DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

GRADUATE STUDENT SURVIVAL MANUAL 2021-22

UNIVERSITY OF CALIFORNIA
SANTA BARBARA

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ECE CONTACT INFORMATION

PERSONNEL

Chair:	• B. S. Manjunath Harold Frank Hall, Room 4157, x3821
Vice Chair:	• Clint Schow Engineering Science Bldg. (ESB), Room 3205C, X2875
Graduate Advisor:	• Clint Schow Engineering Science Bldg. (ESB), Room 3205C, X2875
Student Office:	• Valerie (Val) de Veyra, Grad. Student Matters Bldg. 697, Room 101, x2269. • Beth English, Undergraduate Matters Bldg. 380, Room 101, x8292. • Gayle Gonzales, Graduate Admissions Bldg. 380, Room 101, x3114.

IMPORTANT LOCATIONS

	Room	Phone
Continuing Students Office	Bldg. 697, Room 101	x2269
Graduate Admissions Office	Bldg. 380, Room 101	x3114
Student Mailboxes	Harold Frank Hall, Room 5154	none
Faculty/Staff Mailboxes	Harold Frank Hall, Room 4164	none
ECE Dept. Office (Chair)	Harold Frank Hall, Room 4157	x3821
ECE Budget/Employment	Harold Frank Hall, Room 4115	x8748
ECE Central Admin. Office	Harold Frank Hall, Room 4155	x3716
ECE TA Offices	Trailer 699, Room 103	none
Ryan Sims, Graduate Academic Counselor	Cheadle Hall, Room 3117 (e-mail: Ryan.Sims@graddiv.ucsb.edu)	x2068

IMPORTANT DATES FOR 2021-22

FALL QUARTER 2021

9/19, Sunday	Quarter officially begins.
9/20, Monday	Departmental Orientation for Graduate Students, 10:00-11:30 a.m.
9/20, Monday	ECE Departmental T.A. Orientation, 1:00-2:30 p.m.
9/20-9/21, Monday & Tuesday	Campus-wide T.A. Orientation, https://oic.id.ucsb.edu/ta-training-programs/ta-orientation
9/22, Wednesday	Campus-wide Orientation for all new Graduate Student, 11 a.m. to 12:30 p.m.
9/22, Wednesday	Environmental Health & Safety Meeting, 2-5 p.m., Girvetz Hall, Rm. 1004
9/23, Thursday	**Instruction begins.**
9/23, Thursday	Last day for student to pay all "now due" charges on the September 1 BARC statement or to complete financial aid processing. A $50 late payment fee will be assessed after 4 p.m. on this date.
9/23, Thursday	Registration deadline for new and returning students. After this date, new and returning students will be assessed a $50 late registration fee.
9/29, Wednesday	Last day for all students to drop courses without a $3 fee per drop transaction. Last day to add a course w/o an approval code.
10/1, Friday	**ECE Ph.D. Screening Exam.**
10/6, Wednesday	Last day to add course without paying $3 fee. Also last day to change grading option without paying $3 fee.
10/13, Wednesday	Last day to add classes by 11:59 p.m.
11/11, Thursday	Veteran's Day Holiday
11/25 & 26, Thursday & Friday	Thanksgiving Holiday
12/3, Friday	Last day to drop courses or change grading option for the quarter.
12/3, Friday	**Last day of instruction.**
12/4-10	**Final exams.**
12/10, Friday	Last day to present theses or dissertations to the Graduate Division to receive Fall 2021 degree.
12/10, Friday	Last day to submit Incomplete Grade Petitions with the Instructor's signature to the Office of the Registrar.
12/10, Friday	Degree candidates must have all transfer course work and examinations completed no later than this date for current quarter graduation.
12/10, Friday	Quarter ends.

WINTER QUARTER 2022*
(Abbreviated schedule, see Winter Schedule of Classes "Calendar" when available.)

1/3, Monday	Quarter officially begins.
1/3, Monday	**Instruction begins.**
1/17, Monday	Martin Luther King Jr.'s Birthday celebrated (Holiday)
2/21, Monday	President's Day (Holiday)
3/2, Wednesday	Deadline for continuing, new, & returning students to apply for 2021-22 Free Application for Financial Aid (FAFSA).
TBA	Deadline to apply to take ECE Ph.D. Screening Examination.
3/11, Friday	**Instruction ends**
3/12-18	**Final exams.**
3/18, Friday	Last day to present theses or dissertations to the Graduate Division to receive Winter 2022 degree.
3/18, Friday	Degree candidates must have all transfer course work and examinations completed no later than this date for current quarter graduation.
3/18, Friday	Quarter ends.

SPRING QUARTER 2022*
(Abbreviated schedule, see Spring Schedule of Classes "Calendar" when available.)

3/28, Monday	Quarter officially begins.
3/28, Monday	**Instruction begins.**
4/1, Friday	**ECE Ph.D. Screening Examination.**
5/30, Monday	Memorial Day (Holiday)
6/3, Friday	**Instruction ends.**
6/4-10	**Final exams.**
6/10, Friday	Last day to present theses or dissertations to the Graduate Division to receive Spring 2022 degree.
6/10, Friday	Degree candidates must have all transfer coursework and examinations completed no later than this date for current quarter graduation.
6/10, Friday	Quarter ends.
6/10, Friday	Graduate Division Commencement.

* Information subject to change.

I.   INTRODUCTION

This Survival Manual is intended as a guide; its purpose is to assist the student in selecting the program of study best suited to his/her needs and interests and to furnish help and guidance in the routine procedures involved in the pursuit of the program. Every effort is made to keep this manual current, but information is changing constantly. Please contact Val de Veyra in the ECE Graduate Student Office (Building 697, Room 101) with any questions or should you notice any erroneous information.

II.   ECE GRADUATE PROGRAMS

The Electrical and Computer Engineering (ECE) graduate program offers Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees, which differ in scope and degree requirements. The department offers these programs in several topics that fall under three major Program Areas: CE, CCSP, and EP;which are summarized in the following table.

Computer Engineering (CE)

Computer Systems Architecture	Very Large Scale Integration and Computer Aided Design
Computer Networks and Distributed Systems	Software Systems
Computational Models, Algorithms, and Analysis	Scientific Computation
Graphics and Image Processing	Machine Intelligence

Communications, Control, and Signal Processing (CCSP)

Biomedical Signal and Image Processing, Imaging Systems	Computer Graphics and Computational Photography
Computer Vision, Pattern Recognition and Machine Learning	Cyber-Physical Systems, Network Control and Power Systems
Distributed Computation	Information Theory and Rate Distortion, and Multimedia Data Compression
Multi-Agent Systems, Robotics	Next Generation Wireless Communication
Signal Processing Fundamentals and Algorithms	Robotics and Locomotion
Multi-Agent Systems, Cooperative Control and Game Theory	Nonlinear, Hybrid and Robust Control
Scientific and Engineering Computation Algorithms	

Electronics and Photonics (EP)

Compound Semiconductors and Widebandgap Semiconductor Technologies	Quantum Electronics and Nanoscience
Electromagnetics, Optics and Antennas	RF/Wireless Electronics Systems
Growth and Properties of Electronic Materials and Quantum Structures	RF and Optical Communications

Integrated Micro-Electro-Mechanical Systems (MEMS) and Micromachining Technologies	Semiconductor Device Physics
Modern Device and Int. Circuit Processing and Fabrication	Optical Communication Networks
Opto-Electronic Devices and Photonic Integrated Circuits	Solid-State Lighting and Displays
Quantum Mechanics and Solid-State Physics	Ultra High-Speed Devices and Circuits

All graduate programs are supervised by the Graduate Council and are administered by the Dean of the Graduate Division. At the departmental level, graduate programs are under the direction of the ECE Department Chair, the ECE Graduate Advisor, and the ECE Graduate Administration Committee. The Department's *Graduate Advisor*, who is appointed by the Dean of the Graduate Division on the recommendation of the Department Chair, deals with all graduate matters affecting the Department and represents the Department in dealings with the Graduate Division.

The choice of a program of study is primarily that of the student. Each student is assigned a faculty advisor, whose technical interests coincide with those of the student. The faculty advisor is available for consultation and guidance in course selection and matters related to the student's technical program.

Each Master's student must complete and submit to the ECE Graduate Student Office a formal Study Plan approved by his/her faculty advisor by the end of the his/her graduating quarter.

III.   DEGREE REQUIREMENTS AND PROCEDURES

Each degree has a set of requirements that must be fulfilled for UCSB to grant that degree. Some of these requirements are common to all graduate programs and are imposed by the Graduate Division. The ECE Department is responsible for the remaining requirements, which vary depending on the Program Area.

The degree requirements for the graduate programs listed below are intended to be flexible so that the program of study can be tailored as much as possible to the needs and interests of the student. The student may petition for a variation or waiver of any given requirement. For departmental requirements, the petition may take the form of a letter written to the person or committee with appropriate authority, typically the Department's Graduate Advisor. For Graduate Division requirements, the request should be submitted on a petition form, which can be downloaded from the following website: https://www.graddiv.ucsb.edu/academic-services/forms-petitions.

Degree requirements are sometimes altered to accommodate for technical, academic, or administrative changes. However, students are held to the requirements in effect when they enter the ECE graduate program unless they have written permission for an exception from the Department Graduate Advisor, in the case of departmental requirements, or the Dean of the Graduate Division, in the case of Graduate Division requirements.

Further information on requirements and procedures may be obtained from the ECE Graduate Student Office and from the Graduate Division. The student is also expected to read relevant

sections of the University's publications: the General Catalog https://my.sa.ucsb.edu/catalog/Current/Index.aspx and the Graduate Division website: https://www.graddiv.ucsb.edu/academic-services/policy-procedure.

A.   MASTER OF SCIENCE

ECE expects M.S. students to attain the degree in six quarters or less. However, M.S. students have up to four years to actually finish the degree. Students who are unable to complete the M.S. in four years must petition the Graduate Council for an extension of degree deadline. The Graduate Division makes note of all M.S. students who have been granted an extension and consults with the Department about their progress.

Graduate studies leading to the M.S. degree in ECE are administered under either **Plan I**, which requires course work and a thesis; or Plan II, which requires course work and a comprehensive examination. The requirements for obtaining an M.S. degree under each plan are listed below:

Graduate Division Requirements (common to both plans)

Residency	Three or more academic quarters in which the student completes 8 units or more of course work. All courses (including lower division courses and courses outside the department) count toward residency.
GPA	3.0 (B) or more on all courses taken
Fee	Student must be registered during the quarter in which the degree is awarded or file a filing fee leave of absence petition and pay a filing fee.

ECE Requirements (common to both plans)

Coherency	Study plan approved by the faculty assuring appropriate breadth and degree of specialization. Besides listing the courses needed to fulfill the major program requirements (needed for the three program area CE, CCSP, and EP) and the minor program requirements (only CE and CCSP), the Study Plan must also indicate any work required to meet any deficiency in undergraduate preparation.
Course load	Enrolled for a minimum of 12 units per quarter. All courses (including lower division courses and courses outside the department) count toward this requirement. How many courses to take in order to meet this requirement depends on a variety of factors, including the extent to which one must work for financial support, fluency in English, the quality of preparation, and the relative difficulty of the courses selected. In addition to formal course work, the following courses may be advisable to meet this requirement: • Project and research courses (ECE 596). • TAs assisting in ECE courses may register for ECE 502. • Students studying for the M.S. Comprehensive Exam (Plan I) may register for ECE 597. • Plan I M.S. students complete their thesis under units of ECE 598.

	• Courses numbered 595 only carry one unit applicable to this requirement.

Course work	Complete at least 42 units of course work.
	
	The following courses do not count toward this requirement:
	  • Courses graded B- or below.
	  • Lower division courses (course number less than 100)
	  • ECE or CMPSC upper-division (course number greater than 100 but less than 200) required courses for the undergraduate Electrical Engineering or Computer Engineering degrees or
	those courses that are prerequisites to graduate courses already successfully completed.
	  • Courses numbered 595, which must be taken for an S/U grade.
	  • Courses numbered 597.
	
	An Incomplete (I) grade acquired in one quarter must be removed by the end of the next quarter, or earlier. Otherwise, the "I" automatically becomes an "F" or "U".
	
	A student will be allowed to carry No Grades (NG) and No Records (NR) for only one quarter past when the course was originally undertaken before the NG or NR automatically reverts to a failing grade. This brings the grade notations of NG and NR in line with the policy governing Incomplete grades, except that student will not be able to petition for extensions of NG and NR as they can with an Incomplete.

GPA	3.0 (B) average in all courses in the 100-, 200- and 500-series, taken as a graduate student with the letter grade option. A student may only sign up for 595 and 596 courses with the S/U grading option, which therefore do not count toward this requirement. Grades received for courses taken outside the Department will be counted in the student's grade-point average, whether or not they are acceptable toward the degree. However, lower division (numbered 1-99) courses do not count towards the GPA calculation.
Area	Area Course requirements specific to the student's program area (CE, CCSP, or EP), as discussed in **Section A.1.**
EMS (English for Multilingual Students)	Linguistics courses passed for those students who were placed in such courses as a result of taking the English Language Placement Exam (ELPE). See Section I for details.
Incompletes	No Incomplete grades remaining

ECE requirements specific to Plan I (thesis)

Form	MS Form I filed along with a Conflict of Interest (COI) form. The MS Form I used to nominate the thesis committee must also be accompanied by a Conflict of Interest Form which is available at the ECE

	Graduate Student Office. Further questions regarding this form may be addressed by going to the Graduate Division website's Academic Services section: https://www.graddiv.ucsb.edu/our-services/academic-services.
Courses	8 courses meeting the following requirements: • up to a maximum of 12 units from undergraduate level senior elective courses; • up to a maximum of 8 units from ECE 493, 596, independent study or any course taken with the S/U grade option; • a minimum of 5 courses in ECE (for CE majors the 5 courses may be in ECE and/or Computer Science); • Excluding Engr. 101, ECE 139 & 152A, and all other courses required for the BS in Electrical Engineering and Computer Engineering and Technology Management (TMP) courses.
Thesis	8 units of ECE 598 and an approved thesis filed. See **Section A.2** for detailed thesis and thesis committee policy information.

ECE requirements specific to Plan II (comprehensive exam)

Form	MS Comprehensive Committee form filed.
Courses	10 courses meeting the following requirements: • up to a maximum of 16 units from undergraduate level senior elective courses; • up to a maximum of 8 units from ECE 493, 596, independent study or any course taken with the S/U grade option; • a minimum of 7 courses in ECE (for CE majors the 7 courses may be in ECE and/or Computer Science) • Excluding Engr. 101, ECE 139 & 152A, and all other courses required for the BS in Electrical Engineering and Computer Engineering and TMP courses.
Exam	Comprehensive exam passed. An M.S. candidate with serious interest in the doctoral program may take the Ph.D. Screening Examination in lieu of the M.S. Comprehensive Examination. See **Section A.3** for detailed comprehensive exam policy information.

A.1   Program Areas

Each Program Area has specific course requirements for the M.S. degree, which are listed below.

PLEASE NOTE: After taking a particular course, students may not get credit for prerequisites to that course. For example, if ECE 158 is the prerequisite for ECE 258, a student who has already taken ECE 258 in winter 2021 may not get credit for ECE 158 taken the following fall 2021 towards the MS degree requirement.

Computer Engineering

The Computer Engineering M.S. Degree requires a student to take four graduate (200) level courses in one of three major areas defined below and two graduate (200) level courses in one of the remaining seven areas as minor, i.e. other than the chosen major area. No course taken in the major area can be used to fulfill the minor requirement, and vice versa, even if the course is listed in more than one area.

The major must be taken in one of these three areas: a) Very Large Scale Integration and Computer Aided Design; b) Computer Networks and Distributed Systems, or c) Computer Architecture.

Very Large Scale Integration and Computer Aided Design		Computer Networks and Distributed Systems	
ECE 220A	Semiconductor Device Processing	ECE 250	Wireless Communication and Networking
ECE 223	High-Performance Digital Circuit Design	ECE 251	Mobile Embedded Systems
ECE 224A	VLSI Project Design	CS 270	Operating Systems
ECE 225	High Speed Digital Integrated Circuit Design	CS 271	Advanced Topics in Distributed Systems
ECE 254D	Advanced Computer Architecture: Memory-Centric Computing	CS 276	Advanced Topics in Networking
ECE 256C	Advanced VLSI Architecture and Design	CS 279	Network Security and Intrusion Detection
ECE 272A	Machine Learning in Design and Test Automation	CS 284	Mobile Computing
ECE 272B	Artificial Intelligence in Design and Test Automation		

Computer Architecture		Machine Intelligence	
ECE 251	Mobile Embedded Systems	CS 266	Formal Specification and Verification
ECE 252B	Computer Arithmetic	CS 267	Automated Verification
ECE 253	Embedded Systems Design	CS/ECE 281	Advanced Topics in Computer Vision
ECE 254A	Advanced Computer Architecture: Processor Design	ECE 278A	Digital Image Processing

ECE 254B	Advanced Computer Architecture: Parallel Processing	ECE 283	Machine Learning: A Signal Processing Perspective
ECE 254D	Advanced Computer Architecture: Memory-Centric Computing		
ECE 257A	Fault-Tolerant Computing		
CS 240A	Applied Parallel Computing		
CS 254	Advanced Computer Architecture		
CS 271	Advanced Topics in Distributed Systems		

Software Systems		Computational Models, Algorithms, and Analysis	
CS 240A	Applied Parallel Computing	CS 220	Theory of Computation and Complexity
CS 240B	Parallel Computing and Program Parallelization	CS 225/ ECE 205	Information Theory
CS 260	Advanced Topics in Program Analysis	CS 220	Theory of Computation and Complexity
CS 263	Modern Programming Languages and Implementation	CS 230	Approximations, NP-Completeness and Algorithms
CS 266	Formal Specification and Verification	CS 231	Topics in Combinatorial Algorithms
CS 267	Automated Verification	CS 266	Formal Specification and Verification
CS 270	Operating Systems	CS 267	Automated Verification
CS 272	Software Engineering	ECE 229	Hybrid Systems
CS 273	Data and Knowledge Bases		
CS 274	Advanced Topics in Database Systems		

Scientific Computation		Graphics and Image Processing	
CS 211A/ ECE 210A	Matrix Analysis and Computation	CS 280	Computer Graphics
CS 211B/ ECE 210B	Numerical Simulation	CS 281/ ECE 281	Advanced Topics in Computer Vision
CS 211C/ ECE 210C	Numerical Solution of Partial Differential Equations	ECE 278A	Digital Image Processing

CS 211D/ ECE 210D	Finite Difference Methods/Finite Element Methods	ECE 278C	Imaging Systems
CS 216/ECE 226	Level Set Methods	ECE/CS 285	Advanced Image Synthesis
ECE 271A	Principles of Optimization		
ECE 271B	Numerical Optimization Methods		
ECE 271C	Optimal Control of Dynamic Systems		

Communications, Control, and Signal Processing

Students in the CCSP area have three options for the major: Communications, Signal Processing or Control.

Communications and Signal Processing

All students in the communications and signal processing field must take five courses in one of the two major areas listed below. Any prerequisite courses not in the list can be used as credit towards the degree, but cannot be used to satisfy the major requirement (or the minor requirement described below).

Communications			
Five courses from this list:			
ECE 205/ CS 225	Information Theory	ECE 243B	Advanced Digital Comm. Theory
ECE 235*	**Stochastic Processes**	ECE 246	Data Communication Networks
ECE 240	Optimal Estimation and Filtering	ECE 250	Wireless Communication and Networking
ECE 242	Digital Signal Compression	ECE 282	Error Correcting Code
ECE 243A	Digital Communication Theory	ECE 284	Theoretical Machine Learning

Signal and Image Processing			
Five courses from this list:			
ECE 235*	**Stochastic Processes**	ECE 278A	Digital Image Processing
ECE 241	Multimedia Compression	ECE 278C	Imaging Systems
ECE 245	Adaptive Filter Theory	ECE/CS281	Advanced Topics in Computer Vision
ECE 258	Multirate Digital Signal Processing	ECE 283	Machine Learning: A Signal Processing Perspective
ECE 277	Pattern Recognition	ECE 284	Theoretical Machine Learning
		ECE/CS 285	Advanced Image Synthesis

* ECE 235 is **<u>mandatory</u>** for all students majoring in communications or signal processing.

In addition to the major, students are required to have a ***minor area***.

A minor in Communications or Signal Processing requires the student to take three courses from one of the two areas listed above, other than the major. ECE 235 is not required for a minor in that area; however, it is strongly recommended.

Alternatively, the students majoring in Communications or Signal Processing can satisfy their minor requirements by taking two courses from the following areas:
- Control (typically 230A/230B)
- Scientific Computation (typically ECE 210A/B/C/D)
- Optimization (typically ECE 271A/B/C)

Any given course can only be counted once, to either satisfy the major or the minor course requirements.

Control

All students in the control field must take four courses from the following table. Any prerequisite courses not in the list can be used as credit towards the degree, but cannot be used to satisfy the major requirement (or the minor requirement described below).

Control			
One required course from this list		Three additional courses from this list	
ECE 230A	Linear Systems I	ECE 147B	Digital Control Systems Theory and Design
		ECE 229	Hybrid Systems
		ECE 230B	Linear Systems II
		ECE 232	Robust Control with Applications
		ECE 234	Identification for Control
		ECE 236	Nonlinear Control Systems
		ECE 237	Nonlinear Control Design
		ECE 238	Advanced Control Systems Design Laboratory
		ECE 240	Optimal Estimation and Filtering
		ECE 247	System Identification
		ECE 248	Kalman and Adaptive Filtering
		ECE 249	Adaptive Control Systems
		ECE 269	Network Systems
		ECE 270	Non-cooperative Game Theory
		ECE 271A	Principles of Optimization
		ECE 271C	Optimal Control of Dynamic Systems

		ECE 289	Introduction to Robotics: Dynamics & Control

In addition to the major, students are required to have a minor area. A minor can be in one of the following areas:

- Signal Processing or Communication (by meeting the minor requirement in that area, see above)
- Computer Engineering (minor courses must be in the same program category)
- Electronics & Photonics
- Scientific Computation (typically ECE 210A/B/C/D)
- Optimization (typically ECE 271A/B)
- Dynamical Systems (typically ME 201, ME 202, Math 243A/B/C)
- Mathematics (typically Math 228A/B, Math 246A/B/C, P/Stat 222A/B/C)

The courses listed for the minor areas are only representative; students should consult with their advisors and choose two courses that provide sufficient depth in the minor. Students may also propose a program of minor study in a technical area not listed above. However, any courses taken to satisfy the major requirement cannot be used to satisfy the minor requirement. The student's advisor and Department Graduate Advisor must approve such programs.

Electronics and Photonics

The faculty of the Electronics and Photonics group offer many undergraduate and graduate courses that can be grouped into sequences as shown below. Additional courses from other areas and departmentsare also listed when appropriate. Courses marked with an "*" are generally taught every other year. The majority of the classes must be taken from the following list.

Technology	Electromagnetics	Device Physics and Quantum Mechanics
ECE 120A, B	ECE 144	ECE 162A, B
ECE 220A, B	ECE 201A	ECE 211A, B*
ECE 260A	ECE 261	ECE 215A, B
		ECE 221A, B
		ECE 261

Electronic Materials	Electronics	Optics and Optoelectronics
ECE 162A (or Physics 115 A, B)	ECE 120A, B	ECE 135
ECE 162B	ECE 122A	ECE 162A, B, C
ECE 211A, B*	ECE 144	ECE 201A
ECE 215A, B	ECE 218A, B, C	ECE 215A
ECE 216	ECE 220A, B	ECE 227A, B, C*
ECE 217	ECE 224A	ECE 260A, B
MATRL 227*	ECE 225	ECE 261
		ECE 262
		ECE 265

Graduate students are encouraged to participate in directed research (ECE 596) projects.

A.2   M.S. Thesis/M.S. Thesis Committee (Plan I)

A master's thesis is patterned after a Ph.D. dissertation but on a scaled-down level of originality and length. A public seminar presentation is not required for thesis defense. The thesis must make a significant contribution. Publishable results are encouraged but not required. Some examples of the types of **projects suitable for M.S. thesis** are the following:
an advanced design project, either analytical or experimental;

- an experimental or theoretical contribution to a research problem currently investigated within the Department;
- a critical evaluation of the state-of-the-art of a current research area, going beyond mere literature compilation;
- a critical theoretical analysis or a preliminary experimental study intended as a feasibility study or precursor laying the groundwork for more advanced Ph.D.-level research.

A **Thesis Advisor** must supervise the thesis and a **Thesis Committee** must approve it. The Thesis Committee shall consist of the Thesis Advisor and at least two additional faculty members chosen by the student and approved by the Thesis Advisor, by the Departmental Chair and Departmental Graduate Advisor, and by the Graduate Dean. The Committee must have at least three Academic Senate members (those who hold the title of either Professor, Associate Professor, Assistant Professor, Lecturer with Potential Security of Employment (LPSOE) or Lecturer with Security of Employment or Senior Lecturer (LSOE)), two of whom must be from the department; the third faculty member may be from another department. At the Department's discretion, a non-ladder faculty member may serve as a fourth committee member. The Thesis Committee Chair must be Professor, Associate Professor, or Assistant Professor; LSOE or LPSOE may serve as co-chair with a Professor, Associate Professor or Assistant Professor.

It is the responsibility of the student to find a faculty member willing to supervise the thesis and a Thesis Committee willing to serve. The Department does not guarantee that such an Advisor and Committee can be found, or that the thesis can be completed within any specified time. However, the student may at any time switch to a Plan II M.S. degree simply by satisfying the requirements for it. The thesis should be typed in draft form for the Committee. After the Committee approves it, it should be typed in the format set forth in the ***Guide to Filing Theses and Dissertations*** which may be downloaded
from the following website: https://www.graddiv.ucsb.edu/academic-services/filing.

A.3   Comprehensive Examination Requirements (Plan II)

A committee of three ladder faculty members selected by the student called the ***Examination Committee for the Degree of Master of Science*** administers the exam. The Department should approve the student's selections as early as possible in the quarter in which s/he expects to receive the M.S. degree. This is done through the ECE Graduate Student Office. The formation of the M.S. Comprehensive Exam Committee follows the same rules as the formation of the M.S. Thesis Committee.

The Comprehensive Examination for the Master's Degree generally is taken in the last quarter listed on the student's approved Study Plan, or later, and only if his/her cumulative GPA is 3.0 or above. The student must pass the exam before the end of the quarter in which s/he plans to graduate officially. ***The student is in charge of scheduling the exam.***

For students who *fail the comprehensive examination* on the first try, the decision to allow a second try is at the discretion of the Examination Committee.

The different Program Areas (CE, CCSP, and EP) have slightly different formats for the exam, which are described below.

Computer Engineering:

For students with a Computer Engineering emphasis, the examination may be oral or written at the discretion of the examination committee (but not at the discretion of the student).

The MS comprehensive exam committee must consist of three faculty members at least two of whom are in the ECE Department. Two of the committee members must specialize in the student's selected major area and one must be from the selected minor area. The committee chair must be an ECE faculty member in the student's major area. The names of the faculty are given to the ECE Graduate Student Office, which then gives the form to the student about three days before the exam.

The CE group makes a commitment to schedule the exam within one month of the committee formation.

Communications, Control & Signal Processing:

For students with a Communications, Control & Signal Processing emphasis, the comprehensive examination may take one of the following three forms:

   a) An oral examination on a subset of course material from ECE classes taken by the candidate and taught by faculty on the exam committee

   b) A written examination on a subset of course material from ECE classes taken by the candidate and taught by faculty on the exam committee, or

   c) A seminar presentation of a topic, or project, based on coursework or research.

The exam committee chair decides on the form of the exam after consulting with the student and exam committee members.

In case of a course-based oral or written examination (a or b), the candidate must compile, in consultation with the committee members, a list specifying the scope of the material on which s/he is to be examined on. This list must be approved by the committee chair and made available to all committee members no later than four weeks before the scheduled exam date.

In case of a seminar presentation (c), the candidate is required to prepare a 20-30 minute oral presentation (typically supported by slides) on a topic related to his/her course selections or a research project s/he has carried out.

The committee chair must approve the topic no later than 4 weeks before the scheduled exam date. The oral presentation is followed by a questions and answer session led by the committee members.

A second exam attempt cannot be scheduled less than 4 weeks after a failed attempt. Candidates are therefore strongly encouraged to schedule their exam early in the quarter to minimize delays in case of a failed attempt.

Electronics and Photonics:

For students with an Electronics and photonics emphasis, the examination is always oral. As a point of departure for the exam, students are required to prepare a 20-minute oral PowerPoint presentation on a topic of their choosing. The topic presumably should relate to an area of concentration that the student has already chosen by his or her course selections. Prior approval of the topic by the Exam Committee Chair must be obtained.

Electronics and Photonics students opting to take the oral comprehensive exam are allowed only two chances to pass the exam.

A.4   Transfer from an M.S.-only to the M.S./Ph.D. Program

Students who are already involved in the M.S. program at UCSB and who wish to work for a doctorate should discuss their prospects with their faculty advisor and other professors. If, after receiving advice and encouragement, a student wishes to apply for the Ph.D. program, s/he must start and complete a new application via the Graduate Division application website. This application is usually done after passing the Ph.D. Screening Exam (see Section **B.3**).

Current students who apply and are accepted into the doctoral program will be fully eligible for central recruitment funding including the International Doctoral Recruitment Fellowship (IDRF) if they apply and are admitted. If admitted, students will be given a new start quarter for the doctoral degree objective. This means that the degree clock starts anew.

B.   THE DOCTOR OF PHILOSOPHY PROGRAM

Graduate Division Requirements

| Residency | Six or more academic quarters in which the student completes 8 units or more of course work. All courses (including lower division courses and courses outside the department) count toward residency.

Three consecutive quarters of residency must be completed in regular session (excluding summer session) before Advancement to Candidacy. Only the Graduate Council may grant exceptions to this rule. |
|---|---|
| Form | A Conflict of Interest Form is required to establish a doctoral dissertation committee with the Graduate Division. The ECE Graduate Student Office handles this paperwork, but the student's signature is required on the form.

Further questions regarding this form may be addressed by going to the Graduate Division website's Academic Services section: https://www.graddiv.ucsb.edu/academic-services/committees. |
| GPA | 3.0 (B) or more on all courses taken |

Fee	Student must be registered during the quarter in which the degree is awarded or file a filing fee leave of absence petition and pay a filing fee (see **Section B.7)**.

ECE Requirements

Foreign Language	There is no foreign language requirement in ECE for the Doctor of Philosophy degree.
Course Load	Enrolled for a minimum of 12 units per quarter. All courses (including lower division courses and courses outside the department) count toward this requirement. How many courses to take in order to meet this requirement depends on a variety of factors, including the extent to which one must work for financial support, fluency in English, the quality of preparation, and the relative difficulty of the courses selected. In addition to formal course work, the following courses may be advisable to meet this requirement: • Project and research courses (ECE 596) • TAs may register for ECE 502 if assigned an ECE TAship • Students studying for the Ph.D. Screening Exam may register for ECE 597 • Students doing dissertation research and writing may register for ECE 599 • Courses numbered 595 only carry one unit applicable to this requirement **For all students with M.S. degrees entering the Electrical & Computer Engineering (ECE) Ph.D. program with an emphasis in Computer Engineering during Fall 2010 or later or for those with an emphasis in Communication and Signal Processing during Fall 2018 or later, 24-units (6 courses) of graduate engineering or science courses taken at UCSB are required. For courses to count toward this requirement, a grade of B or better must be attained.**
EMS (English for Multilingual Students)	Linguistics courses passed for those students who were placed in such courses as a result of taking the English Language Placement Exam (ELPE). See **Section I** for details.
Screening Exam	Ph.D. Screening Exam passed. See **Section B.3** for detailed screening exam policy information.
Qualifying Exam	Ph.D. Qualifying Exam passed and consequent advancement to candidacy. See **Section B.4** for detailed information about qualifying exam policy and advancement to candidacy.
Defense	Defense of Dissertation Exam (public seminar) passed. See **Section B.5** for detailed information on the dissertation defense exam.

Dissertation	Filing of an approved dissertation.

B.1 Ph.D. Committee

Most of the technical guidance for the student in the Ph.D. program will come from the faculty advisor and the Doctoral Committee Chair. After passing the Screening Exam, the student, in consultation with his/her faculty advisor, will select a faculty member who will serve as Doctoral Committee Chair. The faculty advisor and the Doctoral Committee Chair are often the same faculty member. Details of the individual program are set by agreement between the student and the faculty advisor or Doctoral Committee.

The student is responsible for selecting a faculty member who will agree to serve as Chair of the Committee. The Chair of the Committee and the student confer on the selection of the remaining members.

The Chair of the Committee is responsible for monitoring the student's progress through the program and for the supervision of the dissertation research. The Committee should be formed at any time after passing the Screening Exam. The required forms are obtained in the ECE Graduate Student Office.

A Ph.D. committee shall consist of no fewer than four members, which should be faculty in the same or different departments at UCSB or at another university. In rare cases, a highly qualified individual from industry can be a committee member. In such cases, a student must submit a detailed technical biography or CV of the outside member for review by both the Department Vice Chair and Chair. However, no fewer than three committee members shall be ECE ladder faculty (those who hold the title of either Professor, Associate Professor, Assistant Professor, LPSOE and LSOE) with part- or full-time or. affiliated appointments in ECE. The Chair and at least one other member of the ECE faculty shall be from the student's area of research as defined by the Screening Exam: CE, CCSP, or EP; whereas at least one committee member shall be from outside this area. A qualified individual from outside UCSB will always count as outside the major area.   Exceptions to these rules regarding committee composition require the approval of the ECE Graduate Advisor. Also note that LPSOE and LSOE cannot serve a sole committee chair but may serve as co-chair.

Emeriti faculty may serve as members of Ph.D. committees but will not serve as chairs of Ph.D. committees except under particularly compelling circumstances. The appointment of an emeritus faculty member as chair requires not only departmental approval but also approval by the Graduate Council. Emeriti faculty will be counted the same as they were counted before becoming emeriti.

Graduate Division requires the Ph.D. Form I, which lists a student's committee along with the Conflict of Interest (COI) Form. These forms must be submitted prior to the qualifying exam form (Ph.D. Form II).

The Committee may be restructured at any time with the approval of the Department Chair and the Dean of the Graduate Division. Paperwork for a change in committee must then be filed with the Graduate Division via the ECE Student Office.

B.2 Study Plan

It is expected that a student in the Ph.D. program will pursue a program of study providing: (1) depth of knowledge in a technical specialty area; and (2) breadth of knowledge in two or more technical areas distinct from, but supportive of, the technical specialty area. The breadth of knowledge should involve concepts different from those of the specialty area. Students will normally demonstrate substantial satisfaction of depth and breadth requirements through the successful completion of regular course work.

Evaluation of the depth and breadth of a student's knowledge is made by the Doctoral Committee. The criteria used in this evaluation should refer to levels of achievement and technical maturity rather than to a fixed numbers of courses completed. Normally, doctoral students are expected to take all available ECE graduate courses in their area of interest, which are deemed relevant to their programs, as well as courses outside their area for breadth. Approved courses in other departments are encouraged in the interest of greater breadth. It is also anticipated that it will be necessary or desirable for many students to complete 100-series courses, both for added breadth and as preparation for more advanced courses. The breadth requirement is normally considered met when the student successfully completes a single graduate course sequence (three courses) in each of two separate areas outside the specialty area.

For all students with M.S. degrees entering the Electrical & Computer Engineering (ECE) Ph.D. program with an emphasis in Computer Engineering during Fall 2010 or later or for those with an emphasis in Communication and Signal Processing during Fall 2018 or later, 24-units (6 courses) of graduate engineering or science courses taken at UCSB are required as part of the 72-unit Ph.D. graduation requirement FOR A PHD IN COMPUTER ENGINEERING OR IN COMMUNICATION AND SIGNAL PROCESSING. For courses to count toward this requirement, a grade of B or better must be attained.

B.3   Ph.D. Screening Exam

The purpose of the Ph.D. Screening Examination is to screen candidates for continuation in the doctoral program. This exam is not required for admission to the Ph.D. program; however, to remain in the Ph.D. program, all students are required to pass the exam, which is offered twice a year at the beginning of fall and spring quarters.

The Ph.D. Screening Exam evaluates the candidate's knowledge in major and minor areas of study. The Ph.D. Screening Examination Handbook provides a detailed description of each of the examination areas, including specific topics and reading lists, and is available in the ECE Graduate Student Office and on the ECE website.

A student's choice of major examination area should conform to their area of interest as indicated by the choice of research advisor and Ph.D. committee. Exceptions require the approval of the student's Ph.D. committee and the Department Graduate Advisor.

Students should plan for this exam immediately after entering the program. Rules for taking the exam are as follows:

1) a student who entered the Ph.D. program, as a holder of an M.S. degree in Electrical and/or Computer Engineering must pass the exam no later than the second time it is offered following matriculation at UCSB;

2) a student who entered the Ph.D. program without an M.S. degree in Electrical and/or Computer Engineering must pass the exam no later than the first time it is offered after the first occurrence of any of the following conditions:
   o completion of all M.S. Graduate Division and ECE requirements other than the Comprehensive Examination;
   o completion of 42 units of course work in the M.S. program;
   o the elapse of two years from date of matriculation in the M.S. program;

3) a student must have a minimum Grade Point Average of 3.30 to qualify to take the Exam. A student having a GPA of less than 3.30 at the time that s/he is required to take the Exam shall be considered to have failed the Exam. This failure will be counted as one of their allowed attempts at the Exam.

"Part-time" and other graduate students for whom this rule (1) or (2) represents undue hardship may petition the Screening Exam Committee for an extension of time. The petition must be submitted no later than **two months before the examination** and must be endorsed by the student's Faculty Advisor.

Screening Exam performance and other information related to the examinee's prospects for success in the Ph.D. program leads to one of the following directions:
   a. proceed to the formation of the Doctoral Committee and continue in the program;
   b. proceed in the program after some remedial action;
   c. repeat the exam (possibly changing the major and/or minor areas)
   d. terminate the program, without being granted a Ph.D. degree.

If a student is required to repeat the exam, s/he must repeat the examination the next time that it is offered. A student is allowed a maximum of two attempts at the Ph.D. Screening Examination.

A student who fails to show up for part or all of the examination is considered to have taken the examination and failed it.

Any petition or appeal regarding:
   • the result of the examination, or;
   • a subsequent examination attempt, or;
   • the removal from the Ph.D. program must be made before the end of the quarter in which the student failed the examination.

A student who, after passing the screening examination, chooses a committee not conforming the major area of the examination must either petition the Department Graduate Advisor for approval, or, at the earliest available opportunity, retake the Ph.D. screening examination with the choice of major conforming to the research advisor's area of interest. The Department Graduate Advisor must be informed of the intended change in the area of specialization before dissertation research commences in the new area.

Students who have been removed from the Ph.D. program are not eligible for additional attempts at the screening examination by declaring a change of specialization.

B.4   Qualifying Examination

The Qualifying Exam provides the Doctoral Committee with a basis for student evaluation and guidance and the student with an opportunity to review, organize, and demonstrate his/her knowledge. It is understood that upon passing the Qualifying Examination, the student has presented an approved dissertation research proposal and has demonstrated substantial readiness to undertake the research.

The Exam is oral with the focus on the dissertation problem and is administered by the student's Doctoral Committee. It will include considerable depth in the student's area of specialization, as required for a successful completion of the dissertation. The student confers with committee members to set up the date/time of the exam. The necessary forms are available in the ECE Graduate Student Office and should be completed prior to the exam. More information about paperwork is available on the ECE website under PHD FAQs.

While the Qualifying Exam is normally taken one to two years following the passing of the Screening Examination, students admitted to the Ph.D. or M.S./Ph.D. degree programs have at most **four** years from first matriculation to take the exam and advance to doctoral candidacy. If they do not advance within those four years, they should meet with their research advisor to complete a plan and a timetable for advancement. Students may be placed on academic probation if they do not make sufficient progress towards their degree (see **Section L**). Not advancing to Ph.D. candidacy by the fourth year of study will affect one's employment as a GSR, a TA or a Reader.

The paperwork that Graduate Division requires from us (Ph.D. Form II) must have all committee signatures and must also now have the signature of the Department Graduate Advisor. The Department Graduate Advisor certifies that a student has completed all required coursework and departmental milestones. This also includes completing MS degree requirements for those pursuing the MS/Ph.D. degree objective.

Advancement to Candidacy

The Academic Senate requires the Qualifying Exam for advancement to candidacy. Upon spending three consecutive quarters in residence on the campus and passing the Qualifying Exam, a student is eligible for advancement to candidacy. Advancement is then accomplished when the student pays $50 to the Cashier's Office (1212 Student Affairs/Administrative Services Building = SAASB). The receipts from the Cashier's Office must be taken directly to the Graduate Division (3117 Cheadle Hall).

At this point, the student becomes eligible to apply for faculty library privileges, to apply for a travel grant for presentations of papers or posters at conferences, and to apply for dissertation fellowships.

After advancing to doctoral candidacy, a student's class level changes to P2 the next registered quarter and non-resident tuition is waived for nine registered quarters (if applicable).

Library Privileges

Students who have passed the Qualifying Examination are eligible for faculty borrowing privileges in the Davidson Library.

Tuition Reduction

Effective Fall 2006, the quarterly nonresident tuition fee is reduced by 100% for graduate doctoral students who have advanced to candidacy. Eligibility for the reduced nonresident tuition is measured in calendar years, and begins with the first academic quarter following advancement to candidacy. Leave of absence and unregistered quarters will not extend a student's eligibility. A student who continues to be enrolled or who re-enrolls three calendar years after advancing to candidacy will be charged the full nonresident rate in effect at the time.

As a P2 student, one is eligible for different types of financial support including Graduate Division Fellowships, teaching assistantships, department fellowships, etc. A student may only be in this P2 status for 9 registered quarters starting the quarter following the date of advancement. If the nine registered quarters are up and the student remains in the graduate program, s/he then gets classified as a P3 student. A P3 student becomes ineligible for most financial support including fellowships and teaching assistantships and will require special permission from the Graduate Division for any student appointments held.

B.5   Dissertation

The dissertation is written on a subject chosen by the candidate that is related to an area of study in ECE. It must be of such nature as to enable the student to demonstrate his/her ability to carry out independent investigation and study.

The candidate in a public presentation will defend the dissertation before the Doctoral Committee approves it. After approval, the dissertation must be formatted according to the rules set forth at the following website: https://www.graddiv.ucsb.edu/academic-services/filing.

Defense of Dissertation Examination

For the Defense of Dissertation, the candidate must defend his/her work before the Doctoral Committee and give a public seminar presentation. Ordinarily, the public presentation is considered part of the Examination. The Committee will meet with the student after the Examination to discuss any areas that need revision or additional work.

The student must contact the Central Administration Office, Harold Frank Hall I, Room 4155 via "Events Submission" on the ECE home page, a minimum of **five working days in advance**, in order to guarantee the distribution of a flyer to announce the seminar. After the defense, students who took the defense may be reimbursed for they served at the defense exam. Receipts for the expenses must be provided (no alcohol). Maximum reimbursement is $30. The student should also notify the ECE Graduate Student Office of the Defense date/time/location and any changes to your committee and verify that all forms are in order at least one week in advance of the defense date. An e-mail message sent to the ECE Graduate Student Office will suffice. The student must pick up the Defense Form (Ph.D. Form III) from the ECE Graduate Student Office at least the day before the defense exam date.

The student must provide at least the first draft of the dissertation to all committee members to allow them time to go over the dissertation **at least 10 working days prior to the defense date**. In exceptional cases, this time can be reduced with the consent of the committee, but a dissertation draft must be available before the defense.

B.6   Time Limit to Earn Doctor of Philosophy Degree/Normative Time

Except as authorized by the Graduate Council, each student in a doctoral program must satisfy all requirements for the Ph.D. within six calendar years after s/he has been admitted to graduate study at UCSB. This includes leaves of absence and withdrawal from the University to complete the dissertation. The student may petition for an extension of time to degree. However, the "normative time" established by the ECE Department to complete a doctoral degree is six years, although many students require less time. Normative time is the number of years considered to be reasonable by the faculty of a department for completion of a doctorate by a full-time student in that program.

If a student who was originally in the terminal MS degree program and then applies for the doctoral program, the normative time clock starts anew with the first quarter in the doctoral degree program.

When students take an approved leave of absence for medical, family emergency, or pregnancy/parenting reasons, Graduate Division will extend the student's normative time by one quarter at a time up to a maximum of three quarters of leave. More leaves or periods of lapsed status (status of neither being on an official leave of absence nor being registered as a student) will not stop the normative time clock; the deadline stands. Quarters of Research Leave and the Filing Fee Quarter of Leave count toward expiration of a student's normative time clock.

B.7   Leaving from the University Before Completion of the Dissertation

A student who has fulfilled the residency requirement and has completed all research requirements, course requirements (including Linguistics classes in which student was placed according to the ELPE or TA Language Evaluations) and examinations for the Ph.D. (with the exception of the Defense-of- Dissertation Exam and submission of the dissertation) may take an official filing fee leave of absence from the University during the quarter in which s/he will file his/her dissertation.

A student must have been registered the quarter immediately preceding the leave quarter. S/he must obtain a leave of absence form, pay a $20.00 processing fee, and check filing fee quarter as the reason for the leave. By taking a leave of absence this way, one's student status is still protected without paying full fees for the quarter. To file a dissertation, a student must pay fees either through normal registration or by paying a filing fee (currently approximately $200) at the Cashier's Office (1212 SAASB) during the quarter s/he files his/her dissertation with the Graduate Division. The filing fee is paid on the actual day that the dissertation is filed. The student on official leave of absence may continue to use University facilities, such as the Library, the Student Health Center, and laboratories. If a student fails to file his/her dissertation on the quarter of filing fee leave of absence, s/he must register in subsequent quarters until the dissertation is filed. A student on filing fee leave may not be employed in any student titles.

IV.   COURSE CREDITS

C.   APPROVAL OF UNDERGRADUATE COURSES FOR GRADUATE CREDIT

Lower division undergraduate courses (< 100) cannot be used for credit towards unit requirements for a degree and, if taken, are not counted in the student's GPA. Most 100-series or upper-division Electrical & Computer Engineering elective courses are available for graduate credit. However, any course in the 100-series that is a requirement for the undergraduate

degree in either Electrical Engineering or Computer Engineering (ECE 130A/B, 132, 134, 137A/B, 139, 152A, 154A, CMPSC 130A, 170, ENGR 101 and PSTAT 120A) may not be taken for graduate credit. Engineering Science courses and all courses in the Technology Management Program (TMP) also will not be counted towards graduate degree requirements.

PLEASE NOTE: After taking a particular course, students may not get credit for prerequisites to that course. For example, if ECE 158 is the prerequisite for ECE 258, a student who has already taken ECE 258 in winter 2020 may not get credit for ECE 158 taken the following fall 2020 towards the MS degree requirement.

D.   APPROVAL FOR COURSES OUTSIDE THE DEPARTMENTS OF ECE & CS

A student who wishes to take courses outside ECE and CS for graduate credit should consult with their advisor and the ECE Graduate Student Office to be sure that the course/s selected is acceptable to the Department and to the Graduate Division. This should be done before registration.

Many upper-division and/or graduate courses in the Departments of Mathematics, Statistics and Applied Probability, Physics, and other branches of Engineering and selected courses in other departments are acceptable when they are shown to have relevance to a student's program.

E.   TRANSFER OF CREDIT

With approval from the ECE Graduate Advisor and the Graduate Division, up to:

- 8 quarter units of credit for courses completed with a minimum grade of "B" from an accredited college or university other than a University of California campus, or
- 12 quarter units of credit for courses completed with a minimum grade of "B" from another UC campus may be transferred toward the M.S. degree at UCSB. These courses will be transferred at their equivalent unit value.

One-third of the residency required for the M.S. degree (one academic quarter) may also be transferred from another UC campus.

The following limitations apply:

- The course must not have already been used at the previous institution or any other institution as credit/s towards a degree that has already been awarded.
- The course must have been taken while registered in a graduate degree program that was not finished. No credit will be allowed for any course taken as an undergraduate student or while in a non-degree status.
- Courses taken in Summer Session cannot apply toward a graduate degree unless the student has been admitted to graduate standing prior to enrollment in the Summer Session.
- For credit transfer, the student must have been in graduate standing at UCSB for at least one quarter and must have maintained a 3.0 GPA.

The petitions for credit transfer are available in the ECE Graduate Student Office. An official transcript must accompany the petition. If the student's transcript does not show his/her graduate status, s/he must have a letter sent from the Registrar of the other school to the

Graduate Division at UCSB which gives his/her status at the time of taking the courses for which credits are to be transferred.

Admitted students who had formally applied to UCSB at the time they completed coursework through UCSB Extension's Open University Program (formerly Concurrent Enrollment) may transfer up to 12 units to their graduate transcript contingent upon departmental and Graduate Division approval. UCSB Extension's Open Enrollment courses taken Fall 2000 and after will be included in the UCSB GPA if the department and Graduate Division accepts and applies the courses towards the degree. **Units taken through Open University Program prior to completing an application for graduate school cannot be transferred.**

Education Abroad Program (EAP) reciprocity students who are subsequently admitted to a master's and/or doctoral degree program can transfer up to 12 units taken at UCSB while in non-degree EAP status. Under limited circumstances, one quarter of UCSB residency can be granted toward their graduate degree.

F.   INTERCAMPUS EXCHANGE PROGRAM

A graduate student in good standing who has completed at least one year of graduate study at UCSB who is on good standing, who has a cumulative GPA above 3.00, and who wishes to study temporarily at another UC campus may apply for the Intercampus Exchange Program for Graduate Students (IEPGS).

The student must obtain the approval of the Graduate Advisor, the Chair of the host Department, and the Graduate Deans on both campuses. This program enables the student to maintain academic residence at UCSB without being physically present.

Approval is given only when there is an excellent reason for making the request, and the student is in good academic standing. Examples of "excellent reasons" are to take a specific course or courses not offered at UCSB or to study under the guidance of a specialist in the student's field. Separate applications are required for each quarter and must be filed with the UCSB Graduate Division at least six weeks before the beginning of the quarter in which the student wishes to take advantage of this privilege. The student pays fees at UCSB and registers at UCSB and at the host campus. The ECE Graduate Student Office will help in filing the UCSB forms. The student should obtain a class schedule from the host campus in order to learn his/her registration procedures and deadlines.

Further information about the Intercampus Exchange Program can be obtained in the following website:
https://www.graddiv.ucsb.edu/forms/intercamp-ed-abroad-and-cross.

G.   "INCOMPLETE" GRADES

An "I" ("Incomplete") grade may be placed on a student's record only with a completed "Request for an Incomplete Grade" form. The form must indicate the reason for assigning the "I" grade, the student's grade at that point, the nature of the course work to be completed, the percentage of the final grade to be based on that work, and the deadline for submitting the work. The form must be approved and signed by the instructor and must be filed with the Registrar's Office. There is a $5 processing fee for each form filed and will be billed to the student's BARC account. In the absence of the form, an "NR" or "NG" for no grade will be recorded for the

course taken. The deadline for submission of the Incomplete petition is the last day of each quarter.

The work for the course must be completed and the "I" grade removed by the end of the next full quarter (or by an earlier date if specified on the form), whether or not the student is registered and whether or not the course is offered. If the work is not completed by the deadline or its authorized extension, the "I" will be changed automatically to an "F" or "U," as appropriate. The same case applies if a course had an "NG" or "NR" recorded originally, it will automatically turn into an "F" or "U" if an instructor doesn't submit a grade by the end of the following quarter.

A student may not repeat a course in which an "I" was assigned and therefore may not register for the course a second time in order to remove an "I". Unexpired "I" grades are not included in the computation of the student's grade point average at the end of the quarter.

The Instructor of the course or the Chair of the Department in which the course was offered has authority to extend the deadline for completion of "I" grades in the event of unusual circumstances.

V.   GENERAL ACADEMIC PROCEDURES

H.   REGISTRATION PROCEDURE

Students register for classes or via the GOLD system (Gaucho On-Line Data). Complete instructions are available on GOLD. If there are any questions about course offerings, please consult with the ECE Graduate Student Office.

Please note that in the case of a graduate student wanting to register for an undergraduate course, registration priority will always be given to undergraduates before a graduate student will be allowed in said undergraduate ECE course. In many cases, if not all cases, a graduate student must obtain an add code for the undergraduate class in order to register for it.

It is important that students enroll on time. If students foresee a problem, they should contact the ECE Graduate Student Office for help.

Students pay fees at the Cashier's Office (1212 SAASB). It is the student's responsibility to register in a timely manner or else risk incurring a penalty of $50 for late registration. Consult GOLD to find out your pass time schedule for registration and for registration deadlines.

I.   INTERNSHIP IN INDUSTRY FOR INTERNATIONAL STUDENTS

International students are allowed to work in an internship in industry under the Curricular Practical Training (CPT) program overseen by the Office of International Students and Scholars (OISS). During the academic year, CPT can only be part-time (i.e. twenty hours per week maximum). During the summer, CPT can be full-time. To be on CPT, an international student must register for at least one unit of ECE 493 (Internship in Industry) during the term of his/her internship. So, summer internships require registration and therefore the payment of additional fees.

To be eligible for CPT, international students must have been registered and physically present in the United States for at least three quarters.

There is a CPT form that OISS requires and the ECE Student Office also requires a form for registering for ECE 493 signed by an ECE faculty who is willing to have the student register for the units. OISS also requires a letter from the ECE 493 instructor. Ask the Graduate Student Office for help, if needed.

J.   LINGUISTICS REQUIREMENT

It is a University requirement, enforced by the ECE Department, that international students for whom English is not the native language attain proficiency in English before a degree will be awarded.

International students for whom English is not the native language are required to take an English Language Placement Examination (ELPE) before the beginning of a quarter. International students who attended a four-year undergraduate foreign institution that offered English medium classes only are exempt from taking the English Language Placement Exam (ELPE). The results of the examination are used to place students in appropriate language classes or to exempt them from taking more English classes. Although requirements are normally satisfied in three quarters or less, some students are required to continue in the program for additional quarters. The ECE Department will require that such students enroll in the indicated course/s each quarter until exempted from further studies.

Students receiving Linguistics course placements, either through the ELPE or the TA Language Evaluation, are recommended to complete these placements at the earliest possible time. Students who have not completed Linguistics placements will be given lower priority in TA assignments in subsequent years. A student may not file a petition for a Filing Fee Leave of Absence status if they have not completed all Linguistics placement courses.

WRIT 109ST may be used as a substitute for the Linguistics written language placement as long as it is not also used to satisfy another requirement.

K.   ATTENDANCE AT COLLOQUIA AND SEMINARS

The Department presents colloquia and seminars on technical subjects of current interest at least once a week. The speakers at these seminars are usually distinguished guests from other academic institutions or industrial research organizations, faculty, or advanced graduate students. ECE recognizes the great value of such presentations to a professional engineering education and expects the attendance of its graduate students at seminars for which the topic is relevant to the student's technical area.

L.   DEPARTMENT POLICY ON PROBATION/DISMISSAL

The policy for academic probation or dismissal is as follows:
- probation is automatic for a student falling below the 3.0 GPA level for the first time
- continued probation is recommended for a student who remains below 3.0 after one quarter if reasonable progress toward academic recovery has been demonstrated
- dismissal is recommended for a student who fails to reach the 3.0 level after two consecutive quarters on probation.

ECE Department recommendations are based on an appraisal of the student's prospects for recovering to the 3.0 cumulative GPA level. The department policy is less tolerant in the case of

a student who, having been on probation and having recovered to a cumulative GPA level of 3.0, subsequently falls below that level.

The Department may recommend that the Graduate Division place a student on academic probation for any of the following reasons:
- excessive units of unfinished coursework (12 or more units)
- failure to meet the time limits for advancement to candidacy (4 years)
- failure to meet the time limits for the completion of the degree (4 years for M.S.; 6 years for Ph.D.)
- failure to meet standards of scholarship, which may include (but is not limited to):
- failing the M.S. comprehensive exam
- failing the Ph.D. screening exam
- inability for forming an M.S. or Ph.D. committee
- failing the Ph.D. qualifying examination
- failing to register for the required 12 units per quarter.

Should any of the reasons listed above remain valid for subsequent quarters, continued probation will be recommended in these subsequent quarters for students making tangible progress toward academic recovery; otherwise, dismissal will be recommended.

M.   IN-ABSENTIA REGISTRATION

Graduate students whose research or study requires them to remain outside California for the duration of a quarter or longer, may apply for In-Absentia registration, which ensures that students maintain continuous enrollment even while engaged in study away from campus. In-Absentia registration decreases the combined registration, educational and campus fees components by 85%. Student will still be responsible for full payment of non-resident tuition and graduate student health insurance when applicable.

Students conducting research within California are expected to adhere to the UC policy of continuous enrollment and to register as a full-time student. Exceptions are sometimes granted by the Graduate Division Dean, but it must be explained why an exception is warranted. Exception approvals are not guaranteed. The following are the In Absentia eligibility and registration requirements established by the University of California Office of the President:

In Absentia Registration eligibility criteria (established by UC Office of the President):

Students may apply for In Absentia registration under the following circumstances:

- Doctoral students who have advanced to candidacy by the time the *in absentia* status would begin.
- Master's and graduate professional students who have completed at least one year of coursework by the time in absentia status would begin.
- Students who seek in absentia registration beyond the initial term must reapply for each subsequent term.

The Graduate Dean may grant *In Absentia* registration status for:

- Up to two years for doctoral students, with the second year requiring special approval by the Graduate Dean.

- Up to one year for master's and professional students.

Students shall observe the following requirements while enrolled *In Absentia*:
- Enroll full-time at their UC campus of origin for the duration of their in absentia registration.
-
- Enroll in a UC doctoral, master's, or graduate professional program for the duration of their *in absentia* registration.

Students shall be assessed the following fees while registered *in absentia*:
- 15 percent of the combined education, registration, and campus fees. This reduced fee assessment reflects that in absentia students have less access to UC resources than do other UC students, but continue to utilize some level of advising and other University resources to facilitate timely academic progress toward degree completion.

- The full health insurance fee with the UC campus of origin. Students registered in absentia will have access to student health centers and all other benefits associated with their student health insurance plan.

- Nonresident tuition, if applicable.

Students will be eligible to apply for and receive University fellowships and research assistantships, but not eligible for any other student academic appointments during the *in absentia* period.

Students may download the *in absentia* petition from the Graduate Division website at: https://www.graddiv.ucsb.edu/forms/absentia. There is no fee to process an *in absentia* petition.

N.   LEAVE OF ABSENCE

A student may petition to be granted a leave of absence. The leave policy stipulates five categories of leave:
- Leave for medical/health difficulties.
- Leave for pregnancy/parenting needs during the first 12 months after the child's birth or placement in the home.
- Leave to deal with emergencies in the immediate family.
- A Filing Fee Quarter of Leave for terminal master's or doctoral students who intend to file the thesis, take the MS comprehensive exam, or file the dissertation the quarter of the leave request.
- Military leave.

The deadline for filing a leave of absence for a particular quarter is approximately one month prior to the beginning of each quarter. Petition forms and further information regarding leaves of absence are available at the following website: https://www.graddiv.ucsb.edu/forms/leave-absence or the ECE Graduate Student Office. International students are encouraged to talk with

the Office of International Students and Scholars (OISS) before applying for leaves, to avoid subsequent visa problems.

A student may not hold a University fellowship, teaching assistantship, or graduate student researcher position, etc. while on leave.

O. STUDENT PARTICIPATION IN DEPARTMENTAL AND UNIVERSITY AFFAIRS

ECE and the University welcome the participation of interested students in policy and other matters. The University has a Graduate Students Association (GSA). Its purposes are disseminating of information concerning graduate student affairs, providing a student voice in administrative committees on campus, and promoting the general welfare of the students within each department. If you wish to get involved, please go to their website at https://gsa.ucsb.edu/. The GSA Office is located at 2502 University Center, on the 2nd floor above the Multicultural Center Building.

Student professional organizations and honor societies also are consulted by the departmental administration regarding matters of student interest. These organizations include student branches of the IEEE (Institute of Electrical and Electronics Engineers), the ACM (Association for Computing Machinery), the Society of Women Engineers, the National Society of Black Engineers, Los Ingenieros, Eta Kappa Nu, and Tau Beta Pi.

P. COMMENCEMENT/DIPLOMA

Commencement ceremonies are held once per year in June. Students who officially finished their graduate programs in December, March, or June, or who will finish in summer may attend the ceremony in June. This is a ceremony only; no diplomas are presented.

The diploma will be mailed to the student approximately three to four months after the date of graduation and automatically mailed to the "diploma address" on record. One should update the diploma address on GOLD. The Registrar's Office is currently working on digital diplomas.

VI. FINANCIAL MATTERS

Q. FELLOWSHIPS

Various graduate fellowships are available to students in ECE. The Department and the Graduate Division administer some; others are administered directly by the sponsoring agencies. Some are merit-based and are awarded to the applicants with the best academic records or greatest promise; others are reserved for members of minority groups, students in particular technical specialties, or students with particular career goals.

Fellowships administered by the University are usually awarded to beginning graduate students. However, continuing graduate students have, on occasion, received such awards. Fellowship applications are normally filed in the winter quarter for the following academic year. Check the following Graduate Division website for fellowship opportunities and applications: https://www.graddiv.ucsb.edu/fellowships.

The fellowships awarded directly by the sponsoring agencies are usually publicized in professional journals and on websites of said agencies. Sometimes they do not come to the attention of many eligible candidates. As a result, students who would not fare well in the competition for university awarded fellowships could very well receive one of these fellowship awards. Notices regarding such fellowships received by the ECE Graduate Student Office will be sent via e-mail. All outstanding graduate students are encouraged to apply for such fellowships, if eligible.

International students who start the MS/PHD or PHD program in Fall 2015 or later are eligible for a new fellowship program called the IDRF (International Doctoral Recruitment Fellowship). The IDRF will pay the non-resident tuition for all international MS/PHD or PHD students beyond their first year of residency who have not yet advanced to doctoral candidacy.

This relatively new fellowship commences on the student's fourth quarter of enrollment (Fall 2021 for those entering Fall 2020) and continues until the student has advanced to doctoral candidacy, provided the student remains within the official time-to-advancement approved by the Graduate Council. For ECE, that means passing the qualifying exam and advancing to doctoral candidacy within 4 years from the start of matriculation.

The IDRF will relieve research grants of the need to pay the non-resident tuition for international doctoral students hired as Graduate Student Researchers (GSRs) who are covered under this fellowship program.

R.   TEACHING ASSISTANTSHIPS

The Department awards approximately 35 teaching assistantships per quarter. Most are 20-hour per week appointments. Curriculum needs, student's academic record and past evaluations, if applicable, are considered in making TA awards. However, other qualifications, such as English language skills, will also be taken into consideration. The Vice Chair makes the appointments. The majority of these go to incoming graduate students. Normally, incoming students receive a nine-month award; continuing students receive one-quarter awards.

All students appointed for 25% time (10 hours per week) or more would have their mandatory student health insurance paid and a partial fee offset. Some teaching assistantships are awarded along with a fellowship payment for tuition and/or fees. Applications for teaching assistantships are available in Trailer 697, Room 101. For more information, see the ECE Teaching Assistant's Handbook. This is available also in Trailer 697, Room 101.
In addition to the ECE TA Handbook, the Office of Instructional Development (OID) has published a TA Handbook that may prove useful: https://oic.id.ucsb.edu/ta-handbook.

The Department has a policy requiring TAs to register for a minimum of 12 units during any quarter that the student is a TA.

S.   P3 STATUS

Students on P3 status are ineligible for teaching assistantships, reader positions and fellowships. See **Section B.4** for P3 status definition.

T.   GRADUATE STUDENT RESEARCHER (GSR) POSITIONS

Enrolled graduate students may seek employment up to 49% time as GSRs. If appointed at least 25% time, mandatory health insurance and partial fee remission will be covered. If appointed 35% time or more, fees and, if necessary, tuition, will be provided. GSRs are hired directly by professors who hold research contracts or grants. These appointments are not awarded or administered through the ECE Student Office.

Students interested in such positions must talk directly to faculty having research interests similar to theirs. The faculty advisor may be a good source of information regarding which professors may currently hold contracts or grants in the student's research area. There are many more of these positions available than teaching assistantships and fellowships. However, most faculty will not consider hiring a student who has not yet passed the Ph.D. Screening Examination or who has not carried a course load of 12 or more units per quarter with excellent grades. Therefore, students interested in these positions should take the Screening Examination early and establish a strong academic record in the ECE program.

Salary, Policy, and Rates

The Department's policy is to appoint GSRs at a minimum of step 9 in the GSR series at 45% time for 9 months. This provides a consistent monthly payment for the GSR, reduces departmental administrative expenses, and has no effect on actual direct costs of the research.

The gross monthly pay levels are as follows:

Step 9	45%	$2,995/mo	Pre-Candidacy
Step 10	45%	$3,234/mo	Advanced to Ph.D. Candidacy

This is equivalent to a 12-month salary as follows:

Step 9	$ 35,943
Step 10	$ 38,807

The University of California, in compliance with Titles VI and VII of the Civil Rights Acts of 1964, Title IX of the Educational Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973, does not discriminate on the basis of race, color, national origin, religion, sex, or handicap in any of its policies, procedures, or practices. This nondiscrimination policy covers admission and access to, and treatment and employment in, University programs and activities, including but not limited to academic admissions, financial aid, educational services, and employment.

The University of California, in compliance with the Age Discrimination in Employment Act of 1967, does not discriminate in employment on the basis of age; nor does the University discriminate against any employees or applicants for employment because they are disabled veterans or veterans of the Vietnam era. Inquiries regarding the University's equal opportunity policies may be directed to the Affirmative Action Coordinator at 805-893-2701.

U.   TUITION AND FEE FELLOWSHIPS

ECE is allotted a "block" grant, which may be used to pay tuition and/or fees for some students each year. These are merit-based awards. New doctoral students receive top priority for these awards, although some awards may be given to new M.S. students and continuing doctoral students in their second year.

Second-year domestic out-of-state students are expected to have achieved California resident status for tuition purposes (see **Section Y**). Continuing doctoral students are expected to obtain sufficient support through GSR appointments: Fees and tuition for all GSRs employed 35% time or more are covered by the supervising professor's research grant or contract.

International students who start the MS/PHD or PHD program in Fall 2015 or later are eligible for a new fellowship program called the IDRF (International Doctoral Recruitment Fellowship). The IDRF will pay the non-resident tuition for all international MS/PHD or PHD students beyond their first year of residency who have not yet advanced to doctoral candidacy.

This new fellowship commences on the student's fourth quarter of enrollment (Fall 2021 for those entering Fall 2020) and continues until the student has advanced to doctoral candidacy, provided the student remains within the official time-to-advancement approved by the Graduate Council. For ECE, that means passing the qualifying exam and advancing to doctoral candidacy within 4 years from the start of matriculation.

The IDRF will relieve research grants of the need to pay the non-resident tuition for international doctoral students hired as Graduate Student Researchers (GSRs) who are covered under this fellowship program.

V. FINANCIAL AID INFORMATION FOR NONIMMIGRANT FOREIGN STUDENTS

V.1 President's Work-Study

This program enables international students to compete for on-campus jobs just like American students who are in the Work-Study Program. If a student receives a President's Work-Study award, which is managed by OISS, any department that hires him/her only has to pay 40% of your salary. The UC Office of the President pays the other 60%. This makes the student a more attractive job candidate since departments do not have to use as much of their annual budget to support your position. One can receive up to $1,100 for each quarter that one is enrolled from the President's Work-Study award. A student can use the maximum amount of the award in one quarter or spread it out over the course of the year.

For more information, please contact OISS.

V.2 Teaching Assistant Loan, Emergency Loan

Information regarding the TA loans can be found on the Financial Aid Office website: https://www.finaid.ucsb.edu/loans. Click on TA Loans. TA Loans are available from the Financial Aid Office to alleviate financial hardships experienced by TAs during their initial period of employment. TAs may borrow up to the amount of their first month's salary and repay that amount out of their first three paychecks. They can apply for this loan up to 30 days prior to the start of the first day of instruction for their initial quarter of the TAship.

New TAs must supply a letter of employment from their department that indicates the initial quarter of their TAship and what their monthly salary will be. The Financial Aid Office is located at 2103 SAASB.

V.3   Part-Time Employment

Graduate non-immigrant international students are allowed to hold part-time on-campus academic titles such as Teaching Assistant, Reader, Graduate Student Researcher, etc. However, off-campus part-time jobs require documented authorization from the U.S. Immigration or OISS. While school is in session, employment (on campus or off) is limited to 50% time (20 hours per week).

W.   RESEARCH TRAVEL FUNDS FOR DOCTORAL STUDENTS

The Academic Senate has a small travel fund for the use of graduate students who have advanced to Ph.D. candidacy. Grants are made to doctoral students who are invited to present papers or results of research at major professional meetings and conferences. Applications for the travel grant are available at the following website: https://senate.ucsb.edu/grants/doctoral-student-travel/.

X.   FILING FEE PAYMENT FOR GRADUATION IN LIEU OF ENROLLMENT

It is possible for a candidate for a M.S. or Ph.D. degree to pay a filing fee (currently approximately $200) in his/her final quarter in lieu of the regular registration fees. Only a candidate who has satisfied residency and all other requirements for the degree except passing the Master's Comprehensive Examination and filing the Master's thesis or filing the doctoral dissertation may use this fee alternative. The filing fee is used in lieu of full fees and/or tuition. This only applies to those students who have been approved for a Filing Fee Leave of Absence.

A student taking a filing fee leave of absence must be registered the quarter immediately preceding the leave quarter. Spring quarter is the quarter immediately preceding fall quarter. If a student is not registered in Spring quarter and wishes to take a filing fee leave in Fall quarter, said student must then register for the Summer for 4 units immediately preceding the Fall quarter. Students who have not completed Linguistics placements are not eligible for Filing Fee leave, as they are not considered to have completed their course requirements.

The fee must be paid to the Cashier's Office (1212 SAASB) on the day that the thesis or dissertation is actually filed or when one passes the MS comprehensive exam.

If a student fails to file the thesis or dissertation or pass the comprehensive exam on the quarter that s/he is on filing fee leave, s/he must subsequently register the quarter the final degree requirements are met. Continuous registration requirements also take effect. In cases where students who were originally California residents and have lived out-of-state, it might be possible to be assessed nonresident tuition once they re-register.

Y.   ESTABLISHING CALIFORNIA RESIDENCY

Out-of-state domestic graduate students whose duration of study at UCSB will exceed one year are advised to take the necessary steps to establish California residency (for determining assessment of nonresident tuition) immediately upon the first quarter of matriculation. The campus Residency Deputy is the person to contact for more information about establishing California residency. The Residency Deputy may be reached at Residency@sa.ucsb.edu or (805)893-3692. More information about establishing residency is available via the following website: https://registrar.sa.ucsb.edu/fees-residency/residency.