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PERSONNEL

ELECTRICAL AND COMPUTER ENGINEERING

Chair:	• Kwang-Ting Tim Cheng Harold Frank Hall, Room 4157, x3821
Vice Chair:	• Roy Smith Harold Frank Hall, Room 5117, x2967
Graduate Advisor:	• Roy Smith Harold Frank Hall, Room 5117, x2967
Student Office:	• Valerie de Veyra, Grad. Student Matters Bldg. 697, Room 101, x2269. • John Gonzalez, Undergraduate Matters Bldg. 380, Room 101, x8292. • Erika Klukovich, Graduate Admissions Bldg. 380, Room 101, x3114.

<u>IMPORTANT LOCATIONS</u> (near and in Harold Frank Hall)

	Room	Phone
Continuing Students Office	Bldg. 697, Room 101	x2269
Graduate Admissions Office	Bldg. 380, Room 101	x3114
Student Mailboxes	Frank Hall, Room 5154	none
Faculty/Staff Mailboxes	Frank Hall, Room 4164	none
ECE Dept. Office (Chair)	Frank Hall, Room 4157	x3821
ECE Budget/Employment	Frank Hall, Room 4115	x8748
ECE Central Admin. Office	Frank Hall, Room 4155	x3716

IMPORTANT DATES FOR 2006-07
Fall Quarter 2006

9/22, Friday	English Language Placement Exam for new foreign students for whom English is not the native language: written section, Friday, September 22, 8:00 a.m. – 10:00 a.m., in Lotte Lehmann Concert Hall; oral section, time and location to be announced at written exam.
9/23, Saturday	Quarter officially begins.
9/25, Monday	Departmental Orientation for Graduate Students, 10:00-11:00 a.m. in ESB 1001.
9/25, Monday	ECE Departmental T.A. Orientation, 1:30 p.m. – 3:00 p.m., ESB 1001.
9/26, Tuesday	Campus wide T.A. Orientation, 9:00 a.m. – 1:00 p.m., Campbell Hall.
9/27, Wednesday	Campus wide Orientation for all new Graduate Students, 9:00 a.m. – 12:30 p.m., Campbell Hall.
9/27, Wednesday	Environmental Health & Safety Meeting, 2:00-4:30 p.m., Harold Frank Hall 1104
9/28, Thursday	Last day to apply for reclassification of residency status for fall tuition purposes.
9/28, Thursday	Instruction begins.
9/28, Thursday	Registration deadline for new and returning students. After this date, new and returning students will be assessed a $50 late registration fee.
9/28, 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.
10/4, Wednesday	Late registration period ends. Lapse in student status if obligations are not met.
10/4, 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.
10/4, Wednesday	Last day to file Leave of Absence with the Graduate Division for fall quarter.
10/6, Friday	**ECE Ph.D. Screening Exam.**
10/11, Wednesday	Last day to add course without paying $3 fee. Also last day to change grading option without paying $3 fee.
10/18, Wednesday	Last day to add classes at the Office of the Registrar by 4 p.m. or via GOLD by 11:45 p.m.
11/10, Friday	Veteran's Day Holiday
11/23 & 24	Thanksgiving Holiday
12/8, Friday	Last day to drop courses or change grading option for the quarter with the Office of the Registrar by 4 p.m. or via RBT or via GOLD by 6:45 p.m.
12/8, Friday	Last day of instruction.
12/11-16	Final exams.
12/15, Friday	Last day to present theses or dissertations to the Graduate Division to receive Fall 2006 degree.
12/15, Friday	Last day to submit Incomplete Grade Petitions with the Instructor's signature to the Office of the Registrar by 4 p.m.
12/15, Friday	Degree candidates must have all transfer course work and examinations completed no later than this date for current quarter graduation.
12/10, Saturday	Quarter ends.
12/24, Sunday	Fall 2006 grades available on GOLD.

Winter Quarter 2007*

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

1/7, Sunday	Quarter officially begins.
1/8, Monday	Instruction begins.
1/15, Monday	Martin Luther King Jr.'s Birthday celebrated (Holiday)
2/19, Monday	President's Day (Holiday)
3/2, Friday	Deadline for continuing, new, & returning students to apply for 2007-2008 UCSB financial aid (UC Grant, Cal Grant A or B, Supplemental Grant, Perkins Loan, and Work-Study). Students are advised to get a Certificate of Mailing when sending the financial aid application.
TBA	Deadline to apply to take ECE Ph.D. Screening Examination.
3/16, Friday	Instruction ends.
3/19-24	Final exams.
3/23, Friday	Last day to present theses or dissertations to the Graduate Division to receive Winter 2007 degree.
3/23, Friday	Degree candidates must have all transfer course work and examinations completed no later than this date for current quarter graduation.
3/24, Saturday	Quarter ends.

Spring Quarter 2007*

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

4/1, Sunday	Quarter officially begins.
4/2, Monday	Instruction begins.
4/6, Friday	**ECE Ph.D. Screening Examination.**
5/28, Monday	Memorial Day (Holiday)

6/8, Friday	Instruction ends.
6/9-15	Final exams.
6/15, Friday	Last day to present theses or dissertations to the Graduate Division to receive Spring 2007 degree.
6/15, Friday	Degree candidates must have all transfer coursework and examinations completed no later than this date for current quarter graduation.
6/15, Friday	Quarter ends.
6/17, Sunday	**Graduate Division Commencement

* Information subject to change.
**Cap and gown rentals may be made on a first–come, first–serve basis one to two weeks before the ceremony.

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. Information is changing constantly and every effort is made to keep this manual current. Please contact Val de Veyra in the Student Office (Building 697, Room 101) with any questions or should you notice any erroneous information.

The Electrical and Computer Engineering (ECE) graduate program offers M.S. and Ph.D. degrees. 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. *Faculty advisors*, who recommend and approve students' programs of study, include all members of the ladder (regularly appointed) faculty.

Technically, 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 in ECE are under the direction of the ECE Department Chair, Graduate Advisor, and the ECE Graduate Administration Committee.

The following pages provide general information on the requirements and procedures of the graduate degree programs in ECE. Further information may be obtained from the ECE Graduate Student Office and from the Graduate Division.

Choice of a Program

The choice of a program of study is primarily that of the individual student. Each student will be assigned a faculty advisor (technical advisor) whose technical interests coincide closely 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. The general requirements for a given degree (as distinct from the program of study) represent the framework common to all programs and must be met regardless of the program chosen. For advice and counsel regarding degree requirements and general administrative matters, consult the Graduate Student Office.

The student consults with his/her faculty advisor to set up a program in his/her area of interest. Ideally, upon beginning graduate study, each student must complete and submit to the ECE Graduate Student Office a formal Study Plan approved by his/her faculty advisor, which is a "contract" between the Department and student. The student is also expected to read relevant sections

of the University's publications: the *General Catalog*, the *College of Engineering Announcement*, and the quarterly *Schedule of Classes*. All of these publications are available for reference in the ECE Graduate Student Office.

The requirements are intended to be flexible so that 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, frequently 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: www.graddiv.ucsb.edu/academic/petitions/.

See **Appendix, Section I** for additional policy information regarding changes in Department and Graduate Division Requirements.

Fields of Study

The general fields of study available to graduate students are categorized below under three major headings. Because of the flexibility of graduate programs built around these fields of study, it is not feasible to list and discuss all possibilities.

Computer Engineering:

- Computer Systems Architecture
- Integrated Systems
- Computer System Modeling, Analysis, and Dependability
- Scientific Computation
- Computational Models, Algorithms, and Complexity
- Software Systems
- Graphics and Image Processing
- Machine Intelligence

Communications, Control, and Signal Processing:

- Data Compression for Speech, Audio, Images, and Video
- Scientific and Engineering Computation and Algorithms
- Non-linear, Adaptive, and Robust Control
- Digital and Analog Signal Processing
- Digital Communications and Communications Networks
- Identification and Modeling
- Filtering and Estimation
- Image and Video Processing
- Computer Vision
- Information Theory, Pattern Recognition and Neural Networks

Electronics and Photonics

- Electromagnetics
- Antennas
- High–Frequency Electronics
- Microwaves, Millimeter–Wave, and Optical Integrated Circuits
- Optics
- Quantum Electronics
- Lasers and Laser Applications
- Electronic Waveguides
- Microwave and Millimeter–Wave Devices
- Optical Devices and Electronic ICs for High Speed Fiber Optic Transmission
- Quantum Mechanics and Solid–State Physics
- Semiconductor Device Physics
- Growth and Properties of Electronic Materials and Structures
- Device and Circuit Processing and Fabrication
- Device and Circuit Design and Modeling
- Opto–Electronic Devices and Photonic Integrated Circuits
- Optical Communication Systems
- High–Speed Devices and Circuits

II. THE MASTER OF SCIENCE PROGRAM

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. ECE normally expects M.S. students to attain the degree in six quarters or less. However, MS 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 Division Requirements

- Residency: 3 quarters
- GPA: 3.0 minimum
- Fee Paid: Registered quarter degree awarded or pay filing fee

Residency—The minimum residency requirement is three academic quarters. Any quarter in which the student completes 4 units or more of course work will count toward the residency requirement.

Normal Course Load—Twelve units is considered full time status by UC System wide Office. Since resources come to the campus based on the 12-unit formula, **students are required to be enrolled for a minimum of 12 units each quarter**. In addition to formal course work, project and research courses (ECE 207, ECE 596) may be advisable. TAs should sign up for ECE 502 if need be in order to meet the 12-unit minimum requirement. Students studying for exams should sign up for ECE 597. Plan I M.S. students complete their thesis under units of ECE 598.

Grade–point requirements—The candidate must maintain a 3.0 (B) average in all courses in the 100–, 200– and 500–series taken as a graduate student. **No credit toward the M.S. degree will be given for work graded B- or below.** 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. An "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".

Lower division courses—Lower division courses (course number less than one hundred) count neither toward the degree nor in the grade–point average. However, they do count toward residency.

P/NP and S/U grading—Upper division courses (course numbers 100 to 199) graded on a P/NP basis are not acceptable as part of the graduate program. Certain graduate courses are designated, as being optional S/U or letter grade, or S/U required. Please note that effective Fall 2006, a student may only sign up for ECE 596 with an S/U grading option.

ECE 595s—Courses numbered 595 are intended for review of current research. They carry one unit applicable to course load and residency requirements but no credit toward a degree. They are taken for an S/U grade.

Grading Policy Changes—The UCSB Faculty Legislature revised regulations concerning unfinished graduate coursework (defined as any course in which a graduate student enrolls, regardless of the course number). The revisions bring a greater degree of uniformity to the way unfinished coursework is treated and thereby makes it more important than ever that students complete their coursework in a timely manner.

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.

Coursework numbered 597, 598, or 599 will no longer be exempt from the one-quarter deadline established for completion of Incompletes in all other courses. The change means that in any course undertaken by a graduate student, the Incomplete will automatically revert to a failing grade unless the work is completed and a grade is reported to the Registrar by the end of the subsequent quarter.

Teaching Assistants Policy on Course Workload—The Department has a policy restricting TAs to a maximum of three academic courses per quarter, including independent study courses such as ECE 207, 596, 598, and technical writing courses such as ENGR. 103 or 203. English as a Second Language (ESL) courses and ECE 501 and 502 (TA courses) do not count toward the limit.

ECE General Requirements

See **Appendix, Section II** for information regarding the Department coherency requirement.

Plan I (Thesis) Requirements:

- 8 courses meeting the following requirements:
  - up to a maximum of 12 undergraduate level senior elective units;
  - excluding Engr. 100 & 101, ECE 139 & 152A, and all other courses required for the BS in Electrical Engineering and Computer Engineering
  - up to maximum of 8 units total from ECE 293, 596, independent study or S/U grade option
  - a minimum of 5 courses in ECE (CE majors: the 5 courses may be in ECE and/or Computer Science).
- No Incomplete grades remaining.
- Plan I Committee form filed.
- Approved Study Plan completed–see Program Areas section following.
- Total 42 units (including 8 units of ECE 598).
- Thesis filed.
- ESL course passed for those students who were placed in such courses.

See **Appendix, Section III** for detailed thesis and thesis committee policy information.

Plan II (Comprehensive Exam) Requirements:

- 10 courses meeting the following requirements:
  - up to a maximum 16 undergraduate level senior elective courses

  - excluding Engr. 100 & 101, ECE 139 & 152A, and all other courses required for the BS in Electrical Engineering and Computer Engineering
  - up to a maximum 8 units from ECE 293, 596, independent study courses or S/U grade option
  - 7 courses in ECE or Computer Science minimum (CE majors: the 7 courses may be in ECE and/or Computer Science)
- No Incomplete grades remaining.
- Plan II Committee form filed.
- Approved Study Plan completed–see Program Areas section following.
- Total 42 units.
- Comprehensive Exam passed.
- ESL course passed for those students who were placed in such courses.

See **Appendix, Section IV** for detailed comprehensive exam policy information.

A 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.

Program Areas

Computer Engineering

For each of the areas described in the following pages a *minor* consists of any two graduate or 200–level courses. A *major* in each of the first three areas consists of any four graduate or 200–level courses.

Graduate study programs that do not meet the above major and/or minor course requirements must be submitted with full justification for approval by the CE faculty.

Computer Systems Architecture:

ECE 252A	Sequential Machines and Automata Theory
ECE 252B	Computer Arithmetic
ECE 252C	Advanced Topics in Digital System Design
ECE 253	Embedded Systems Design
ECE 254A	Advanced Computer Architecture: Supercomputers
ECE 254B	Advanced Computer Architecture: Parallel Processing
ECE 254C	Advanced Computer Architecture: Distributed Systems

Integrated Systems:

ECE 220A	Semiconductor Device Processing
ECE 224A	VLSI Project Design
ECE 224B	VLSI Project Testing
ECE 225	High Speed Integrated Circuit Design
ECE 253	Embedded System Design
ECE 255A	VLSI Testing Techniques
ECE 255B	VLSI Design Validation
ECE 256A	Introduction to Design Automation
ECE 256B/D	Logic Design Automation
ECE 256C	System Level Design Automation

Computer Systems Modeling, Analysis, and Implementation:

ECE 250	Wireless Communication and Networking
CS 276	Distributed Computing and Computer Networks
ECE 257A	Fault-Tolerant Computing
ECE 257B	Dependable Systems
ECE 268	Internet Computing and Digital TV
ECE 279A	Computer System Performance Evaluation
ECE 279B	Queuing Theory and Applications

Minor in Scientific Computation:

ECE 210A	Matrix Analysis and Computation
ECE 210B	Numerical Simulation

ECE 210C/D	Numerical Solution of Partial Differential Equations – Finite Difference Methods/Finite Element Methods
ECE 233	Numerical Simulation
ECE 271A/B	Principles of Optimization/Numerical Optimization Methods
ME 226A	Applied Numerical Methods

Minor in Computational Models, Algorithms, and Complexity:

CS 220	Automata–Based Complexity
CS 230A/B	Design and Analysis of Algorithms (I, II)
CS 240A	High Performance Parallel Systems and Languages
CS 240B	Parallel Computing and Program Parallelization

Minor in Software Systems:

CS 260	Advanced Topics in Translation
CS 262	Semantics in Programming Languages
CS 263	Modern Programming Languages and Their Implementation
CS 266	Formal Specification and Verification
CS 272	Software Engineering
CS 274	Transaction Management in Distributed Databases

Minor in Graphics and Image Processing:

ECE 278A	Digital Image Processing
ECE/CS281B	Advanced Topics in Computer Vision

Minor in Machine Intelligence:

CS 265	Advanced Topics in Machine Intelligence
ECE 277B	Pattern Recognition
ECE/CS 281B	Advanced Topics in Computer Vision

Communications, Control, and Signal Processing

All students in the communications, control, and signal processing field must take four (4) courses in one of the major areas listed below. Of these, one (1) course is required and three (3) can be chosen from the list of additional courses. Any prerequisite courses not on the list can be used as credit towards the degree, but they cannot be used to satisfy the major requirement (or the minor requirement described below). In addition, it is required that all students take ENGR 103, Advanced Engineering Writing or ENGR 203, Graduate Research Writing.

Communications:

Required:	ECE 242	Digital Signal Compression
	or ECE 243A	Digital Communication Theory

Additional:	ECE 205A	Theory of Information
	ECE 235	Stochastic Processing
	ECE 240A	Optimal Estimation and Filtering
	ECE 240B	Detection Theory
	ECE 243B	Advanced Digital Comm. Theory
	ECE 246	Data Communication Networks
	ECE 250	Wireless Comm. and Networking
	ECE 282	Error Correcting Code

Control:

Required:	ECE 230A	Linear Systems I
Additional:	ECE 147B	Digital Control Systems Theory and Design
	ECE 229	Hybrid Systems
	ECE 230B	Linear Systems II
	ECE 231A	Numerical System Theory
	ECE 231B	Numerical System Applications
	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 240A	Optimal Estimation and Filtering
	ECE 247	System Identification
	ECE 248	Kalman and Adaptive Filtering
	ECE 249	Adaptive Control Systems

Signal and Image Processing:

Required:	ECE 258A	Advanced Digital Signal Processing
Additional:	ECE 235	Stochastic Processing
	ECE 240A	Optimal Estimation and Filtering
	ECE 240B	Detection Theory
	ECE 242	Digital Signal Compression
	ECE 245	Adaptive Filter Theory
	ECE 258B	Multirate Digital Signal Processing
	ECE 258C	VLSI Digital Signal Processing Systems
	ECE 259A	Digital Speech Processing
	ECE 259B	Fundamentals of Speech Recognition
	ECE 277A	Neural Networks Theory
	ECE 277B	Pattern Recognition
	ECE 278A	Digital Image Processing
	ECE 278B	Selected Topics in Image Processing

ECE 278C	Imaging Systems
ECE/CS281B	Advanced Topics in Computer Vision

In addition to the major, students are required to take two courses in a minor area. A minor can be one of the areas above (other than the major) or one of the following:

• Computer Engineering	see courses listed for corresponding major
• Computer Science	see courses listed for corresponding major
• Electronics and Photonics	see courses listed for corresponding major
• Scientific Computation	ECE 210A/B/C/D
• Optimization	ECE 271A/B
• Dynamical Systems	ME 201, ME 202, Math 243A/B/C
• Mathematics	Math 228A/B/C, Math 233A/B/C, Math 246A/B/C, P/Stat 222A/B/C

The courses listed for some 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. The student's advisor and Department Graduate Advisor must approve such programs.

The required core course listed for each of the major areas is not required for a minor in that area. However, it is strongly recommended. Any courses taken to satisfy the major requirement cannot be used to satisfy the minor requirement.

Students in the Communication, Control, and Signal Processing Area will have the option of either (i) writing a thesis (Plan I), or (ii) taking a comprehensive exam (offered once a quarter) (Plan II), or (iii) completing a project (Plan II) (written report required) as the final requirement for earning the M.S. degree. Note that in all cases, the student must form a committee of at least three ladder (not temporary) faculty. See Val for the paperwork on the formation of a committee.

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 departments

are also listed when appropriate. Courses marked with an "*" are generally taught every other year.

Device Physics and Quantum Mechanics	Electromagnetics	Device Technology
ECE 162 A	ECE 144	ECE 124 B, C
ECE 162 B	ECE 201 A, B	ECE 201 C*
ECE 211 A, B		ECE 201 D*
ECE 215 A, B		ECE 220 A, B
ECE 221 A, B		ECE 208 A, B, C
		ECE 260 A

Electronic Materials	Electronics	Optics and Optoelectronics
ECE 162A (or Physics 115 A, B)		ECE 124 A, B, C
	ECE 135	
ECE 162B	ECE 144	ECE 162 A
ECE 211 A/B*	ECE 201 D*	ECE 162 B
ECE 215 A/B	ECE 202 A	ECE 162C
ECE 213*	ECE 202 B*	ECE 201 A, B
ECE 216 A*, B*	ECE 218 A, B	ECE 208 A, B, C
ECE 217*	ECE 220 A, B	ECE 215 A
Matrl 227*	ECE 224 A, B	ECE 227 A, B, C
	ECE 225*	ECE 228 A/B/C
		ECE 260 A, B

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

III. THE DOCTOR OF PHILOSOPHY PROGRAM

There are very few formal requirements for a doctoral degree in ECE. These requirements include completion of an approved program of study, Ph.D. Screening Exam, Qualifying Exam (Advancement to Candidacy), submission of an approved dissertation, and a Defense of Dissertation Exam. The examinations provide 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. Details of individual programs are set up by agreement between the student and the faculty advisor or Doctoral Committee to add the Ph.D. degree objective.

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 should obtain a graduate student petition from the ECE Student Office to add the Ph.D. degree objective. A statement must accompany the petition from the faculty advisor stating support for continuing into the Ph.D. program and stating that the prospective advisor will support the student. An e-mail statement to Val will suffice. This petition must be done after passing the Ph.D. Screening Exam.

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 may be the same faculty member. See **Appendix, Section V,** for detailed policy information regarding formation of the Doctoral Committee.

Foreign Language Requirement

There is no foreign language requirement in ECE for the Doctor of Philosophy degree.

Residency

A minimum of six quarters of residence is required for the Ph.D. degree. For purposes of this requirement, residence is established in any quarter by enrollment in and completion of four units of course work. 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.

Course Load

Since resources come to the campus based on the 12-unit formula, the **ECE Department requires that students be enrolled for a minimum of 12 units each quarter.** To help students meet the 12-unit standard, the 500–

series courses are available to those who are (1) doing directed study or research (596, 207); (2) studying for the M.S. Comprehensive Exam, the Ph.D. Screening Exam or the Qualifying Exam (597); (3) doing dissertation research and writing (599); (4) serving as teaching assistants (502); or (5) doing MS thesis research and writing (598).

Further, the Department has a policy restricting TAs to a *maximum* of three academic courses per quarter, including study courses such as ECE 207, 596, 598, and technical writing courses such as ENGR 203. English as a Second Language (ESL) courses and ECE 502 (TA units) do not count toward the limit.

ECE Ph.D. Requirements:

- Residency (six quarters minimum)
- GPA (3.0 minimum)
- No Incomplete grades remaining
- Screening Exam Passed
- Qualifying Exam Passed
- Defense of Dissertation Exam (Seminar)
- File Dissertation
- Registered quarter degree awarded or paid filing fee
- ESL courses passed for those students who were placed in such courses as a result of taking the English Language Placement Exam (ELPE)

Study Plan and Course Requirements

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 courses should be ones that 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 evaluation are levels of achievement and technical maturity rather than 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.

S/U and P/NP Grading

S/U grading is available only in certain designated graduate courses. In some cases, it is mandatory; in others, it is available at the student's option. P/NP grading is not available in any graduate course. ECE discourages the election by Ph.D. students of P/NP grading in undergraduate upper–division courses relevant to their study programs. The taking of such courses on a P/NP basis requires written approval of the student's Doctoral Committee Chair and the Graduate Advisor. Effective Fall 2006, ECE 596 may be taken only with an S/U grading option.

Ph.D. Screening Exam

The purpose of the Ph.D. Screening Examination (henceforth, the Exam) 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 normally given twice a year at the beginning of fall and spring quarters.

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:
(a) completion of all M.S. requirements other than the Comprehensive Examination; (b) completion of 42 units of course work in the M.S. program; or
(c) the elapse of two years from date of matriculation in the M.S. program;

(3) students must have a minimum Grade Point Average of 3.3 to qualify to take the Exam. Students having a GPA of less than 3.3 at the time that they are 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 Department Graduate Advisor 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.

If a student fails the first attempt at the examination, 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.

In the case when a student reaches the maximum number of allowed attempts at the examination without having passed it, the eligible ECE Faculty will vote on whether or not to remove the student from the Ph.D. program. 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'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. 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.

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 his/her program after some remedial action; (c) repeat the exam (not necessarily in the same areas); (d) do not continue.

The *Ph.D. Screening Examination Handbook*, which provides a more detailed description of each of the examination areas including specific topics and

reading lists, is available in the ECE Graduate Student Office and on the ECE website.

Qualifying Examination

The Qualifying Exam, required by the Academic Senate for advancement to candidacy, is normally taken one to two years following the passing of the Screening Examination. A Ph.D. student is not eligible for candidacy until s/he has spent three consecutive quarters in residence on the campus. 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.

Students admitted to doctoral degree programs have four years to advance to doctoral candidacy. This also applies to those who are in the MS/PHD program. If they do not advance within four years, they should meet with their research advisor to complete a plan and a timetable for advancement. Students may be placed on probation if they do not make sufficient progress towards their degree.

Advancement to Candidacy

Upon passing the Qualifying Exam, a student is eligible for Advancement to Candidacy. Advancement is accomplished when the student pays $65 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 compete for patent funds, and in some cases, to secure the Doctoral Candidacy Fee Offset. Upon advancing to candidacy, a student will be eligible to apply for funding such as travel grants with the Academic Senate (via the Graduate Division) or various dissertation fellowships.

Library Privileges

Students who have passed the Qualifying Examination are eligible for faculty privileges in the Library. After having the cash register receipt for the $65 advancement–to–candidacy fee date-stamped at the Graduate Division, it is taken to the Library, and a faculty card is issued to the student. Should the receipt be lost, a copy of it may be obtained from the Graduate Division.

Tuition Reduction

The annual nonresident tuition is reduced by 100 percent for graduate doctoral students who have advanced to candidacy, subject to the understanding that (a) a graduate doctoral student may receive the reduced nonresident tuition rate for a maximum of three years, and (b) any such student who continues to be enrolled or who re-enrolls after receiving the reduced tuition for three years will be charged the full nonresident tuition rate that is effect at the time. This reduction applies whether or not the student has a GSR position and is effective the quarter after the date of advancement to candidacy.

The 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 typed according to the rules set forth in the *Guide to Filing Theses and Dissertations* which is available at the following website: http://www.graddiv.ucsb.edu/pubs/filingprocess/filingdissertation.htm).

Defense–of–Dissertation Examination

For 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, a minimum of five working days in advance, in order to guarantee the distribution of a flyer to announce the seminar and to ask about being reimbursed for refreshments (up to $30) should you choose to do so for your defense. Notify the ECE Graduate Student Office of the day/time/location of your Defense, and check to see that your forms are in order at least a week in advance of the defense date.

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 seven 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 five years, although many students require less time. This includes time worked on the M.S. degree. 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.

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.

Candidate in Philosophy Degree

A student in the Ph.D. program who has been advanced to candidacy for the Ph.D. program may petition the Graduate Council to have the degree of Candidate in Philosophy (C. Phil.) conferred. This degree is not a terminal degree, i.e.; a student may not apply for admission with the objective of working toward the C. Phil. degree. The advantage of this intermediate degree is that a student who has fulfilled the residence requirement and has been advanced to candidacy will have tangible evidence of accomplishment if completion of the dissertation is delayed while holding a full–time teaching or research position, or if s/he does not complete the dissertation. Eligibility for the C. Phil. degree is limited to seven years following advancement to candidacy for the Ph.D. degree. However, an application for the C. Phil. degree filed a year or more after advancement to candidacy must be approved by the Dean of the Graduate Division in consultation with the ECE Department and the student's Doctoral Committee before submission to the Graduate Council.

Leave 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 leave of absence from the University during the quarter in which s/he will file his/her dissertation. NOTE: 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 (approximately $122.50 at time of publication) 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.

IV. GENERAL ACADEMIC PROCEDURES

Registration Procedure

Students register for classes or via the GOLD system (Gaucho On-Line Data). Complete instructions for GOLD are printed in the quarterly *Schedule of Classes*, which may be obtained at the Bookstore. A reference copy of this booklet is also available at the ECE Graduate Student Office. It is very 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.** To find out your pass time schedule for registration, please consult GOLD.

Full Program of Study

All students should consult their faculty advisors and/or the Graduate Advisor regarding the scope of their course load. The quarter course load 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. UC System wide Office considers twelve units full time status. Since resources come to the campus based on the 12-unit formula, **students are required to enroll for a minimum of 12 units each quarter.** TA's may enroll in ECE 502; GSR's may enroll in 596 to help reach the 12-unit minimum.

English-as-a-Second-Language (ESL) Requirement

Foreign students for whom English is not the native language are required to take an English Language Placement Examination (ELPE) during Orientation Week of their first quarter. Results of the examination are used to place them in the proper class 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. It is

a University requirement, enforced by the ECE Department, that foreign students for whom English is not the native language attain proficiency in English before a degree will be awarded. The ECE Department will require that such students enroll in the indicated course/s each quarter until exempted from further studies. Students rated at Levels 1 and 2 (the lowest levels of English proficiency) should limit their non–ESL units to eight per quarter. Students rated at Level 3 may take up to 12 non–ESL units.

Students receiving ESL course placements, either through the ELPE or the TA Language Evaluation, are recommended to complete these placements at the earliest possible time. Students with uncompleted ESL 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 an uncompleted ESL placement.

ESL written language placements may be substituted by the ENGR 103 or ENGR 203 writing courses as long as the substituted course is not also used to satisfy another requirement.

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.

Approval of Undergraduate Courses for Graduate Credit

Lower division undergraduate courses cannot be used for credit toward unit requirements for a degree and, if taken, are not counted in the student's GPA. At this time, most 100–series Electrical and 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, 152B, 154, CS 130A, 170, ENGR 101 and PSTAT 120A) may not be taken for graduate credit. Engr. 100 and all courses in the Engineering Technology Management Program also will not be counted toward graduate degree requirements.

Approval for Courses outside the Departments of ECE and CS

A student who wishes to take courses outside ECE and CS for graduate credit should consult with his or her advisor and the ECE Graduate Student

Office to be sure that the course/s selected would be 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.

Transfer of Credit

With approval from the ECE Graduate Advisor and the Graduate Division, up to eight quarter units of credit for courses completed with a minimum grade of "B" may be transferred toward the M.S. degree at UCSB if the courses were taken while a graduate student in an accredited college or university other than a University of California campus. However, the course/s being transferred 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 and must have been taken while registered in a graduate degree program that was not finished. The maximum number of graduate (i.e., completed in graduate standing) units transferable from another UC campus is 12 quarter units. 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. These courses will be transferred at their equivalent value. Also, one–third of the residency required for the M.S. degree (one academic quarter) may be transferred from another UC campus. No credit will be allowed for any course taken as an undergraduate or while in nondegree status. No courses taken in Summer Session will apply toward a graduate degree unless the student has been admitted to graduate standing by the Graduate Division prior to enrollment in the Summer Session. A student who has been in graduate standing at UCSB for at least one quarter and has maintained a 3.0 GPA may petition to transfer credit under the limitations described above. The petitions are available in the ECE Student Office. An official transcript must accompany the petition.

Students who have formally initiated an application for admission at the time they completed coursework at UCSB through Concurrent Enrollment and who have been admitted to graduate status since earning those units may transfer up to 12 units to their graduate transcript, contingent upon departmental and Graduate Division approval. UCSB courses completed via Concurrent Enrollment through UCSB Extension in Fall 2000 or thereafter will be included in the UC GPA if they are accepted towards the degree. **Units taken through Concurrent Enrollment prior to filing application for graduate school cannot be transferred.**

Education Abroad Program 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.

"Incomplete" Grades

An "I" ("Incomplete") grade may be placed on a student's record only with a completed "Request for an 'I' Grade" form. 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. 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. (In the absence of the form, an "F" or "U" grade will be recorded for the course taken.) 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. 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 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.

Department Policy on Probation/Dismissal

A graduate student is subject to probation/dismissal any time his/her GPA falls below 3.0. See **Appendix, Section VI,** for detailed policy information.

Leave of Absence

A student may petition to request a leave of absence. Petition forms are available at the following website: www.graddiv.ucsb.edu/academic/petitions. See **Appendix, Section VII,** for policy details.

Intercampus Exchange Program

A graduate student in good standing who has completed at least one quarter of residence at UCSB and who wishes to study temporarily at another UC campus may apply for the Intercampus Exchange Program by obtaining the approval of the Graduate Advisor, the Chair of the host Department, and the Graduate Deans on both campuses. See **Appendix, Section VI,** for policy details.

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). Every enrolled graduate student is automatically a member. Meetings are held once a month. 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. The GSA has representation on the Graduate Council. The GSA Office is located in Room 2502, University Center, x3824.

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.

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 only if s/he requests the Registrar's Office to do so, leaves a correct mailing address, and pays the processing fee to the Cashier's Office. The student may also pick up his/her diploma from the Registrar's Office approximately six months after the last day of the quarter when degree was awarded.

V. FINANCIAL MATTERS

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 and apply for following academic year beginning in fall. Inquiries should be directed to the ECE Graduate Student Office in Building 697, Room 101. Most of the available fellowships are awarded directly by the sponsoring agencies. These are usually publicized in professional journals and on bulletin boards in universities. 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. For notices regarding such fellowships, please contact the department Graduate Student Office. All superior graduate students are encouraged to apply for such fellowships, if eligible. For Graduate Division Fellowships, go to the following website: http://www.graddiv.ucsb.edu/academic/handbook/financial.htm#FellowshipsforContinuingStudents

Teaching Assistantships

The Department awards approximately 35 teaching assistantships per quarter. Most are 20 hour per week appointments. Like fellowships, these are merit–based awards, with the student's academic record and past evaluations, if applicable, as the prime consideration for awards. However, other qualifications, such as English language skills, will also be taken into consideration. The Vice Chair makes appointments. The majority of these go to incoming graduate students. Normally, incoming students receive a nine-month award; continuing students receive a one–quarter award. 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 *Teaching Assistant's Handbook*.

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. See **Appendix, Section IX,** for salary policy and rates.

Financial Aid Information for Nonimmigrant Foreign Students

Fellowships, Teaching Assistantships, Readerships, and Non–resident Tuition Fellowships: All requests regarding campus–administered financial assistance in these categories should be directed to the ECE Graduate Student Office. Most campus–administered fellowships are overseen by the Graduate Division. Applications for the following year are normally due in winter quarter. The deadlines for teaching assistantships and readerships vary each quarter.

President's Work–Study (Summer and Academic Year): Limited financial assistance ordinarily is available to a small percentage of continuing graduate nonimmigrant foreign students through the President's Work–Study Program, administered by the Office of International Students and Scholars, in which students earn money by working on campus during the academic year or summer. Amounts of awards vary, but may be up to $3000 per student per academic year. Eligibility requirements, in addition to financial need, include a 3.0 GPA and attendance at UCSB for at least three quarters, excluding the summer session.

Teaching Assistant Loan, Emergency Loan: Information regarding the TA loans can be found on the Financial Aid Office website: http://www.finaid.sa.ucsb.edu/Services.asp. 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 2101 SAASB.

Part–Time Employment: Graduate non-immigrant foreign 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 prior approval from the Bureau of Citizenship and Immigration Services (BCIS). Consult the immigration counselor at OISS.

It is unlikely that the BCIS will authorize off–campus employment at all during the first academic year in the United States. In addition, part–time job opportunities are extremely limited.

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 domestic (out–of–state) students receive top priority for these awards, although some awards may be given to new domestic M.S. students, new foreign doctoral students, and continuing foreign doctoral students in their second year. (Second–year domestic out–of–state students are expected to have achieved California resident status for tuition purposes. To find out more about obtaining California residency, contact Michael Basile at the Registrar's Office as early as possible in the first quarter of student registration. He may be reached x3033 or by stopping by at his office located at 1105 SAASB.) You may also check the website to learn more about establishing residency (www.registrar.ucsb.edu). Most 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.)

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: http://www.graddiv.ucsb.edu/pubs/#fn. Applications for the grant must be received at least 21 calendar days before travel. The money is granted on a first-come, first-served basis until funds are expended or until May 15th, whichever occurs first.

Filing Fee Payment for Graduation in Lieu of Enrollment (not applicable to TAs and GSRs)

It is possible for a candidate for a M.S. or Ph.D. degree to pay a filing fee (approximately $122.50 at time of publication) in his/her final quarter in lieu of the regular registration fees. Only a candidate who has satisfied residence and all other requirements for the degree except passing the Master's Comprehensive Examination and filing the Master's thesis and filing the doctoral dissertation may use this fee alternative. The filing fee is used in lieu of full fees and/or tuition. 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 immediately preceding the Fall quarter. Students with uncompleted ESL placements are not eligible for Filing Fee Status, as they are not considered to have completed their course requirements.

A week or so before actually filing the thesis or dissertation, one should acquire the filing fee form with instructions from the Graduate Division and must submit the form with the fee to the Graduate Division on the day that the thesis or dissertation is actually filed. 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.

Establishing 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. Michael Basile, the campus Residency Deputy, is the person to contact for more information about establishing California residency. He may be reached at 893-3033 or via e-mail at regresid@sa.ucsb.edu. More information about establishing residency is available via the following website: http://www.registrar.ucsb.edu.

FACULTY AND RESEARCH INTERESTS

KAUSTAV BANERJEE, Associate Professor, Ph.D., UC Berkeley (4151 Harold Frank Hall, 893-3337, kaustav@ece.ucsb.edu) Nanometer scale circuit effects and implications for high-performance VLSI and mixed-signal system-on-chip designs and their computer-aided design methods; emerging/alternative device, interconnect and circuit architectures such as 3-D ICs, optical interconnects, hybrid SET-FET ICs electrothermal engineering of highly integrated structures

DANIEL J. BLUMENTHAL, Professor, Ph.D., University of Colorado at Boulder (2221F ESB, 893-4168, danb@ece.ucsb.edu) Fiber optic networks, wavelength and subcarrier division multiplexing, photonic packet switching, signal processing in semiconductor optical devices, wavelength conversion, microwave photonics.

JOHN E. BOWERS, Professor, Ph.D., Stanford University, Director of Multidisciplinary Optical Switching Technology Center (2221C ESB, 893-8447, bowers@ece.ucsb.edu) High-speed photonic and electronic devices and integrated circuits; fiber optic communication, semiconductors; laser physics and modelocking phenomena; compound semiconductor materials and processing.

FORREST BREWER, Professor, Ph.D., University of Illinois at Urbana-Champaign (4159 Harold Frank Hall, 729-1410, forrest@ece.ucsb.edu) VLSI and computer system design automation; theory of design and design representations; symbolic techniques in high-level synthesis.

ELLIOTT BROWN, Professor, Ph.D., California Institute of Technology (2205C ESB, 893-7562, erbrown@ece.ucsb.edu) RF system modeling and design; solid state and biomedical ultrasonics; thermal management of solid state power devices.

STEVEN E. BUTNER, Professor, Ph.D., Stanford University (3151 Harold Frank Hall, 893-4161, butner@ece.ucsb.edu) Computer architecture; VLSI design of CMOS and gallium-arsenide ICs, with emphasis on distributed organizations and fault-tolerant structures.

SHIVKUMAR CHANDRASEKARAN, Professor, Ph.D., Yale University (3109 Harold Frank Hall, 893-7542, shiv@ece.ucsb.edu) Numerical analysis, numerical linear algebra and scientific computation.

EDWARD CHANG, Professor, Ph.D., Stanford University (3159 Harold Frank Hall, 893-2971, echang@ece.ucsb.edu) Multimedia systems, database systems, and distributed systems.

KWANG-TING (TIM) CHENG, Professor and Chair, Ph.D., University of California, Berkeley (4109 Harold Frank Hall, 893-7294, timcheng@ece.ucsb.edu) VLSI and MCM testing, design synthesis and verification; algorithms; computer networks.

* **LARRY A. COLDREN**, Professor, Ph.D., Stanford University, Director of the Optoelectronics Technology Center (3205F ESB, 893-4486, coldren@ece.ucsb.edu) 75% ECE; 25% Materials, Semiconductor integrated optoelectronics; optical waveguides and modulators; single-frequency, tunable, and surface-emitting lasers; optical fiber communication; growth and processing techniques.

NADIR DAGLI, Professor, Ph.D., Massachusetts Institute of Technology (2231E ESB, 893-4847, dagli@ece.ucsb.edu) Design, fabrication, and modeling of photonic integrated circuits; ultrafast electro optic modulators; solid state microwave and millimeter wave devices; experimental study of ballistic transport in quantum confined structures.

* **STEVEN P. DENBAARS**, Professor, Ph.D., University of Southern California (3231 E/F ESB, 893-8511, denbaars@engineering.ucsb.edu) 25% ECE; 75% Materials, Metalorganic vapor phase epitaxy; optoelectronic materials; compound semiconductors; indium phosphide and gallium nitride; photonic devices.

JERRY GIBSON, Professor, Ph.D., Southern Methodist University (2215 CNSI, 893-6187, gibson@mat.ucsb.edu) 33% ECE; 67% Media Arts & Technology Program, Data, speech, image, and video compression, multimedia over networks, wireless communications, multi-user communications, information theory, digital signal processing, and adaptive filtering

* **ARTHUR C. GOSSARD**, Professor, Ph.D., UC Berkeley (1231A Engr. II, 893-2686, gossard@engineering.ucsb.edu) 25% ECE; 75% Materials, Epitaxial crystal growth; artificially structured materials; semiconductor structures for optical and electronic devices; quantum confinement structures.

JOAO HESPANHA, Professor, Ph.D., Yale University (5157 Harold Frank Hall, 893-7042, hespanha@ece.ucsb.edu) Hybrid and switched systems, supervisory control, control of computer networks, probabilistic games, the use of vision in feedback control

* **EVELYN L. HU**, Professor, Ph.D., Columbia University, Director of the Center for Quantized Electronic Structures and Director of National Nanofabrication Users Network (CNSI, 893-2368, hu@ece.ucsb.edu) High resolution fabrication techniques for semiconductor device structures; process-related materials damage; contact/interface studies; superconductivity.

RONALD A. ILTIS, Professor, Ph.D., UC San Diego (3159 Harold Frank Hall, 893-4166, iltis@ece.ucsb.edu) Digital spread-spectrum communications; spectral estimation and adaptive filtering.

RYAN KASTNER, Associate Professor, Ph. D., UC Los Angeles (4123 Harold Frank Hall, 893-3985, kastner@ece.ucsb.edu) Embedded and reconfigurable systems:

compiler techniques for embedded systems, architectural synthesis, reconfigurable architectures; VLSI CAD: routing, placement, logic synthesis; e-commerce: combinatorial auctions and supply chains

PETAR V. KOKOTOVIC, Professor, Ph.D., USSR Academy of Sciences, Director for the Center for Control Engineering and Computation (5119A Harold Frank Hall, 893-7011, petar@ece.ucsb.edu) Sensitivity analysis; singular perturbations; large-scale systems; nonlinear systems; adaptive control; automotive and jet engine control.

* **HERBERT KROEMER**, Professor, Ph.D., Dr.rer.nat, University of Göttingen, Donald W. Whittier Professor in Electrical Engineering (2205A ESB, 893-3078, kroemer@ece.ucsb.edu) 75% ECE; 25% Materials, General solid-state and device physics; heterostructures; molecular beam epitaxy; compound semiconductor materials and devices; superconductivity.

HUA LEE, Professor, Ph.D., UC Santa Barbara (3121 Harold Frank Hall, 893-4480, hualee@ece.ucsb.edu) Image system optimization, high-performance image formation algorithms; synthetic-aperture radar and sonar systems; acoustic microscopy; microwave nondestructive evaluation; dynamic vision systems.

STEPHEN I. LONG, Professor, Ph.D., Cornell University (2231F ESB, 893-3965, long@ece.ucsb.edu) Semiconductor devices and integrated circuits for high-speed digital and RF analog applications.

UPAMANYU MADHOW, Professor, Ph.D., (3111 Harold Frank Hall, 893-5210, madhow@ece.ucsb.edu) Spread-spectrum and multiple-access communications, space-time coding, and Internet protocols.

B.S. MANJUNATH, Professor, Ph.D., University of Southern California (3157 Harold Frank Hall, 893-7112, manj@ece.ucsb.edu) Image processing; computer vision; neural networks; learning algorithms; content-based search in multimedia databases.

MALGORZATA MAREK-SADOWSKA, Professor, Ph.D., Technical Univ. of Warsaw, Poland (4111 Harold Frank Hall, 893-2721, mms@ece.ucsb.edu) Design automation; computer-aided design; integrated circuit layout; logic synthesis.

P. MICHAEL MELLIAR-SMITH, Professor, Ph.D., Cambridge University, England (5161 Harold Frank Hall, 893-8438, pmms@ece.ucsb.edu) Fault tolerance; formal specification and verification; distributed systems; communication networks and protocols; asynchronous systems.

UMESH MISHRA, Professor, Ph.D. Cornell University (2215C ESB, 893-3586, mishra@ece.ucsb.edu) High-speed transistors; semiconductor device physics;

quantum electronics; wide band gap materials and devices; design and fabrication of millimeter-wave devices; in-situ processing and integration techniques.

LOUISE E. MOSER, Professor, Ph.D., University of Wisconsin (5151 Harold Frank Hall, 893-4897, moser@ece.ucsb.edu) Distributed systems and algorithms; network architectures and protocols; dependable and fault-tolerant computing; software engineering.

BEHROOZ PARHAMI, Professor, Ph.D., UC, Los Angeles (5155 Harold Frank Hall, 893-3211, parhami@ece.ucsb.edu) Parallel architectures and algorithms; computer arithmetic, computer design; dependable and fault-tolerant computing.

* **PIERRE M. PETROFF**, Professor, Ph.D., UC Berkeley (3221C ESB, 893-8256, petroff@engineering.ucsb.edu) 25% ECE; 75% Materials, Self-assembling nanostructures in semiconductors and ferromagnetic materials; spectroscopy of nanostructures; nanostructure devices; semiconductor device reliability.

LAWRENCE RABINER, Professor, Ph.D., Massachusetts Institute of Technology (5153 Harold Frank Hall, 893-8225, rabiner@ece.ucsb.edu) Digital signal processing: intelligent human-machine interaction, digital signal processing, speech processing and recognition; telecommunications. (PART-TIME FACULTY; HERE ONLY IN THE WINTER QUARTER)

VOLKAN RODOPLU, Assistant Professor, Ph.D., Stanford University (4113 Harold Frank Hall, 893-7277, vrodoplu@ece.ucsb.edu) Wireless communications, wireless ad hoc networks, microeconomic foundations of wireless communications.

MARK J.W. RODWELL, Professor, Ph.D., Stanford University, Director of Compound Semiconductor Research Laboratories (2205F ESB, 893-3244, rodwell@ece.ucsb.edu) Heterojunction bipolar transistors; high frequency integrated circuit design; electronics beyond 100 GHz.

KENNETH ROSE, Professor, Ph.D., California Institute of Technology, Co-Director of Center for Information Processing Research (3153 Harold Frank Hall, 893-7024, rose@ece.ucsb.edu) Information theory; source and channel coding; image coding; communications; pattern recognition.

JOHN J. SHYNK, Professor, Ph.D., Stanford University (3123 Harold Frank Hall, 893-3977, shynk@ece.ucsb.edu) Adaptive filtering; array processing; wireless communications; blind equalization; neural networks.

ROY S. SMITH, Professor and Vice Chair, Ph.D., California Institute of Technology (5117 Harold Frank Hall, 893-2967, roy@ece.ucsb.edu) Robust control theory with an emphasis on the modeling, identification, and control of uncertain systems; applications and experimental work including process control; flexible structures;

automotive systems; semiconductor manufacturing; levitated magnetic bearings and dynamic aeromaneuvering of interplanetary spacecraft.

ANDREW TEEL, Professor, Ph.D., UC Berkeley (5121 Harold Frank Hall, 893-3616, teel@ece.ucsb.edu) Control design and analysis for nonlinear dynamical systems; input-output methods; actuator nonlinearities; applications to aerospace problems.

LI C. WANG, Associate Professor, Ph.D., University of Texas, Austin, (3161 Harold Frank Hall, 893-5916, licwang@ece.ucsb.edu) Design verification, testing, computer-aided design of microprocessors.

POCHI YEH, Professor, Ph.D., California Institute of Technology (5111 Harold Frank Hall, 893-3981, pochi@ece.ucsb.edu) Phase conjugation; nonlinear optics; dynamic holography, optical computing; optical interconnection; neural networks; image processing.

ROBERT A. YORK, Professor, Ph.D., Cornell University (2215F ESB, 893-7113, rayork@ece.ucsb.edu) High-power/high-frequency devices and circuits; quasi-optics; antennas; electromagnetic theory; nonlinear circuits and dynamics; microwave photonics.

PATRICK YUE, Associate Professor, Ph.D., Stanford University, (5159 Harold Frank Hall, 893-7825, cpyue@ece.ucsb.edu) High-speed CMOS IC design, cell-based RF CAD methodology and integrated biomedical sensors.

Affiliated Faculty:

David Awschalom, Ph.D. (Physics)
Elizabeth Belding-Royer, Ph.D. (Computer Science)
Francesco Bullo, Ph.D. (Mechanical and Environmental Engineering)
Francis Doyle, Ph.D. (Chemical Engineering)
Oscar Ibarra, Ph.D. (Computer Science)
Eric McFarland, Ph.D., M.D. (Chemical Engineering)
Shuji Nakamura, Ph.D. (Materials)
Bradley E. Paden, Ph.D. (Mechanical and Environmental Engineering)

Emeriti:

Jorge R. Fontana, Ph.D., Stanford University
Allen Gersho, Ph.D., Cornell University
Glenn R. Heidbreder, Ph.D., Yale University
Steven M. Horvath, Ph.D., Harvard University
George L. Matthaei, Ph.D., Stanford University
James L. Merz, Ph.D., Harvard University
Sanjit Mitra, Ph.D., UC Berkeley
Venkatesh Narayanamurti, Ph.D., Cornell University

Philip F. Ordung, D. Eng., Yale University
Ian Rhodes, Ph.D., Stanford University
John G. Skalnik, D. Eng., Yale University
Glen Wade, Ph.D., Stanford University
†**Roger Wood**, Ph.D., UC Los Angeles

* Joint appointment with Department of Materials
† Joint appointment with Department of Computer Science

LABORATORY & COMPUTATIONAL FACILITIES

The Department of Electrical and Computer Engineering maintains a wide variety of well–equipped laboratory facilities in support of its many instructional and research programs. These laboratories range from specialized lower division teaching laboratories to graduate teaching and research laboratories.

At the undergraduate level, all courses for which laboratory and/or computational experience are appropriate have strong laboratory and/or computational components. This experience is one of the strong features of the Department's undergraduate program. Lower division and the general undergraduate teaching laboratories, the computational facilities of the Department, and the Computer Center, typically supports junior–level courses.

Senior elective courses and graduate courses are typically supported by individualized, discipline–oriented laboratories and specialized computing facilities, as well as the general–purpose computational facilities of the Department and the Computer Center. Many of these are also used to support a wide variety of research programs in the Department.

The departmental computing facilities are highly distributed. A large number of workstations are scattered within laboratories associated with individual faculty and various research groups. Networking facilities provide convenient access to several departmental computers and centralized computing resources that are managed by the College of Engineering or the Campus Computing Center.

For more detailed information on the laboratories associated with a particular area of research emphasis, consult the ECE Department website.

APPENDIX

I. Pertinent Set of Requirements Regardless of changes that may occur in subsequent years, you are held to the requirements in effect when you entered the ECE graduate program unless you 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 University requirements.

II. MS Plan of Study Under either plan, the student is required to complete at least 42 units of course work. Each 42–unit program is subject to a coherency requirement intended to assure appropriate breadth and degree of specialization. A Study Plan approved by a faculty advisor is ordinarily deemed to satisfy the coherency requirement. The coherency requirements for students with Computer Engineering or Communications, Control, and Signal Processing emphases are stated in terms of major and minor course selection rules. Besides listing courses needed to fulfill the major program requirements and the minor program requirements, if applicable, the Study Plan must indicate any work required meeting a deficiency in undergraduate preparation.

III. MS Thesis/MS Thesis Committee

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 defense of thesis. 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. theses 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 Graduate Advisor, and by the Graduate Dean. The Committee must have at least three ladder faculty (not temporary faculty), 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. 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:
http://www.graddiv.ucsb.edu/academic/filingprocess/filingmasters.htm.

IV. Comprehensive Examination Requirements

General:
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 exam is administered by a committee of three ladder (not temporary) faculty members called the Examination Committee for the Degree of Master of Science selected by the student. The Department should approve the student's selections no later than the beginning of the quarter in which s/he expects to receive the M.S. degree. This is done through the ECE Graduate Student Office. The examination is oral. The student is in charge of scheduling the exam he or herself. 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. Formation of the MS Comprehensive Exam Committee follows the same rules as the formation of the MS Thesis Committee.

Electronics and Photonics:
Electronics and Photonics students opting to take the oral comprehensive exam should be aware that they would be allowed **only two chances** to pass the exam. Also, as a point of departure for the exam, **students are required to prepare a 20–minute oral viewgraph presentation** on a topic of their choosing. The topic presumably would 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.

Communications, Control & Signal Processing:
The examination will take one of the following three forms, at the discretion of the examination committee.

1. An oral examination.

2. A written examination.
3. A seminar presentation of a topic, or project, based on coursework or research.

The student must consult with the examining committee as to the form of the examination at least one quarter prior to the quarter in which the student intends to graduate.

Computer Engineering:

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

The student contacts the faculty with whom s/he has taken courses and gets their approvals to serve on his/her MS exam committee. The names of the faculty are given to the ECE Graduate Student Office, which then sends a form to the faculty involved for their signature.

A faculty member with whom the student has taken two or more courses must agree to serve on the committee (even if on sabbatical, but on campus).

From the members chosen, the one with whom the student has taken the largest number of units serves as the committee chair. In case of ties, the chair is decided randomly.

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

V. Ph.D. Committee Formation: ECE Policy

The current ECE Department policy for the formation of Ph.D. committees is the following:

A Ph.D. committee shall consist of no fewer than four members. No fewer than three of those members shall be ECE ladder faculty with part- or full-time or affiliated appointments in ECE. At least one member shall be from outside the major research area of the student as defined by the Screening Exam: Computer Engineering; Control; Signal Processing and Communications; Electronics and Photonics. The Chair and at least one other of the ECE faculty shall be from the student's area of research as defined by the Screening Exam. A qualified individual from outside UCSB will always count as outside the major area. This rule supersedes all previous departmental rules regarding the composition of Ph.D. committees. Exceptions to these rules regarding committee composition require the approval of the ECE Graduate Advisor.

The intent of the faculty is that the fourth person be a faculty member in the same or different department at UCSB or at another university. In rare cases, a highly qualified individual from industry can be the fourth member; in such cases a detailed technical biography or CV of the outside member must be submitted for review by both the Department Vice Chair and 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.

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 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 may be restructured at any time with the approval of the Department Chair and the Dean of the Graduate Division. The Committee should be formed as soon as possible after passing the Screening Exam, and in no case later than the beginning of the second quarter following passing of the Screening Exam. Go to the ECE Graduate Student Office for the required form.

VI. Academic Probation

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.

The Department may recommend that the Graduate Division place a students 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 MS; 7 years for Ph.D.)
- failure to meet standards of scholarship. This may include (but is not limited to): failing the MS comprehensive exam, failing the Ph.D. screening exam, inability for forming an MS or Ph.D. committee, or failing the Ph.D. qualifying examination.

ECE Department recommendations are based on an appraisal of the student's prospects for recovering to the 3.0 cumulative GPA level. Of key significance in making this appraisal are the number of required units remaining in the student's program of study and the grade point deficiency. The grade point deficiency is computed as follows: 3.0 times the number of units attempted for a letter grade, minus the total grade points earned. 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.

VII. Leaves of Absence – The leave policy stipulates six 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.
* Research Leave for students who will be away from the campus conducting research and not using faculty time or University resources.
* A Filing Fee Quarter of Leave for terminal master's or doctoral students who intend to file the thesis or the dissertation the quarter of the leave request.
* Military leave.

S/he also may not hold a University fellowship, teaching assistantship, or graduate student researcher position, etc. while on leave. The deadline for filing a leave of absence for a particular quarter is printed in each quarter's Schedule of Classes.

Foreign students are encouraged to talk with the Office of International Students and Scholars (OISS) before applying for leaves, to avoid subsequent visa problems.

For further information about leaves of absence, please refer to the following website: http://www.graddiv.ucsb.edu/petitions/LOA.htm.

VIII. Intercampus Exchange Program – 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. This program enables the student to maintain academic residence at UCSB without being physically present.

For further information about Intercampus Exchange Program (IEPGS), please refer to the following website: http://www.graddiv.ucsb.edu/academic/petitions/intercampusexchange.htm.

IX. GSR – The Department's policy is to appoint GSRs at a minimum of step 7 in the GSR series at 46.14% time for 12 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 7	46.14%	$1,811.46/mo	no previous experience
Step 8	45.78%	$1,940.61/mo	M.S. or equivalent or after Screening exam passed
Step 9	45.21%	$2070.16/mo	advanced to candidacy

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

Step 4	$21,737.52

Step 5	$23,287.32
Step 6	$24,841.16

"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 805–893–2089."