another department.

You need to submit two copies of your thesis. (Refer to the Graduate Division's Thesis Filing Guidelines). Be sure that you follow all of their formatting procedures exactly.

- 1 copy uploaded to Calcentral under the Dashboard tab and Student Resources.
- 1 copy (including signature and abstract) uploaded to the EECS Department Website online submission form.
- You must also submit to your Graduate Staff Advisor the following documents either in person or by email: (1) a copy of the signed signature page, (2) a copy/printout of the title page, and (3) a copy/printout of the abstract.

PLAN II

A written report of a project must be approved by your EECS Faculty Research Advisor and by a 2nd reader who is also a member of the regular Berkeley faculty. Exceptions for non-Berkeley faculty must be approved by general petition.

Produce an M.S. Plan II Title/Signature Page. See sample (**Word**);
There is no special formatting or paper required for the body of the Plan II MS report (unlike the Plan I MS thesis which must follow strict Graduate Division guidelines);

- 1 copy (including a blank signature page and abstract) uploaded to the EECS Department Website online submission form.
- You must also submit to your Staff Graduate Advisor the following documents either in person or by email:
    - a copy of the signed signature page
    - a copy/printout of the abstract
- 1 copy to your Faculty Research Advisor (optional)

EECS Department Exit Survey

If you are not continuing beyond the M.S. degree, you must complete the online Exit Survey (this is a departmental requirement in order to receive your degree).

Certificate of Completion
Certificates are automatically generated by the Graduate Division and emailed to students as soon as all steps in the filing process have been completed AND all requirements have been met on the student's Academic Progress Report (APR).

Diplomas
Degrees are posted to transcripts approximately 3 months after the conferral date. Diplomas are available approximately 1 month after that. For more information, see the Registrar's sites for Transcripts and Diplomas.

Degree Checklist:

Have you:

- Found a Research Advisor?
- Completed 24+ units of coursework?
- Completed academic residency?
- Advanced to M.S. Candidacy?
- If Plan I, filed with the Graduate Division?
- If Plan II, filed with the EECS Graduate Office?
- Completed the EECS Exit Survey (if you're graduating)?

You should check to make sure that you received grades for all required courses. Missed deadlines or bureaucratic snafus may lead to a delay in receiving your degree.

Fifth Year Master of Science (Joint Bachelor/M.S.)

Many of the above policies for M.S. students also apply for 5th year M.S. students. Below are some of the distinct aspects of this program:

- If you're admitted to this program, you must begin the M.S. in the semester immediately following the conferral of the Bachelor degree.
- The M.S. should take only one additional year (two semesters) beyond the Bachelor degree.
- The program is only available to Berkeley EECS and L&S CS undergraduates.
- Participants in the program may serve as Graduate Student Instructors via petition only.
- Participants in the program are self-funded.
- All 5th year MS students complete the Plan II technical report.

Coursework Minimum of 24 units required:

- 10 units of 200 series (excluding 298 & 299) in the EECS Department;
- 3-6 units of 299;
- at least 8 units must be a 100/200 series outside the EECS Department.

Also note:

- All courses must be taken for a letter grade, EXCEPT for 299s, which must be taken with the S/U option.
- Must maintain an average grade of at least B- in all technical/breadth course work undertaken as a graduate student.
- Minimum graduate GPA required to graduate.
    - Cumulative -- minimum 3.0 GPA
    - Technical electives -- 3.5 GPA

Breadth courses:

- Require at least 8 units outside EECS.
- Must form a coherent set of courses that prepare the student for leadership goals.
- No courses cross listed with EE or CS will be approved for breadth.
- Breadth courses must be approved by your 5th Yr. MS advisor. Please fill out the Proposed Course List form and have your advisor approve it.

Degree Checklist:

- **Completed 24+ units of coursework?**
- Advanced to M.S. Candidacy?
- Filed your Plan II with the EECS Graduate Office?
- Completed the EECS Exit Survey?

You should check to make sure that you receive grades for all required courses. Missed deadlines or bureaucratic snafus may lead to a delay in receiving your degree.

Master of Engineering (MEng)

Many of the above policies for M.S. students are true for MEng. students, as well. Below

are some of the distinct elements of the program:

Coursework
Students are required to complete at least 24 semester units divided into these three areas:

- **Technical Graduate Courses:** Four (4) graduate courses taken for a letter grade are required for each concentration. Students can choose from all approved MEng classes; course offerings not on the list are not open to MEng student enrollments.Each concentration includes a specific list of courses, giving you some options. Students are required to take two technical electives per semester, and must take at least 3 out of their 4 technical electives within their admitted area of concentration. Deviation from this policy in order to accommodate special needs, special interests, or take into account prior academic work or work experience are on a case-by-case basis. Please consult the list of Approved Courses for each concentration (provided each term by the MS graduate advisor) to find out more about the M.Eng. courses offered this year. Exceptions will be considered via General Petition form and reviewed by the MS graduate advisor and Vice Chair.
- **Leadership Courses:** Two courses, one in the Fall and one in the Spring, taken for a letter grade on engineering leadership, are required. These courses fill out the technical education with many non-technical topics of importance to engineering developers and managers, such as intellectual property, communications, teamwork and project planning, and general business concerns like competition, accounting, human resources, organizational development, and so forth. These courses employ the same case study method used in many of the top business schools.
- **Capstone Project:** A unique and important feature of the Berkeley Masters of Engineering is the capstone project experience. Students join a team of three to five students and pursue a specific problem that can be addressed by technology. Through the project, students not only pursue technology challenges but also gain direct experience in applying the skills learned in their leadership courses. Throughout the project, students are closely guided and mentored by faculty from both the technical and leadership sides, and at the end of the project they gain valuable experience in oral and written communication of outcomes.

Additional M.Eng. Policies

- **Due to the intensity of the MEng. curriculum, students in this program may not be employed through GSR, GSI, or Reader appointments.**
- All MEng. students complete the Plan II project report based on their capstone projects.
- Completed 24 units of coursework.
- Minimum graduate GPA required to graduate.
    - Cumulative -- minimum 3.0 GPA
    - Technical electives -- 3.5 GPA

- Must maintain an average grade of at least B in all course work undertaken as a graduate student.
- Completed the EECS Exit Survey

You should check to make sure that you receive grades for all required courses. Missed deadlines or bureaucratic snafus may lead to a delay in receiving your degree.

Doctor of Philosophy (Ph.D.)

The EECS Department offers 2 types of Ph.D. degrees:

- **Doctor of Philosophy in Engineering - Electrical Engineering and Computer Sciences**
- **Doctor of Philosophy in Computer Science**

The principal requirements for the Ph.D. are:

- Coursework (a major field, a minor field, an outside elective, and a free elective)
- Departmental Preliminary Requirement (oral examination and breadth courses)
- Qualifying Examination
- Teaching requirement (30 hours)
- The Dissertation

EECS has no foreign language requirement.

Normative Time

Normative Time is the elapsed time, calculated to the nearest semester, which students would need to complete all requirements for the doctorate, assuming that they are engaged in full-time study and making adequate progress toward their degrees. Normative Times for doctoral programs have been recommended by department faculty and approved by the Graduate Council and the UC Systemwide Coordinating Committee on Graduate Affairs. The targeted Normative Time for the EECS department is 11 semesters.

Teaching Requirement

All Ph.D. students must fulfill the GSI/TA requirement. The requirement is 30 hours of GSI/TA (with at least 20 hours of this being for undergrad courses).

Ph.D. Coursework

The Faculty of the College of Engineering recommends a minimum number of courses for students in the Ph.D. program. **The EECS Ph.D. program requires 24 units taken for a letter grade, and not including 297, 298, 299, 301, 302, 370, 375 and 602 units.** At the discretion of the Vice Chair for Graduate Matters, you may receive credit for some units you've taken at a comparable institution. Please see the Transfer Credit section for more information.

Graduate courses you used for the Berkeley M.S. degree may be included as part of your Ph.D. coursework.

Students that entered the EECS Ph.D. program in fall 2020 and before, may choose to complete either Plan 1 or Plan 2 for the coursework requirements.

Ph.D. candidates entering in fall 2021 and beyond will be required to follow Plan 2.

Plan 1

Major (all grad (200 level) courses)	12+ units	3.5+ GPA
Inside Minor (at least 1 grad (200 level) course)	6+ units	3.0+ GPA
Outside Minor (at least 1 grad (200 level) course)	6+ units	3.0+ GPA

Plan 2

Major (all grad (200 level) courses)	12+ units	3.5+ GPA
Minor (at least 1 grad (200 level) course)	6+ units	3.0+ GPA
Outside Elective (not in major and not in EECS; 100 level course or above)	3+ units	3.0+ GPA
Free Elective (any department, any area; 100 level course or above)	3+ units	3.0+GPA

Note: Courses that usually would have been taken for a letter grade in spring 2020 may be substituted with a Satisfactory grade. This was an accommodation granted due to the covid-19 pandemic.

Plan 1 Description

Major Subject Area

A coherent program of graduate courses (200 level) or the equivalent, with a GPA of 3.5 or better, as approved by your Research Advisor, will satisfy the major requirement. Most students take considerably more than the minimum units in the major area. The

GPA threshold may be rounded to two digits, but this still must be greater than or equal to 3.5.

Minor Subject Areas

The minor subject areas requirement is typically met by taking 2 courses in a given area. At least one of the courses must be a graduate (200 level) course.
Both minor courses for your Ph.D. should provide broad support for your proposed dissertation research. There are 2 issues which you should consider when you are choosing specific courses for the minor:

- adequate depth in the minor, and
- adequate breadth as distinct from the major area.

Ph.D. candidates, with the approval of their advisor, must choose courses for each of their minor subjects which meet the following criteria:

- Each minor program must have an orientation different from the major program, and the courses involved should contain concepts not present in the major program.
- At least one minor program must consist mainly of courses from outside the EECS Department. See a list of approved outside minors and their combination courses.
- The minor may include one or more classes from outside the EECS department.
- The minor program must have depth (meaning 1 graduate course for a 6-unit minor or 2 graduate courses for an 8 unit minor should be included). The more removed the outside minor program is from the content of the EECS major program, the fewer the number of graduate-level courses which may be required (as in the case of a biology minor for a computer hardware major program). To attain depth of knowledge in one-area, a minor is expected to contain courses in a set of coherent topics. A minor should not usually comprise courses covering broadly different areas. In particular, a minor cannot consist of two classes placed in different breadth areas by the prelim breadth requirement rules.
- If an undergraduate course is used in a minor, it must be upper division level (100+).
- The Outside Minor must include two classes outside of the EECS department, one of which should be a graduate-level course. Only one of the courses can be cross-listed with EECS, and it should not appear on the list of restricted courses for that minor. (See list below.)
- The minor programs should provide broad support for the technical goals of the proposed dissertation research.

These criteria attempt to define minors not by departments but by your selection of courses, which constitute a body of knowledge and include courses from several different departments. For example, a student in computer hardware who wishes to have a minor in statistics and stochastic processes could include courses from the Statistics Department, as well as EE 226A. In general, one member in the Qualifying Examination Committee will represent each of the minors.

There are cases where the technical overlap between EECS courses and courses in other departments is so great that the latter should be listed as part of the major, rather than as a minor, since they add so little breadth to your program.

Examples of this sort of overlap would be Electromagnetics students in EECS taking certain EM courses in Physics or CS Theory students taking some of the theory courses in IEOR. These complications make it essential for students to fill out their Blue Card in the EECS Graduate Office as soon as they have passed the preliminary exam requirement.

Suitably chosen sequences in subjects that support the student's professional goals may be used to satisfy the EECS course requirement for a minor. In proposing a set of courses for any minor to the Vice Chair of Graduate Matters for approval, the student should provide descriptions of the course material if not readily available. The student should maintain a minimum GPA of 3.0 in minor fields. In the event of a disagreement, the student may appeal to the EECS Graduate Matters Committee by submitting a written petition to the Graduate Office.

Plan 2 Description
The Major and Minor requirements will remain the same as Plan 1. To complete the Outside and Free Electives, students must complete two courses that are at least 100 level or above and 3+ units. The rules for these courses are detailed below.

Outside Elective: The outside elective requirement is met by taking 3 or more total units of course work outside of EECS in an area that does not overlap with the major. This coursework must have an orientation different from the major program, and must contain concepts not present in the major program. However, this coursework may overlap with the minor. The requirement is typically met by taking one course. Cross-listed courses with EECS are also not permitted.

Except by petition, the outside elective course must be graduate level or upper division undergraduate level. Outside elective course plans must be approved by the head graduate advisor. To fulfill the requirement, the average GPA for the outside elective coursework must be 3.0 or greater.

There are cases where the technical overlap between EECS courses and courses in other departments is so great that the latter should be listed as part of the major, rather than as outside the major, since they add little breadth to your program. Examples of this sort of overlap would be:

- Electromagnetics students in EECS taking certain EM courses in Physics.
- CS Theory students taking some of the theory courses in IEOR.
- Machine learning students taking statistical machine learning in Statistics (statistical machine learning would be appropriate for the major).

- Foreign language is permitted

These complications make it essential for students to fill out their Blue Card in the EECS Graduate Office as soon as they have passed the preliminary exam requirement.

Free Elective: The free elective requirement is met by taking 3 or more total units of course work in any department, and any area. The free elective area must not overlap with the Major. The free elective may be in the same research area as the Inside Minor. The requirement is typically met by taking one course. Except by petition, the free elective course must be graduate level or upper division undergraduate level. To fulfill the requirement, the average GPA for the free elective coursework must be 3.0 or greater.

Things to Consider in Meeting the Ph.D. coursework requirements

- All courses must be taken for a letter grade (with the exception of courses that may have been taken in spring 2020 due to the Covid-19 accommodations).
- A minimum of 24 semester units must be completed.
- Courses in 297, 298, 299, 301, 302, 375 and 602 units do not count towards the requirement.

Sample Blue and White Cards

Statistics minor: Please be advised that a minor consisting solely of Stat 201A (formerly Stat 200A) and Stat 243 is not considered acceptable. We strongly recommend that students in areas of EECS with a strong background in probability, such as CS theory or EE systems, take 2 graduate courses **other than** Stat 201A and 243, as they may find these courses insufficiently advanced for their purposes.

Outside Elective: The outside elective requirement is met by taking 3 or more total units of course work outside of EECS in an area that does not overlap with the major. This coursework must have an orientation different from the major program, and must contain concepts not present in the major program. However, this coursework may overlap with the minor. The requirement is typically met by taking one course.

Except by petition, the outside elective course must be graduate level or upper division undergraduate level. Outside elective course plans must be approved by the head graduate advisor. To fulfill the requirement, the average GPA for the outside elective coursework must be 3.0 or greater.

There are cases where the technical overlap between EECS courses and courses in other departments is so great that the latter should be listed as part of the major, rather than as outside the major, since they add little breadth to your program. Examples of this sort of overlap would be:

- Electromagnetics students in EECS taking certain EM courses in Physics, or

- CS Theory students taking some of the theory courses in IEOR, or
- Machine learning students taking statistical machine learning in Statistics (statistical machine learning would be appropriate for the major).

These complications make it essential for students to fill out their Blue Card in the EECS Graduate Office as soon as they have passed the preliminary exam requirement.

The Teaching Minor:
The Teaching Minor is intended for those with a strong interest in education, teaching pedagogy, or future faculty positions. The following are the requirements:

1) A 3-unit course surveying research in issues relating to computer science education. Examples include the following:
    - Education 170, 203, 224A, 224C, 225C, and 295B
    - Information 216 and 247

    Experimental courses such as those offered as Education 290 or Information 290 may also be appropriate for this requirement. Contact the Faculty Advisor for GSIs for further information.
2) CS 302, "Designing CS Education" (3 units). In a semester-long project, participants invent and refine a number of homework and exam activities, review relevant educational research, and evaluate alternatives for texts, administrative policies, and uses of technology.
3) A total of 40 hours of GSI appointments. (20 hours of work per week is equivalent to a 50% GSI appointment for a semester.) At least a 20 hour per week appointment or two 10 hour per week appointments in lower-division courses and at least a 20 hour per week appointment or two 10 hour per week appointments in upper-division or graduate courses that include discussion sections.
4) Students must enroll in the CS 399 section corresponding with their GSI appointments for a total of at least 4 units. This represents 40 hours of GSI appointments required for the Teaching Minor. A 10-hour per week appointment requires 1 unit of CS399. A 20 hour per week appointment requires 2 units of CS399.

Students interested in the teaching minor may also be eligible for additional certificate programs, including:

- Digital Pedagogy Fellow certificate, from the Center for Teaching and Learning: Certifies that the earner has received and put into practice basic pedagogy around planning and organizing a course with a strong online component, such as designing the "W" version of a campus course or designing a MOOC or online/self-paced module.
- Certificate in Teaching and Learning in Higher Education, from the GSI Resource Center.

Designated Emphases: Ph.D. students may choose to add a designated emphasis to their program. A designated emphasis is a specialization, such as a new method of inquiry or an important field of application, which is relevant to 2 or more existing doctoral degree programs. For more information, please see this complete list of the Designated Emphases.

You must apply for a Designated Emphasis and be accepted before you take your Qualifying Exam, since someone from the DE will sit on your Qualifying Exam.

Adding the M.S. Degree
Many Ph.D. students choose to add the M.S. degree along the way to earning the doctoral degree. This is not a requirement, but can be a financial incentive for graduate students choosing to earn both degrees during their academic career at EECS. EECS students who want to complete the M.S. should just consult with their Staff Graduate Advisor about requirements after reading through the M.S. section above. Ph.D. students from other departments are now required to apply as if they were new students to enter the M.S. program in EECS. See the instructions for Adding the M.S. degree from Another Department.

Departmental Preliminary Requirement

The EECS Preliminary Requirement consists of 2 components: 1) the oral examination and 2) breadth courses. The purpose of the prelim requirements is to ensure that students have competence in several fields of EECS, not just one specialization. Previously, the department preliminary exam covered multiple areas to require breadth. In the current version of the preliminary examination requirement, the breadth course requirement is used in combination with a narrower exam to ensure adequate subject matter depth and breadth. In the past, the department offered one broad oral exam. You will have fulfilled the Prelim Requirement only after you pass the exam and meet the course breadth requirements. All Ph.D. students are strongly encouraged to complete the preliminary breadth requirements by the end of their fourth semester. The Qualifying Examination may not be taken until the "pass" for the Preliminary Requirement is issued.

As a reminder, the prelim oral exam is for students enrolled in the Ph.D. program; students enrolled in the M.S.-only program are not permitted to sign up for the exam. For both the EE and CS oral exams, you must be registered for the semester the exam is taken, and you must have a minimum cumulative 3.5 GPA in courses taken at Berkeley while in graduate standing. Graded units of 299 and 298 are not included in this computation. If the GPA on record in the EECS Graduate Office is below 3.5, you will need to submit a petition, including an explanation, supported by a memo from a faculty member, about your research progress or any extenuating circumstances. These petitions are judged on a case-by-case basis by the Vice Chair for Graduate Matters.

As of November 2018, the Faculty Head Graduate Advisors have determined that the

GPA threshold may be rounded to two digits, but this still must be greater than or equal to 3.5.

In some cases EE students may desire to take a CS exam or vice-versa; in this case, you need to submit a petition, approved by your Faculty Advisor, in your home division before the deadline for prelim applications. Once this is approved, you are responsible for meeting other specific deadlines. You can contact your Staff Graduate Advisor for details. Many other specifics for the EE prelim and the CS prelim are different.

The prelim oral exam serves an advisory role in a student's graduate studies program with official feedback from the exam committee of faculty members. Students need to be able to demonstrate an integrated grasp of the exam area's body of knowledge in an unstructured format. Students generally have to pass the oral portion of the preliminary exam within their first two attempts. Under special circumstances, a third attempt is possible with a petition of support from the student's faculty advisor and final approval by the Prelim Committee Chair. Failure to pass the oral portion of the preliminary exam will result in the student being ineligible to continue in the Ph.D. program.

The breadth courses also ensure that students have an exposure to areas outside of their concentration. It is expected that students achieve high academic standards in these courses.

NOTE: Although CS PhD students are expected to take at least one course from each grouped area (Group 1 : THY, AI, GR; Group 2:Programming, Systems, and Architecture), students can petition to have an EE class satisfy one of their CS breadth requirements.

Tentative Program of Study (Blue Card)
After you have passed the Preliminary Exam Requirement, you must submit a Tentative Program of Study, otherwise referred to as a Blue Card (EE / CS) to the Graduate Office. This card outlines the courses that you plan to take to fulfill all the coursework requirements for the Ph.D. You will be free to make changes to your plan after filing this card, but once your advisor and the Vice Chair have signed it, you are assured that the courses you intend to take will be accepted as satisfying all of the requirements. This eliminates the possibility that you will discover, while preparing to take the qual exam, that you have to take another course.

To see a sample of an approved Blue Card, please refer to the Appendices in section 7.

Division-Specific Requirements

Electrical Engineering - Preliminary Oral Examination

The EE prelim exam should be taken in the area most related to your intended field of

research. If there is any question about the appropriateness of the choice, you should consult with your Faculty Advisor. If the EE Graduate Office sees an apparent discrepancy between your choice of exam and your research area, you and your advisor will be asked for justification. Under certain circumstances, your advisor may require that the exam be retaken in a more appropriate area.

You may select an exam in any one of the following areas:

- architecture (also included in CS, effective Fall 2021)
- control, intelligent systems, and robotics
- cyber-physical systems and design automation
- digital signal processing
- information, data, network, and communication science
- integrated circuits
- micro electro mechanical systems
- optoelectronic and photonics
- power/energy
- semiconductor devices

This list may continue to be revised. The list is maintained through this website.

Structure and Syllabus
The scope of the exam, intended to be the equivalent of about one graduate course plus supporting undergraduate material, is defined by an examination syllabus which is available from the EE Graduate Office or on the EECS Prelim Preparation website. Three faculty members meet with you for one hour, and each poses one or more questions in the field of the exam, based on the syllabus. The graduate students' association often schedules review sessions. It is also useful to talk to students who have previously taken the exam.

Scheduling and Sign-up
The exam is offered prior to the beginning of instruction each semester. All students are expected to take the exam no later than their third semester. If a repeat exam is necessary, it must be done at the next prelim offering. If you think you are exceptionally well prepared, you may petition to take the exam a semester early with the approval of your advisor. If you wish to delay taking the exam, you must submit a petition prior to the application deadline for the scheduled offering of the exam. The petition must explain the circumstances behind your desire to delay and be supported by your advisor. Students apply for prelims late in the semester preceding the exam; the EE Graduate Office will announce the sign-up dates by email. Applications are submitted on-line via MY EECS INFO. Students who do not meet the 3.5 minimum GPA requirement will be notified, and they may file a petition to be permitted to take prelims.

The intended set of examiners, date, and time for each student's prelim will be announced by the end of the semester before your exam; however, a change in the

composition of the examination committee may occur, which is not an excuse to cancel a scheduled exam. Withdrawing from the exam once you have signed up requires you to submit a petition, at least 2 weeks before the exam, approved by your advisor and the prelim committee chair, explaining the extenuating circumstances (e.g. medical or family emergencies). Please be aware that research obligations, dissolution of study groups, employment off campus, etc., are not legitimate reasons for withdrawing. If you sign up and then drop out of the exam within 2 weeks of the exam date, you will be considered to have failed that exam. If you sign up for a time slot and do not show up for the exam, you will also automatically fail and be required to retake the exam the following semester.

Scoring

The 3 examiners make a collective recommendation on whether you have passed or failed the oral portion of the prelim requirement. The examining committee awards a score in the range of 0-10. The minimum passing score is 6.0. A review committee consisting of the chairs of each of the exam groups then evaluates examinees who score below 6.0. The committee considers the student's entire record, including exam scores and any letters of support, particularly from the student's Research Advisor. The EECS Graduate Office staff will only solicit support letters for 2nd-attempt students who receive failing scores. You will receive a letter confirming the results of your exam and stating any remaining requirements (e.g. breadth courses not completed).

EE Prelim Breadth Courses

You must complete, with a grade of A- or better, a graduate or advanced undergraduate course of at least 3 units in 2 different areas in the EECS Department, outside the area of your oral exam. These same rules apply for an EE student who takes a CS prelim oral exam. (For example, an EE student who takes a CS oral preliminary exam in Architecture must choose 2 breadth courses from areas other than Architecture, and these areas must differ from each other.) Also, at least one of the 2 breadth courses must be satisfied while in graduate standing at Berkeley. Depending upon your Preliminary Exam area, you MAY NOT use the following classes in fulfillment of the requirement (this list has been updated as of August 2022 - CS 285 added to the AI list. Note: EE Students that took CS285 prior to this change will be grandfathered in to use the course as a prelim breadth course as it was not listed on the prohibited list until August 2022.):

Linear Systems (discontinued after fall 2020)	128, 221A, 222, 223, 290N, and 290O
Communications	120, 121, 123, 126, 224, 225ABD, 226AB, 228AB, 229, 290Q, 290S, and 290T
Cyber Physical Systems and Design Automation	219ABCD, 144, 244, EECS149, EECS 249A, EECS 249B, CS 170, CS 172, 290A

Digital Signal Processing	120, 123, 126, 225AB, 226, 290T, 290S, CS280
CIR	C106A, C106B, 127/227, 128, C206A, C206B, 221A, 222, 223, 290N, 290O
Integrated Circuits	105, 120, 140, 141, 142, 143, 145L (formerly 145A), 240 (series), 241AB, 242, 244, 251A, 251B, 251L, 290C
IDNCS	EE 120, 121, 123, 126, 127, 224, 225ABD, 226AB, 227AB, 229, 290Q, 290S, and 290T
MEMS	143, 147, 245(ME218), 246(ME219), 247, ME119, BioE121
ENE	EE 137A, 137B, 213A
Semicon. Devices	130, 131, 140, 141, 142, 143, 230 (series), 231, 240 (series), 241AB, 242, 243, 251A, 251L
Semicon. Process.	130, 143, 230A, 231, 243, 290H
Optoelectronics & Photonics	117, 118, 119, 232, 233, 236AB
Electromagnetics	105, 117, 118, 119 210, 216, 217, 290F
Networking	122, 228AB, CS268, 226AB
Operating Systems	CS261, CS262AB, CS266, and CS269
Graphics	CS280, CS284, CS285, CS294-3
Artificial Intelligence	CS280, CS281AB, CS285 (effective August 2022), CS287, CS288, CS289A
Architecture	CS250, CS252, CS254, CS257, CS258, EECS251A, EECS251L
HCI	CS160, CS260, CS294 CS160, CS260, CS294, (CSCW, Human-Centered Computing , or Assistive Technology)
Machine Learning	CS280, CS281AB, CS285, CS287, CS288, CS289A

You must petition to use any EE290 or CS294 courses in fulfillment of the EE prelim breadth requirement. This list may change when Departmental course offerings are updated. See the EE Grad Office for any updates. For courses taken at other schools, you may complete a petition form available in the EE Grad Office and have it

approved by the instructor of the equivalent course here at UC Berkeley. You must provide the instructor with as much information as possible, so that he or she can make an informed evaluation. This form and accompanying information will then be sent to the Chair of the Prelim Committee for final approval.Students must inform the EE Grad Office when they believe they have completed both classes in fulfillment of the prelim breadth requirement. A "pass" can then be issued–this is a necessary step for the student to progress toward the Qualifying Examination.

Computer Science - Preliminary Oral Examination

Subject
Students should choose to take the CS oral exam in the area closest to their major field of study in the Ph.D. program. If there is any question about the appropriateness of the choice, you should consult your advisor. Exams are given in the following research areas:

- Artificial Intelligence (AI) (prior to spring 2025)
- Biosystems & Computational Biology (BIO)
- Computer Architecture & Engineering (ARC)
- Database Management Systems (DBMS)
- Education (EDUC)GSI
- Energy (ENE)
- Graphics (GR)
- Human-Computer Interaction (HCI)
- Machine Learning
- Operating Systems & Networking (OSNT)
- Programming Systems (PS)
- Scientific Computing (SCI)
- Security (SEC)
- Theory (THY)

Structure and Syllabus
The research area prelim is a 50 to 60 minute oral exam given by 2 faculty members. In each area, the faculty team is responsible for designing, administering, and documenting the exam. The syllabus for each exam consists of a topic outline and recommended readings keyed to the test subjects. These syllabi are available on the bottom of the EE and CS Prelim Exam Preparation page. Other resources that may help prepare you for the exam are practice sessions organized by the graduate students' association and other students who have formerly taken the exam.

Scheduling and Sign-up
The oral exams are offered once per semester, sometime during the first few weeks of classes. All students are expected to take the exam no later than their third semester. If

a repeat exam is necessary, it must be done at the next prelim offering. If you think you are exceptionally well prepared, you may petition to take the exam a semester early with the approval of your advisor. If you wish to delay taking the exam, you must submit a petition prior to the sign-up for the scheduled offering of the exam. The petition must explain the circumstances behind your desire to delay and be supported by your advisor. Students sign up for the exam late in the preceding semester. The CS Staff Graduate Advisor will send an email announcing the sign-up dates by email. Applications are submitted on-line via MY EECS INFO. If you do not meet the 3.5 minimum GPA requirements, you will be notified, and the petition procedure must be used. After the deadline, all applications will be reviewed and the examiners will be organized. Another email will inform you of your faculty examiners and other grads who have signed up for the exam. Withdrawing from the exam once you have signed up requires you to submit a petition, at least 2 weeks before the exam, approved by your advisor and the prelim committee chair, explaining the extenuating circumstances (e.g. medical or family emergencies). Please be aware that research obligations, dissolution of study groups, employment off campus, etc., are not legitimate reasons for withdrawing. If you sign up and then drop out of the exam within 2 weeks of the exam date, you will be considered to have failed that exam. If you sign up for a time slot and do not show up for the exam, you will also automatically fail and be required to retake the exam the following semester.

Scoring

The faculty members administer the exam, grade student performance and sometimes inform the students of their grades (sometimes they will have the CS Graduate Advisor contact you with your results). The minimum passing score is 6.0 on a scale of 10. A pass is meant to indicate that the student would be welcome to do Ph.D. research with the examiners or their colleagues in the field of specialization.Students who fail their exam after the second attempt, or who fail to pass all the requirements within the required time period, or who request an exception, are to petition the CS Prelim Exam Committee. The Committee considers the student's entire record, including exam scores and any letters of support, particularly from the student's Research Advisor. Any letters of support should be submitted to the Staff Graduate Advisor to present to the Committee for review and consideration. It is therefore extremely important that students involve themselves in research under some faculty member at the earliest possible opportunity, preferably by their second semester. The Committee also considers compelling circumstances such as illness or, in the case of students switching to CS, those with very weak prerequisite backgrounds. The committee exercises wide discretion: it may decide that no action is necessary (if there are one or more semesters left in which to complete the requirements), that the student be allowed more time to complete the requirements, certain requirements be waived, certain remedial action be taken, or that the student be advised to leave the program. When students leave UC Berkeley and are subsequently readmitted to the Ph.D. program, the Prelim Committee on an individual basis determines the time by which they should complete the Prelims. Students who withdraw to avoid the Preliminary Exam should be aware that they might not be readmitted to the Ph.D. program.

CS Preliminary Breadth Courses
Students must complete courses from three of the following areas, passing each with at least a B+:

Theory:	270, 271, 273, 274, 276, 278
AI:	280, 281A, 281B, 285 (added F22), 287, 288, 289
Graphics/HCI:	260B, 283
Programming:	263, 264, 265, 267; EE219C
Systems:	261, 261N, 262A, 262B, 268, 286B
Architecture/VLSI:	250, 252, 258, *(EECS251A and EECS251L- added SP18)*

The courses must include at least one from the group of three above the line and at least one from the group of three below the line. CS260B, CS263, and EE219C cannot be used for this constraint, though they can be used as providing 1 of the 3 areas. (Students who took the old CS260 may use it as equivalent to the current CS260B.) Students must complete the requirement by the end of their 6th semester. ***CS breadth courses can count towards a major or minor, but classes in different areas cannot be used together for the major or in the same minor.***

Transfer of Credit for the Ph.D. Degree

With the approval of your advisor and the Vice Chair, you may petition to transfer a certain number of units of coursework (see options below) completed at other schools toward the course requirements for the Ph.D. In most cases, no more than one course would be accepted for the major field. Units used to complete your bachelor's degree will not be accepted. A Transfer of Credit petition is required for each course you intend to transfer. Students should fill out the first two sections of the petition, then find a faculty that is familiar with the course or taught the course in the past that can fill out section three. The form can then be sent to the Staff Graduate Advisor to evaluate with the Vice Chair/Head Graduate Advisor.

Please note that the approved transfer credits will be used for department purposes and will not appear in the official Berkeley transcript. In addition, the maximum number of transferable units is 12 semester units or 18 quarter units.

Final Program of Study (White Card)

By the end of your 6th semester, when you are ready to apply for the Qualifying Exam, you should complete the Final Program of Study, also known as a White Card (EE / CS) available on the department website (please note that students cannot ad

Mrunal Sarvaiya

vance to candidacy without an approved White Card on file) . The courses you list on the White Card need not be the same as those you listed on your Blue Card. However, the courses you do list will constitute your final program. Any changes you wish to make after having the card approved and signed by your advisor and the Vice Chair requires a petition. Please refer to the department website to see a sample of some approved White Cards.

Qualifying Examination (also known as Quals) and Thesis Proposal

The Qualifying Examination is an important checkpoint meant to show that you are on a promising research track for the Ph.D. It is a University examination, administered by the Graduate Council, with the specific purpose of demonstrating that students are “clearly an expert in those areas of the discipline that have been specified for the examination, and that he or she can, in all likelihood, design and produce an acceptable dissertation." Despite such rigid criteria, faculty examiners recognize that the level of expertise expected is appropriate for a 3rd year graduate student who may be only in the early stages of a research project.

The EE Division has recently restructured the Qualifying Exam process in order to help students through the Ph.D. in a timeframe closer to that expected by the University, and to ensure that students get feedback from a group of faculty earlier in their research, when it can have the most impact on the direction of their work.

In the past, the Qualifying Exam in EECS doubled as a Thesis Proposal. Under the new system, students, in consultation with their advisors, are given the option of taking a single exam (Format B) as before, or splitting the process in two (Format A): a research area summary as a Qualifying Exam, followed (typically semesters later) by a Thesis Proposal.

The intent of the current Qual system is that very few students should fail; with proper preparation, the examination should not be overly stressful. Rather, it is an opportunity for you to get feedback and constructive criticism on your research ideas from four professors at a time when such criticism can potentially help your research. In the unfortunate case that a student does fail the qualifying exam twice, per the Graduate Division's policy, a third attempt is not permissible. The student will not be eligible to

continue in the doctoral program and may be dismissed.

Qual Deadlines
The Qualifying Examination must be taken within 6 semesters of starting the program, and if the Qual is not a Thesis Proposal, then a satisfactory Thesis Proposal should be presented by the end of 10 semesters. CS students usually take the Format B (see below) Qual by the end of their fourth year; you should consult with your Research Advisor. In some cases, it may be necessary to delay these deadlines depending on the format of the exam (please see the Qual Format section for more details). Significant delays, however, will be brought to the attention of the Research Advisor and to the faculty at large at the EE and CS Student Review meetings. The exam is meant to demonstrate readiness to do research; it is not intended as a defense of an all-but-completed dissertation. An inability to successfully pass or take the Qualifying Exam may result in probationary status, and eventual ineligibility to complete the Ph.D. program.

Qual Eligibility

Since the Qualifying Exam is a University requirement, it can be taken only with the approval of, and at a time approved by, the Graduate Division. Eligibility requirements for taking the exam are as follows:

- You must be registered for the semester in which the exam is taken (an exam may be taken during the summer or winter break **if** the student paid fees for the semester immediately preceding the exam or intends to pay fees for the semester immediately following the exam).
- You must have completed at least one semester of academic residence at Berkeley.
- You must have passed the Preliminary oral exam and met the breadth course requirements. However, students do not need to have completed all the coursework in the major or minor.
- You must have a GPA of at least 3.5 in your major subject area, at least 3.0 in each of your minor and elective areas (298 and 299 not included), and have no more than 2 "Incomplete". Grades. The GPA threshold may be rounded to two digits, but this still must be greater than or equal to 3.5.

Qual Committee

In consultation with your Research Advisor, you should choose an appropriate examination committee. Your committee must consist of 4 members, at least 3 who are regular faculty members at Berkeley. Your advisor or co-advisors are usually members of the committee, but cannot be the chair. The Chair of your Qualifying exam committee must be from the EECS department. Another committee member must be from outside the EECS Department, representing some area of expertise relevant to your research

area, including minor. All members of the Quals Committee must be able to examine the student on at least one of the 3 subjects of the examination (for instance, this could be the major and minor listed on departmental white card).

The outside member can be a UCB faculty member with no more than 0% appointment in EECS, or a faculty member or distinguished researcher from another institution. Your outside member, if not part of the Berkeley Academic Senate, must have a Ph.D. and have published in the previous three years, and must be approved by the EECS Department and Graduate Division.

Process for Non-Senate: Submit a written statement of justification in the EECS Non-Senate Academic Request e-form. Attach the curriculum vitae of the proposed non-Senate member and the e-form will be reviewed and approved by the staff advisor. Once complete, a memo will be attached to your application by the staff advisor and routed to the Graduate Division for review and final approval. This person would be considered an "Additional" member.

Participation via teleconference will be permitted for at most one committee member. To avoid any conflict of interest, students are not allowed to pay travel costs and expenses for their committee members.

To summarize, these are the basic requirements for the qualifying exam committee:

- The chair must be from the student's department (two co-chairs are not allowed).
- The QE chair cannot later serve as the student's dissertation chair.
- All members should be Berkeley Academic Senate faculty. Any non-Berkeley (e.g. Stanford), or non-senate members (e.g. Adjunct Professor without blanket approval for service on student committees), must be petitioned and then approved by the Head Graduate Advisor and the Graduate Division.
- Non-senate members may not serve as outside members or as the Academic Senate Representative under any circumstances. If approved by the petition process, they will serve as an "Additional Member" for the qualifying exam.
- A majority of committee members must be from the student's home department. For this purpose, 50% is considered a majority. For example, 2 out of 4 members from the department are okay. Two out of 5 members are not.

Qual Format

After consultation with his/her advisor, students may choose either format A or B. The majority of EECS students choose format B.

Format A

- If requested by the chair and your committee, prepare a write-up summarizing a specific research area, preferably the one in which you intend to do your dissertation work. Your summary should survey that area and describe open and

interesting research problems. If a write-up is not requested, you can go right into preparing a presentation of your summary.
- Describe why you chose these problems and indicate what direction your research may take in the future.
- Prepare to display expertise on both the topic presented and on any related material that the committee thinks is relevant.
- You should talk (at least briefly) about any research progress to date (e.g. M.S. project, Ph.D. research, class project etc.). Some evidence of your ability to do research is expected.
- The committee will evaluate you on the basis of your comprehension of the fundamental facts and principles that apply within your research area, and your ability to think incisively and critically about the theoretical and practical aspects of this field.
- You must demonstrate sufficient command of the content and the ability to design and produce an acceptable dissertation.

Format B

This option includes the presentation and defense of a thesis proposal in addition to the requirements of option A. This will include a summary of research to date and plans for future work (or at least the next stage thereof). The committee shall not only evaluate the student's thesis proposal and his/her progress to date, but shall also evaluate according to option A. As in option A, the student should prepare a single document (only if requested by the chair and committee) and presentation. In this case, additional emphasis must be placed on research completed to date and plans for the remainder of the dissertation research.

Thesis Proposal Defense

Students not presenting a satisfactory thesis proposal defense, either because they took option A for the Qual, or because the material presented in an option B exam was not deemed a satisfactory proposal defense (although it may have sufficed to pass the Qual), must write up and present a thesis proposal which should include a summary of the research to date and plans for the remainder of the dissertation research. They should be prepared to discuss background and related areas, but the focus of the proposal should be on the progress made so far, and detailed plans for completing the thesis. The standard for continuing on with Ph.D. research is that the proposal has sufficient merit to lead to a satisfactory Ph.D. dissertation. Another purpose of this presentation is to provide feedback on the quality of work to date. For this step, the committee should consist of at least 3 members from EECS familiar with the research area, preferably including those on the dissertation committee. The Departmental Thesis Proposal Application can be found online. This form should be submitted to the Staff Graduate Advisor before your Thesis Proposal Defense. Ideally, it should be

presented within a year from the first exam.

Qual Application & Scheduling

On the CalCentral Student Resources Qualifying exam application and the Departmental Qualifying Exam Application, indicate the names of the proposed examination committee members, as well as the date, time, and location of the examination. (It is your responsibility to find a date and time when all the members of your exam committee are available.) The applications must be approved by your advisor and submitted to the EECS Graduate Office **at least one month before** the proposed date of the exam. Once again, EE students should take the exam before the end of the 6th semester of graduate study. Failure to do so may result in probationary status, and eventual ineligibility to complete the Ph.D. program.

The Staff Advisor reviews the online application before approving or rejecting the selected committee. The application is then routed to the Graduate Division. The Graduate Division then officially appoints the exam committee and approves your admission to the exam. Students must not take the Qual exam without prior receipt of an approval notice from the Graduate Division. One week before the exam date, the Graduate Office sends a reminder about the exam to each member of the committee, so be sure to keep your Staff Graduate Advisor updated about any change of time, location, etc.

If a student wishes to change the membership of the exam committee after the application has been approved by the Graduate Division, the committee must be "reconstituted" by petition in advance before a student files their dissertation. Fill out a Request for Change in Higher Degree Committee petition through CalCentral under Student Resources and it will be routed to your staff Graduate Advisor for processing. On the right hand side for "Student Resources", students will see an option to "Higher Degree Committees form". Please choose "Change of Higher Ed Committee".

Meeting with the Qual Chair

Since research areas differ, the format of the exam may vary somewhat. **It is most important to meet with the Chair of your examination committee well in advance of the exam to be sure you share a common understanding of the structure and format.** You will prepare a written research proposal or short summary of your research area according to your exam chair's direction. Distribute the proposal to the committee in advance of the exam. In some cases, the committee may request a 2nd proposal. Occasionally, one or more of the committee members may give some feedback prior to the exam, but the aim of the written proposal/summary is to provide appropriate background so that the discussion during the exam can move more quickly.

Qual Structure

The exam begins with a formal presentation of a summary of your research area or a

research proposal, typically following the write-up submitted to your committee in advance of the exam. In planning the length of the presentation, you should think in terms of giving a 45-minute seminar if there were no interruptions.

The committee will listen, interrupt, and ask questions. It is almost certain that not all committee members will be expert in all aspects of your research area, so you should give clear definitions and explanations, and be prepared to answer questions of a fundamental nature. Graduate Division instructs outside examiners that their responsibilities include ensuring "that the student's mastery of the subject matter is both broad and comprehensive."

As the exam develops, the questions may range further from the specific topic of research, especially if the questions posed by the research do not appear to be interesting and challenging or if there appear to be gaps or misconceptions in your understanding of the issues. Any and all questions which address the fundamental purpose of the exam should be expected.

Normally, at the conclusion of the exam you will be asked to leave the room while the committee discusses the result of the exam. You will be invited back once the committee has reached an agreement.

Tips and Suggestions for Qualifying Exams

The following tips on preparing for your Qual are taken from the Graduate Division's publication *The Graduate*:

Studying for the Qualifying Exam

- ***Find out about the format of the exam.*** Talk to students who have recently passed their exams, especially students with whom you have committee members in common. Ask about the format of their exams. Did the exam begin with a short summary of the student's academic career by either the chairperson or the candidate? If your department includes a talk as part of the exam, how long was it? Did the faculty members interrupt the talk with questions?
- ***Talk to your committee.*** Many students neglect this all-important resource, even though much of the intimidating mystery of the exam lies in what the faculty members will ask. Don't fly blind. Find out what you'll need to know for the exam. A suggestion: Prepare a brief outline of what you know about your 3 areas and take this with you when you talk to your committee members. Ask them what else you need to know. This outline will help you to organize your studying, and you can plug facts into this framework to illustrate your ideas. If the outline approach isn't appropriate, present a bibliography for a particular area to your committee and ask what other sources you should study. Ask which publications the professor would read to review a certain area quickly and effectively.
- ***Synthesize, not memorize.*** As you study, keep in mind that part of your task during the qualifying exam is to be convincing, as well as accurate, in your

arguments. Professors want to see how you've organized your knowledge and how you can use facts to bolster your arguments. Many questions will have no "right" answer; intelligent, informed conjecture is acceptable in many cases.

- ***Begin studying early enough to permit rehearsal time.*** Be sure to give yourself time to practice. Most students report that practicing for the exam was extremely helpful. Besides giving you a chance to review what you know about the subject matter, a mock exam gives you the experience of answering questions before a group and makes you more confident in that setting. Often major advisors, as well as other students and postdocs are glad to give you a mock exam. If an oral presentation will be part of your exam, practice it several times. Use a blackboard if you plan to use it during the actual exam.
- ***Prepare for the occasional mistake.*** Imagining a perfect exam in which you know every answer and are consistently brilliant for 2 or 3 hours simply is not realistic. Instead, rehearse saying that you don't know and plan what you will say in case you draw a blank. You can gain time, for example, by saying, "Let me take some time to consider that question." Your committee will understand and wait for you to recover.
- ***Organize a mock examination administered by your fellow students.***

During the Exams

If you are nervous, say so. Keep in mind that the committee members are instructed by the Graduate Division to "try to humanize an inherently difficult examination" and that the chair should "do all in his/her power to put the student at ease." It's perfectly fine to say, "I'm a little nervous right now; I'll have to get myself organized." And it will give you time to think.

- ***Take control of your exam as much as possible.*** If you've talked to your committee and other students, you should have a good idea of what to expect. In some cases, you may be asked your preference about the order of topics. If you have prepared answers to questions you are fairly certain you will be asked, you will have well-organized responses with no unfortunate tangents that may lead to questions you can't answer.
- ***Take your time in answering questions.*** Listen to the questions and give yourself time to think about them. Although the silence can be unnerving while you think about an answer, rushing in with a disorganized response is worse.
- ***If you can't answer a question, say so.*** Don't pretend that you know the answer. Going off on a tangent is a transparent attempt to avoid the question. Most committees will simply restate the question. Say you don't know.
- ***If you can't answer a question or feel you have given a poor or incorrect answer, don't dwell on it.*** Remember that no one expects you to know all the answers. Most likely, the very people who are examining you didn't know all the answers on their qualifying exams. (Twenty years later, one Berkeley professor remembers the exact wording of a question he couldn't answer on his exam.) Instead of worrying about a wrong answer, concentrate on the next question, the one you will field with confidence.

Antidotes to Anxiety

- If you're worried about failing the exam, fortify yourself with the knowledge that your chances of passing are excellent. Since 1975, only 6 percent of Berkeley students have failed their 1st qualifying exam.
- Recognize that your committee wants you to pass. These faculty members have a great interest in seeing you do well. They selected you for graduate study and trained you in courses. Most students report that their committee members were very cordial and gave them every opportunity to show what they knew during the exam. Often committee members would re-state questions of other committee members so that students would understand.
- Finally, believe it or not, 83% of Berkeley doctoral candidates consider the qualifying exam to be a beneficial experience, according to the Graduate Division exit questionnaire. It is a rite of passage that can build your confidence and affirm your readiness to take the next step in becoming a scholar.

Advancement to Candidacy

Students should submit the Advancement to Candidacy Application before the end of the semester they passed their Qualifying Exam. The application must be submitted through CalCentral under "My Dashboard". On the right hand side for "Student Resources", students will see an option to "Higher Degree Committees form." Please choose "Advancement to Candidacy".

The fee for Advancement to Candidacy is $90 and it will appear in your CalCentral account. If you are an NSF recipient, Grad Division will pay the advancement fee. NSF recipients are encouraged to email Ava Carl, Financial Analyst and Coordinating Office of the GRFP to process this request. Please also note that students cannot advance to candidacy without an approved White Card on file.

Students must complete the advancement eform in Calcentral no later than the end of the semester following the one in which the Qualifying Exam was passed. In approving this application, the Graduate Division approves your dissertation committee and will send you a Certificate of Candidacy.

Students who plan to use human subjects in their research must take the online Collaborative IRB Training Initiative course and print out the Course Completion Record to be submitted with their candidacy application.

Candidacy forms submitted without the CITI Course Completion Record will be returned to the student and will not be processed. Delays in your advancement to candidacy limit your actual time as a candidate and may jeopardize your full eligibility for the Doctoral Completion Fellowship, if in a qualified major.

Academic Residency

You must be in academic residence for at least 4 semesters to qualify for a Ph.D. In order for a semester to count as one in academic residence, you must enroll for at least 4 units of 100+ or 200+ level courses. (These 4 units do not necessarily satisfy the requirements for full-time study.)

The College of Engineering requires 2 semesters of residence after the Qualifying Examination has been passed before the Ph.D. can be granted. These 2 semesters may include the semester in which the Qualifying Examination is taken.

Summer Sessions may be counted under the following conditions:

- Enrollment in two consecutive six-week Summer sessions counts as one term of residence, provided the candidate is enrolled in each session for the equivalent of at least two units of upper division and/or graduate work as given in a regular term (four units total);
- Enrollment in an eight-week Summer session counts as one term of residence provided the candidate is enrolled for the equivalent of at least four units of upper division and/or graduate work as given in a regular term. No degrees are awarded for work completed during Summer Session only.

Under exceptional circumstances, the requirement may be waived, with the concurrence of the student's advisor and the Vice Chair of Graduate Matters.

Teaching Requirement

The Department requires all Ph.D. candidates to serve as a to gain teaching experience within EECS. The GSI/TA teaching requirement not only enhances and helps to develop a student's communication skills, but it also makes a great contribution to the department's academic community. **Students should discuss and coordinate satisfying their GSI/TA requirement with their faculty advisor.**

Students must fulfill this requirement by working as a GSI/TA (excluding EE or CS 301, or EE or CS 375) for a total of 30 hours minimum prior to graduation. At least 20 of those hours must be for an EE or CS undergraduate course. (NOTE: 20 hours of work per week is equivalent to a 50% appointment for a semester. 10 hours of work per week is equivalent to a 25% appointment for a semester.) Students will typically be able to fulfill this requirement in two semesters.

Students must apply directly through the department application system to be considered for a position. Only official appointments made through the department and the corresponding hiring unit of ERSO will count towards the teaching requirement. **Verbal or email offers from the hiring faculty or staff are not considered official offers.**

NOTE: The hours calculated per semester only refer to the fall or spring semesters. Students who wish to use service during their summer appointment towards their teaching requirement must fill out a general petition to be evaluated by the Head Graduate Advisor. The petition should include information on the course number, course title, the summer session (e.g., 6 or 8 week session), and approximately how many students were enrolled in the course. In addition, students should plan to submit the petition well in advance of applying for a summer appointment if they want it to count towards their teaching requirement. **Students should keep in mind that there is no guarantee the petition will be approved.**

Students who have passed the Preliminary Requirement and have not yet fulfilled the teaching requirement may be required to fill existing departmental teaching needs. 20 hours of the teaching requirement MUST be a course within the EECS department.

Students who wish to use a course outside of the EECS department to count towards the teaching requirement may submit a general petition to be evaluated by the Head Graduate Advisor.

Exemptions from the teaching requirement will be granted only under exceptional circumstances. In order to obtain an exemption, the student's Faculty Advisor must propose to the Vice Chair an alternate form of service for the student IN ADVANCE (e.g., the redesign of laboratory exercises for an existing course). Please note that ALL first time GSIs are required to take the EE or CS 375 course and successfully pass the online ethics course required by the Graduate Division, before they can teach.

Students are also required to successfully complete an approved pedagogy course such as EE375 or CS375 to fulfill the teaching requirement.

For more information about campus GSI requirements, fee remission, etc., see the **GSI Appointments Guide** and **GSI Requirements**. Students can also refer to the GSI Teaching and Resource Center as an additional resource.

The Dissertation

Filing your doctoral dissertation at the Graduate Division is one of the final steps leading to the award of your graduate degree. It is imperative that you carefully follow the Graduate Division's Instructions for Dissertation Writing & Filing. The Graduate Division strictly enforces rules about margin widths, page numbering, etc., and the Graduate Degrees Office in 318 Sproul Hall is the official source of all answers regarding any aspect of preparing your manuscript. In addition to electronically submitting your dissertation to the Graduate Division, a copy should also be uploaded to the EECS Department Website through the online submission form. The Department no longer accepts a hard copy of your dissertation.

As you are working your way through the final steps of your degree, it would be a very

good idea for you to drop by your staff graduate advisor's office or send them an email to check and make sure that you have completed every requirement for the Ph.D. except for the dissertation, the dissertation talk, and the exit survey. You definitely don't want any last minute surprises.

If you want a Certificate of Completion of the Ph.D., it will be sent after you file your dissertation.Your diploma will not be ready for a number of months. You may arrange to have it mailed to you when it is ready by completing the Diploma Request Form, found on the Registrar's website.

Dissertation Committee

Your dissertation committee must contain at least one member outside of EECS. Furthermore, the dissertation committee must comprise at least 3 members of the Academic Senate, voting or non-voting. Four member committees are permitted. The chair of the dissertation committee is usually the student's advisor, but the Qualifying Exam Chair cannot also be a Dissertation Chair. The Graduate Division must approve any additional committee member not a part of the Academic Senate. Members of the qualifying exam are automatically approved as members of the dissertation committee. See your Staff Graduate Advisor for more details.

Things to verify regarding the dissertation committee:

- The chair (or one of the co-chairs), must be from the EECS department Berkeley Academic Senate.
- All members must be Berkeley Academic Senate faculty. Any non-Berkeley (e.g. Stanford), or non-senate members (e.g. Adjunct Professor), must have an exception. Similar to the process for the qualifying exam, an outside member, if not part of the Berkeley Academic Senate, must have a Ph.D. and have published in the previous three years, and must be approved by your EECS Staff Advisor
- Non-senate members or faculty from the student's major may not serve as outside members under any circumstances.
- A majority of committee members must be from the student's home department. For this purpose, we consider 50% a majority. For example, 2 members from the department out of 4 total members is OK. 2 departmental faculty out of 5 members is not.
- Students need at least three UC Berkeley faculty members on their dissertation committee (one must be from outside EECS or have a 0% appointment in EECS); if you want a non-UC Berkeley member on your committee, you will need at least a four person committee.

- If you have been admitted to a Designated Emphasis (DE), one faculty member needs to be from the DE. If you don't know if you have a DE, then you probably never added it.

Process for Non-Senate: Submit a written statement of justification in the EECS Non-Senate Academic Request e-form. Attach the curriculum vitae of the proposed non-Senate member and the e-form will be reviewed and approved by the staff advisor. Once complete, a memo will be attached to your application by the staff advisor and routed to the Graduate Division for review and final approval.. This person would be considered an “Additional” member.

Thesis Seminar (Dissertation Talk)

Students filing a Ph.D. dissertation must give a one-hour talk on the principal results of their research as part of their graduate requirements. This must be done in the last semester in residence or in the semester in which the dissertation is filed. In addition, the talk must be given BEFORE the student files their dissertation. The talk will be advertised in the departmental calendar.

One preferable, but not necessary, venue for the dissertation talk is one of the group seminars. For CS students, the Computer Science Colloquium or any one of the following regular seminars is acceptable for this requirement: Computer Systems, Theoretical Computer Science, Graphics, Numerical and Scientific Computing, Database Systems, AI/Vision/Robotics. The Associate Chair for CS, in consultation with the Research Advisor, may designate another seminar, if appropriate. If this option is selected, it is advisable to contact the professor in charge of the seminar at least 2 weeks before the semester in which the dissertation will be completed.

The talk should cover all the major components of the dissertation work in a substantial manner–in particular, the dissertation talk should not omit topics that will appear in the dissertation but are incomplete at the time of the talk.The dissertation talk is to be attended by the whole dissertation committee, or, if this is not possible, by at least a majority of the members. Attendance at this talk is part of the committee's responsibility. It is, however, the responsibility of the student to schedule a time for the talk that is convenient for members of the committee.

Students should:

- Complete the Thesis Seminar Form before they give the talk.
- Submit the details of their talk to the Department Calendar. The Graduate Student Staff Advisor may be listed as the accessibility coordinator.
- Advertise their talk by sending an announcement to eecs-announce@eecs.

By signing the thesis seminar form, thesis committee members indicate that they have been informed of the scheduled time for the talk and whether they plan to attend.

EECS Department Exit Survey

All graduating/withdrawing/departing students must complete the EECS Exit Survey. The information that is collected will remain anonymous. The survey data will be shared with the department leadership and administration in an aggregated format without specific identifiers to maintain confidentiality.

EECS Technical Report

Every Ph.D. dissertation and Masters thesis must be submitted to the EECS Technical Memorandum Series. Full details of the policy may be found on the EECS Technical Memorandum Series Policy.
Please fill out the Ph.D. Dissertation or Master's Thesis/Report online submission form. Your manuscript will need to be in PDF format. Once submitted, the report will be assigned a number, given an HTML cover sheet, assigned a URL, and added to the EECS Technical Reports Database. You will be sent its number and URL by email.

If you need to delay the submission of your Tech Report, there is an option on your My EECS Info page that will allow you to specify a "delayed publication date".

Be sure that you have checked in with your Staff Graduate Advisor to ensure that all of your coursework, prelim, GSI, and other requirements are completed. They still need to update your milestones in Calcentral to confirm that you have completed all of your requirements for the degree.

6. Coursework

Course Descriptions

For the most current list of EECS courses and their webpages, please refer to the EECS Courses lists.

Sample M.S. Programs

The following are sample programs for the M.S. degree coursework (not including time dedicated to research). It is important to note that these are intended as suggestions only. Few students will elect to take precisely the courses indicated in any of these programs, and few will finish their coursework in exactly 2 semesters. Many students take most of their courses in the first year of the 2-year program, so that they may focus

more intensely on the research project and thesis or project report in the second. You are free to devise any coherent program of study satisfying the coursework requirements of the M.S. degree, subject to the approval of your Advisor.

Caution: Be very careful not to overextend yourself in your first term of graduate study. It is very important to maintain a GPA of at least 3.0, since with a lower GPA you cannot receive the M.S. Failure to do so in your first term can put you into a hole that is difficult to climb out of!

Electrical Engineering

Sample M.S. Programs for CAD (Computer Aided Design)
Accelerated Schedule - One Year Masters Program

Fall–Year 1		
EE244	Intro. to CAD of Integrated Circuits	3
EEC249B	Embedded System Design: Modeling, Analysis & Synthesis	4
	And one of the following:	
EE219A	Computer Aided Verification of Electronic Circuits & Systems	3
EE219C	Computer-Aided Verification	3
	Plus one of the following:	
EE299	Individual Research	2-3
EE290A	Advanced Topics in CAD	3
		Total 12-13 Units
Spring–Year 1		
EE219B	Logic Synthesis for Hardware Systems	4
EE241B	Advanced Digital Integrated Circuits	3
	And one of the following:	
EE225A	Digital Signal Processing	3
	Plus one of the following:	

EE299	Individual Research	2-3
EE290A	Advanced Topics in CAD	3
		Total 12-13 Units

Typical Schedule - 3 SEMESTER MASTER'S PROGRAM

Fall–Year 1		
EE244	Intro. to Computer Aided Design of Integrated Circuits	3
EE290A	Advanced Topics in CAD	3
EE299	Individual Research	3
	And one of the following:	
EE219C	Computer-Aided Verification	3
EE219A	Computer Aided Verification of Electronic Circuits & Systems	3
CS170	Efficient Algorithms & Intractable Problems	4
		Total 12-13 Units
Spring–Year 1		
EE219B	Logic Synthesis for Hardware Systems	4
EE290A	Advanced Topics in CAD	3
EE299	Individual Research	2-3
	And one of the following:	
EE241B	Advanced Digital Integrated Circuits	3
EE225A	Digital Signal Processing	3
		Total 12-13 Units
Fall–Year 2		
EEC249B	Embedded System Design: Modeling, Analysis & Synthesis	4
EE290A	Advanced Topics in CAD	3
EE299	Individual Research	2-3
	And one of the following:	
EE219A	Computer Aided Verification of Electronic Circuits & Systems	3
EE219C	Computer-Aided Verification	3

CS170	Efficient Algorithms & Intractable Problems	4
EE225A	Digital Signal Processing	3
		Total 12-14 Units

Sample M.S. Program for IC PROCESSING

Fall Semester		
E143	Processing & Design of Integrated Circuits	4
EE130/230A	Integrated-Circuit Devices	4
EE141/241A	Intro. to Digital Integrated Circuits	3
EE299	Individual Research	2
		Total 13 Units
Spring Semester		
EE243	Advanced IC Processing & Layout	3
EE230B	Solid-State Devices	3
EE241B	Advanced Digital Integrated Circuits	3
EE299	Individual Research	3
		Total 13 Units

Sample M.S. Programs for SOLID-STATE DEVICES

Fall Semester		
EE130/230A	Integrated Circuit Devices	4
EE299	Individual Research	1
	And one of the following:	
EE141/241A	Digital Integrated Circuits	4
EE140/240A	Linear Integrated Circuits	4
	Plus one of the following:	
EE143	Processing & Design of Integrated Circuits	4
EE230C	Solid State Electronics	3
		Total 12-13 Units
Spring Semester		
EE230B	Solid State Devices	4
EE299	Individual Research	3
	And one of the following:	
EE241B	Advanced Digital Integrated Circuits	3

EE243	Advanced Integrated Circuit Process & Layout	3
	Plus one of the following:	
EE233	Light Wave Systems	3
EE247B	Intro. to MEMS Design	3
		Total 13 Units

Sample M.S. Programs for COMPUTER INTEGRATED MANUFACTURING

Fall Semester		
CS186/286A	Intro. to Database Systems	4
EE143	Processing & Design of Integrated Circuits	4
EE299	Individual Research	2
	And one of the following:	
EE241B	Advanced Digital Integrated Circuits	3
EE230B	Solid State Devices	3
		Total 13 Units
Spring Semester		
STAT135	Concepts of Statistics	4
EE243	Advanced Integrated Circuits Processing & Layout	3
EE244	Computer Aided Design of Integrated Circuits	3
EE299	Individual Research	3
		Total 13 Units
Fall–Year 2		
EE290N	Integrated Circuit Technology Design	3
EE299	Individual Research	7
	And one of the following:	
IDS296	Management of Innovation & Policy	3
CS287	Advanced Robotics	3
IEOR165	Forecasting, Quality Control & Assurance	
IEOR215	Analysis & Design of Databases	3
		Total 13 Units

Sample Program in INTEGRATED CIRCUITS

Fall Semester

EE140/240A	Linear Integrated Circuits	3
EE141/241A	Digital Integrated Circuits	4
	Electives	5
		Total 12 Units
Spring Semester		
EE240B	Advanced Analog Integrated Circuits	3
EE241B	Advanced Digital Integrated Circuits	3
EE299	Individual Research	6
		Total 12 Units

Sample Program in CONTROL

Fall Semester		
EE221A	Linear System Theory	4
EE226A	Random Processes in Systems	4
EE298-14	Control Seminar	1
	And one of the following:	
EE122	Communication Networks	2
EE125/C215A	Introduction to Robotics	4
EE291E	Hybrid Control Systems	
		Total 11-13 Units
Spring Semester		
EE222	Nonlinear Systems: Analysis, Stability & Control	3
CS298-4	AI Robotics & Vision Seminar	4
EE299	Individual Research	3
	And one of the following:	
EE223	Stochastic Systems: Estimation & Control	3
EE227T	Introduction to Convex Optimization	3
ME235	Switching Control & Computer Interfacing	3
ME234	Multivariable Control System Design	3
	Plus one of the following:	
EE291E	Hybrid & Hierarchical Systems	3
CS280	Computer Vision	3
		Total 16 Units

Sample Program in CIRCUITS and NETWORKS

Fall Semester		
EE219	Circuit Theory & Computer Aided Analysis	3
EE221A	Linear System Theory	4
EE226A	Random Processes in Systems	4
EE299	Independent Research	1
		Total 12 Units
Spring Semester		
EE222	Nonlinear Systems-Analysis, Stability & Control	3
EE225A	Digital Signal Processing	3
EE299	Independent Research	3
	And one of the following:	
EE227T	Introduction to Convex Optimization	3
EE244	Computer-Aided Design of Integrated Circuits	3
		Total 12 Units

Sample Program in MECHATRONICS

Fall Semester		
EECS221A	Linear System Theory	4
EECS125/215A	Introduction to Robotics	4
EE247B	Introduction to MEMS Design	3
ME230	Real-Time Applications of Mini & Micro Computers	4
		Total 15 Units
Spring Semester		
EECS192	Mechatronic Design Lab	3
EE225A	Digital Signal Processing	3
EE299	Independent Research	1
ME235	Switching Control & Computer Interfaces	4
	And one of the following:	
CS184/284A	Foundations of Computer Graphics	4
EECS222	Nonlinear Systems Analysis, Stability, & Control	3
EE291E	Hybrid Control Class	4
		Total 14-15 Units

Sample Program in COMMUNICATIONS

Fall Semester		
EE221A	Linear System Theory	4
EE226A	Random Processes in Systems	4
EE299	Independent Research	1-2
	And one of the following:	
EE228A	High Speed Communications Networks	3
EE122	Intro. to Communication Networks	2
		Total 11-13 Units
Spring Semester		
EE224	Digital Communication	3
EE299	Independent Research	6
	And one of the following:	
EE223	Stochastic Systems: Estimation & Control	3
EE229	Information Theory & Coding	3
EE225A	Digital Signal Processing	3
		Total 12 Units

Sample Program for SIGNAL PROCESSING

Fall Semester		
EE123	Digital Signal Processing	4
EE221A	Linear System Theory	4
EE226A	Random Processes in Systems	4
EE299	Independent Research	1
		Total 12 Units
Spring Semester		
EE225A	Digital Signal Processing	3
EE225B	Multi Dimensional Signal Processing	3
EE299	Independent Research	2
	And one of the following:	
EE127/227AT	Optimization Models in Engineering	4
EE224	Digital Communication	3
CS281A	Statistical Learning Theory	3
		Total 12 Units

Sample Program for ROBOTICS

Fall Semester		
EE221A	Linear System Theory	4
EE125/215A	Introduction to Robotics	4
CS298-4	Graphics, Vision & Robotics Seminar	1
	And one of the following:	
CS184/284A	Foundations of Computer Graphics	4
CS188	Intro. to Artificial Intelligent	4
		Total 13 Units
Spring Semester		
EE192	Mechatronic Design Lab	2
CS287	Advanced Robotics	3
EE222	Nonlinear Control	3
CS280	Computer Vision	3
EE299	Individual Research	3
		Total 14 Units

Computer Science

Sample M.S. Program for DATABASE MANAGEMENT SYSTEMS
(For students who have had the equivalent of CS152, 162, 164)

Fall Semester		
CS186/286A	Introduction to Database Systems	3
CS262A	Advanced Topics in Operating Systems	3
CS268	Computer Networks	3
	And one of the following:	
EECS122	Introduction to Communication Networks	3
CS299	Individual Research	3
CS188	Introduction to AI & Natural Language Processing	4
		Total 12-13 Units
Spring Semester		
CS262B	Advanced Topics in Computer Systems	3
CS286B	Implementation of Database Systems	3
CS299	Individual Research	4
	Electives	3-4

		Total 13-14 Units

Sample M.S. Program for COMPUTER GRAPHICS

Fall Semester		
CS170	Efficient Algorithms & Intractable Problems	4
CS184/284A	Foundations of Computer Graphics*	4
CS283B	Computer-Aided Geo. Design & Modeling	3
CS299	Individual Research	2
	And one of the following:	
CS285	Solids Modeling	3
CS280	Computer Vision	3
		Total 13-16 Units

*If you have had a CS184/284A equivalent, take CS283B and CS285 whenever they are offered, since they may not be offered every year. Also, get involved with a research project as soon as possible.

Following Semesters—Take 1-2 courses per semester from this list, doing a minimum of 12 units per semester		
CS260	User Interfaces to Computers	3
CS264	Implementation of Programming Lang	4
CS274	Computational Geometry	3
CS280	Computer Vision	3
CS283B	Computer-Aided Geometric Design & Modeling	3
CS285	Solids Modeling	3
CS286B	Implementation of Database Systems	3
CS287	Advanced Robotics	3
CS288	AI Approach to Natural Language Processing	3
CS294	Special topics courses offered (e.g. Rendering)	3
CS299	Individual Research	3+

Sample M.S. Program for Human-Computer Interface (HCI)

Fall Semester		
CS160/260A	User Interface Design, Prototyping & Evaluation*	4

CS260B	Research Topics in Human-Computer Interface	3
CS294-4	Human-Centered Computing	3
CS299	Individual Research	2-3
		Total 12-13 Units

*If you have had a CS160 equivalent, take CS260 and CS294-4 (HCC) whenever they are offered, since they may not be offered every year. Also, get involved with a research project as soon as possible.

Spring Semester—Take 1-2 courses per semester from this list, doing a minimum of 12 units per semester		
CS294-3	Digital Documents and Services	3
SIMS290	Computer-Mediated Communication	3
SIMS214	Needs Assessment and Evaluation of Information Systems	3
SIMS247	Information Visualization & Presentation	3
SIMS271	Quantitative Research Methods for Information Management	3
CS280	Computer Vision	3
CS188	Introduction to AI & Natural Language Processing	4
CS288	AI Approach to Natural Language Processing	3
CS281B	Advanced Topics in Learning & Decision Making	3
CS294-5	Statistical Learning Theory	3
CS184/284A	Computer Graphics	4
CS283B	Computer-Aided Geometric Design & Modeling	3
CS262	Advanced Topics in Operating Systems	3
CS294	Special topics courses offered (e.g. CSCW)	3
CS299	Individual Research	3+

Sample M.S. Program for PROGRAMMING LANGUAGES

Fall Semester		
CS164	Programming Languages and Compilers	4
CS162	Operating Systems & System Programming	4

	And one of the following:	
CS170	Efficient Algorithms & Intractable Problems	4
CS150	Components & Design Techniques for Digital Systems	5
		Total 12-13 Units
Spring Semester		
CS264	Implementation of Programming Languages	4
CS262	Advanced Topics in Operating Systems	4
CS252	Graduate Computer Architecture	4
		Total 12 Units
Fall–Year 2		
CS263	Design of Programming Languages	3
CS265	Advanced Programming Languages Implementation	3
CS299	Individual Research	4
CS292,294	Special Topics	3
		Total 13 Units

Sample M.S. Program for OPERATING SYSTEMS
(For students who have had the equivalent of CS, 162, and 170)

Fall Semester		
CS152	Computer Architecture & Engineering	5
CS262	Advanced Topics in Operating Systems	4
CS164	Programming Languages & Compilers	4
CS299	Individual Research	2
		Total 15 Units
Spring Semester		
CS252	Graduate Computer Architecture	4
CS267	Applications of Parallel Computers	3
CS268	Computer Networks	3
CS299	Individual Research	1
CS300	TA Software Engineering (CS169)	3
		Total 14 Units

*also recommended are CS 260, 264, 270, 283B or 286B

Sample M.S. Program for THEORY of COMPUTATION
(For those students who have had the equivalent of CS, 152, 170, 172)

Fall Semester		
CS174	Combinatorics & Discrete Probability	3
CS270	Combinatorial Algorithms & Data Structures	3
CS274	Computational Geometry	3
CS299	Individual Study	3
		Total 12 Units
Spring Semester		
CS273	Foundations of Parallel Computing	3
CS276	Number Theory & Cryptography	2
CS278	Machine-Based Complexity Theory	3
CS299	Individual Research	4
		Total 12 Units

Designated Emphasis

Doctoral students in many science programs at UC Berkeley now have the opportunity to pursue a specialization and receive recognition for it when awarded their degree. For a list of all the Designated Emphasis programs offered, the Graduate Division maintains a list.

Admissions Procedures for the DE
Before taking the qual exam, complete an application for admission to the appropriate Designated Emphasis program. When you file your dissertation, the DE will appear on the degrees list and on your final transcript as awarded.

7. Appendices

Sample Blue and White Cards

https://eecs.berkeley.edu/resources/grads/sample-cards