CAL STATE LA

CALIFORNIA STATE UNIVERSITY, LOS ANGELES

ELECTRICAL ENGINEERING
GRADUATE
STUDENT HANDBOOK

SEVENTH EDITION

DEPARTMENT OF ELECTRICAL
AND COMPUTER
ENGINEERING

CALIFORNIA STATE UNIVERSITY
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Although every attempt has been made to keep this handbook up to date and accurate, it is an advising tool and not an official University policy statement. Therefore, in cases where there are contradictions, the Official University rules take precedence over statements in this handbook.

I. INTRODUCTION

Welcome to the Department of Electrical and Computer Engineering at Cal State LA. The faculty of the department is pleased to provide you with this information manual. You are expected to read this entire manual. Failure to become aware of the information presented may well **delay your graduation!** If you have any questions, make sure to ask an adviser.

If you have not already done so, you should familiarize yourself with the University catalog (the latest edition is the 2020-2021) which is now available online at http://ecatalog.calstatela.edu/index.php and a schedule of classes for the current semester which is also available online at http://www.calstatela.edu/classschedule/ . The schedule contains much more than the listing of classes being offered during the semester. It also contains important rules and regulations.

The schedule is generated long before the semester begins, and changes can occur after its release. The most up to date version of the Electrical Engineering class schedule is posted on a bulletin board next to the department office (A342). You should check this schedule regularly to note any changes in classes offered or assigned instructors.

Instruction in Electrical Engineering is offered in two semesters in the semester system. Each of the two semesters that comprise the academic year (Fall and Spring) is 16 weeks in duration - 15 weeks for instruction and one week for final exams. You may accelerate your program by attending winter and summer sessions, although to maintain continuing student status, you need only attend one semester within any 12-month period.

You will need a minimum of 30-semester units to obtain the degree. The 30 units are divided into Area of Specialization, and Electives in Engineering as follows:

- **Minimum of 18 units in Area of Specialization (5000-level courses)**
- **4000-level courses in Electrical Engineering, including the prerequisites to the specialization**

Feel free to talk with any faculty adviser about any problem you may have. As you become more involved with the Department, you will benefit more.

The advisers are available to answer questions as they arise. You are strongly encouraged to see an adviser prior to each registration. Additionally, you must see an adviser your first semester of attendance. This is an orientation session where the adviser makes sure that you understand all the rules. .

The Department of Electrical and Computer Engineering is here for you! Use it to your advantage.

II. TERMINOLOGY - YOUR STATUS

Post-baccalaureate students fit into one of two categories: Conditionally classified, and Classified. The distinctions have always been **important,** but have recently become **critical** as the State of California has tightened up on whom they are willing to financially support in school. The State will only support those seeking an initial Masters degree, and will not support people simply seeking continuing education. It is therefore critical that you "get on the right track" as quickly as possible. Hopefully, the following will clarify the situation.

When you first are admitted to the program, you have conditionally classified student G1 status. It means that you have been admitted but you need to see an adviser in the ECE department to select classes and determine whether or not you would need to complete qualifying courses or pre-requisites before your status changes to classified graduate student G2 status.

(a) If your grade point average in the last 60 semester units in your BS degree major is less than 2.75, you must first prove yourself capable of graduate study. The department will assign qualifying courses, (4000 or 5000-level) as a test, and you must achieve at least a B average in these courses to be eligible for admission. These are known as qualifying courses, and you **MUST** take them before starting on the program. That is, these courses must be the first courses you take in our MS degree program. If scheduling problems make it difficult for you to take these in a timely manner, you should see an adviser to discuss changes in the list. If you complete these courses with less than a 3.0 average, you are permanently disqualified from becoming a graduate student in Electrical Engineering at Cal State LA. If you complete the courses with a 3.0 GPA or higher, you have met this condition for classification.

(b) If your BS degree is in a related field such as mathematics or physics but not in Electrical Engineering, or is not equivalent to the BSEE degree offered by Cal State LA, we may require you to complete certain prerequisite courses before being admitted to our program. These will normally be 3000-level courses, though the list might contain a number of 2000- or 4000-level courses depending on each individual's specific circumstances. Under certain conditions, you may start on the graduate program prior to finishing the entire list of prerequisite courses. You should discuss this with an adviser. Your grade point average on the prerequisite courses should be at least 3.0 and at least as high as your undergraduate grade point average. Since the prerequisites are considered part of the BS degree requirement, poor performance (i.e., average GPA below 3.0) on the prerequisite courses could lead to a re-evaluation, and we may have to ask you to take qualifying courses. In other words, even though you are admitted with over a 2.75 GPA in the upper division major, it is possible you will need to take qualifying courses.

Once you have successfully completed all specified conditions (qualifying courses and prerequisite courses), you are ready to become a classified graduate student. The department will normally process this automatically.

Once you are classified, it is time to think about the final category - Advancement to Candidacy. Upon completion of at least 12 units of your graduate program with the grade point average of at least 3.0, you are eligible to advance to candidacy G3 status for the MSEE degree. Advancement to candidacy is a requirement to apply for thesis or comprehensive exam, and also to apply for graduation.

III. FINDING AN ADVISER

In an attempt to better serve our undergraduate and graduate EE majors, and to shorten the time between your discovering a problem and getting advice on the solution, the department has set up an "OPEN ADVISING" system. There are many hours during the week (usually over 12) during which you can see a faculty adviser without any appointment. Signs are posted early each semester listing the open advising hours; each faculty member's advising hours are posted outside his/her office door and a list of all the faculty members' hours are posted on the Department bulletin board (outside ET A342). Any of the faculty advisers should be able to help you with your problems or with any necessary forms. Of course, with this open advising system, there may be peak times when a large number of students are seeking advising. If you see a crowd at the faculty member's door, we suggest you return at the next available time. We try to schedule the hours according to the needs of the students, but we hope you understand that, as in any Engineering problem, trade-offs are involved. Since no appointments are required, there is little control to assure against overload situations.

IV. HOW TO REGISTER

If this is your first registration at CSULA, you must first see an adviser. Following advising, you obtain the department approval to register. Provided you are not trying to take any restricted courses (see description below), you are ready to pay your fees and register. **New students are strongly encouraged to attend the Department's orientation session for new students.** At that session, you will receive valuable information about the University and registration. The information you receive at the Department's orientation session supplements that given by our faculty advisers. You will also perform your first registration as part of the orientation.

Continuing student registration is very simple. You register following instructions in the schedule of classes, and use your GET account to register online. You get immediate verification of your schedule since the computer is adding you to classes immediately upon your request. You must pay fees prior to registration. See the schedule of classes for details.

In an effort to simplify the registration procedure, the Electrical Engineering department has "unrestricted" most of our classes. This means you can register for them without any specific course approvals provided that you have taken the prerequisites for these courses at CSULA. If prerequisites have been taken elsewhere you would need to contact our EE Department to approve that you have taken an equivalent course which satisfies the prerequisite and to then issue a permit in GET to override the prerequisite and enable you to register. The restricted classes are the independent research, thesis, and comprehensive exam. As described later in this manual, you must file the necessary forms, meet with an adviser, and secure the necessary signatures before the computer registration system will accept your request to register in these classes.

Adding classes is done online using the GET system. You must attend the first class meeting or the instructor can drop you from the class. If the class is full, or once the semester starts you must obtain the instructor's permission to ADD. The instructor would give the names of students adding the course to the Department Staff to enter a permit in GET to allow students to register.

Maximum Study Load: The University has a maximum study load of 16 units for graduate students. If you wish to take more than the maximum, you would need to file an "Overload Petition Form" signed by the Department Chair and Associate Dean to allow you to register for more than 16 units.

V. POLICY ON DROPPING CLASSES

During the first week of the semester, students may withdraw from any course with no record of the individual course withdrawal on their permanent academic record. After the "**no-record drop**" deadline, a student may withdraw from any course using the drop form signed by instructor and Department Chair, but the withdrawal will appear as a "W" on the student's transcript. Forms are available at Administration 409. Complete information about withdrawal form and withdrawal deadlines for each academic semester, appears in the Schedule of Classes.

VI. THE GRADUATE PROGRAM

This section describes the actual graduate program of courses. In addition to courses in the graduate program, you may have to take prerequisite and/or qualifying courses, as described in Section II. Under certain circumstances, the graduate program may contain one or more 4000-level courses from the qualifying list (i.e., these can count in both categories). The program may not contain any of the courses from the prerequisite list.

Up to 9 semester units may be used from coursework completed prior to admission to our program. These can be transfer courses from a recognized university, or they may be courses taken at Cal State LA after award of the BS degree. No courses taken prior to the award of the BS degree may be used toward fulfillment of the MS program degree requirements. There are two exceptions to this rule: 1) courses fitting the catalog description, "graduate credit for undergraduate work". This is a limited category that requires pre-approval, and must occur during the very last semester as an undergraduate, and 2) courses taken by students admitted in the integrated BS/MS program that have been approved by the advisor and appear on the student's official program of study.

CAUTION: The Admissions Office sends out tentative letters of acceptance to those in the process of completing their BS degrees. For example, if you are completing your BS degree at Cal State LA in May and apply for MS status in Fall, the acceptance comes before final verification of your graduation. If it turns out that you do not receive the BS on schedule (e.g., you do not complete one requirement), your MS admission is canceled and any courses you have taken cannot count toward the MS. This is very important! Even though you receive a nice congratulation letter on your admission, and the computer lists you as a graduate student, if a problem develops with your BS you may be taking courses that will not count on the MS. If you have questions, see an adviser.

Before you begin your first semester as a graduate student, you make up a program in consultation with an adviser. Up to 9 units can be transfer courses, either taken before CSULA Admission as described above, or taken at another university after admission. The maximum total of 9 units applies to the sum of all transfer courses. Any courses taken in continuing education status at Cal State LA are considered transfer courses and are included in the 9 unit limitation.

Area of Specialization: You must take at least 18 units of 5000-level courses in your area(s) of specialization. If you choose to do a thesis, the research and thesis units count as part of this requirement. The distribution of courses in the area of specialization depends on whether you choose a thesis or comprehensive exam (See Section IX of this handbook). If you choose a

comprehensive exam, you will need at least two areas of specialization, while those choosing a thesis may have only one. The currently available areas are:

BIOMEDICAL ENGINEERING
COMMUNICATIONS
COMPUTER ENGINEERING
CONTROL SYSTEMS
POWER SYSTEMS
SYSTEMS ENGINEERING

The listing of courses in each area is available from your adviser.

Electives in Electrical Engineering: The electives consist of 4000-level courses in Electrical Engineering. They will normally be those courses related to the 5000-level courses selected in the specialization.

VII. PREREQUISITES

All of the prerequisites can be found by referring to the current University catalog or to updated supplements issued by the department. As courses evolve, prerequisites can sometimes change. You are responsible for having the prerequisites currently in effect for the courses you are taking. This may not seem fair since it may require altering your projected program from time to time. However, the alternatives are for us to never change course content, or for you to enter a class without the proper preparation. Neither alternative is acceptable. We endeavor to make prerequisite changes only when absolutely necessary.

The current prerequisites for each of the 4000 and 5000-level EE courses are listed below.

EE 4130	Systems Engineering (3) *Prerequisites*: EE 3600
EE 4200	Digital Communication Systems (3) *Prerequisites*: EE 3200, EE 3040
EE 4210	Coding for Communications (3) *Prerequisites*: EE 3200
EE 4220	Digital Signal Processing (3) *Prerequisites*: EE 3200
EE 4229	Digital Signal Processing Laboratory (1) *Prerequisites*: EE 3020, *Co-req*: EE 4220
EE 4230	Antennas (3) *Co-requisites*: EE 3050
EE 4240	Fiber Optics (3) *Prerequisites*: EE 3200
EE 4250	Digital Image Processing (3) *Prerequisites*: EE 3200
EE 4300	Introduction to Power Systems Engineering (3) *Prerequisites*: EE 3300
EE 4310	Power Systems Analysis (3) *Prerequisites*: EE 4300
EE 4320	Electric Power Distribution (3) *Co-requisites*: EE 4300
EE 4330	Power Electronics (3) *Prerequisites*: EE 3700
EE 4340	Electromagnetic Energy Conversion (3) *Prerequisites*: EE 3300
EE 4400	Data Communications and Networking (3) *Prerequisites*: EE 3200
EE 4420	Multimedia Networking (3) *Prerequisites*: EE 4400, Knowledge of MATLAB
EE 4440	Computer Organization (3) *Prerequisites*: EE 3450
EE 4450	Embedded Architectures (3) *Prerequisites*: EE 3450
EE 4480	Advanced Digital Design (3) *Prerequisites or Co-requisites*: EE 4440
EE 4540	Special Topics in Electrical Engineering (1-3) *Prerequisites*: Senior standing or graduate standing in EE, enrollment subject to approval of instructor in charge. Permission needed by the EE Department.
EE 4600	Control Systems II (3) *Prerequisites*: EE 3600

EE 4610	Digital Control Systems (3) *Prerequisites*: EE 3600
EE 4620	Modern Control Systems (3) *Prerequisites*: EE 3020
EE 4630	Machine Learning Principles & Applications (3) *Prerequisites:* EE 3020, EE 3040
EE 4689	Control Systems Laboratory (1) *Co-requisites*: EE 3600
EE 4710	Analog Integrated Circuits (3) *Prerequisites*: EE 3700
EE 4720	CMOS VLSI Design (3) *Prerequisites*: EE 3720
EE 4730	Optoelectronics (3) *Prerequisites*: EE 3700
EE 4810	Biomedical Devices (3) *Prerequisites*: EE 2040
EE 4820	Biomedical Signal Processing (3) *Prerequisites*: EE 3020
EE 4990	Undergraduate Directed Study (1–3) *Prerequisites*: Department Permission

EE 5130	System Analysis and Design (3) *prereq: EE 4130*
EE 5140	Systems Risk Analysis (3) *prereq: EE 4130*
EE 5150	Systems Performance Analysis (3) *prereq: EE 4130*
EE 5160	Systems Architecture (3) *prereq: EE 4130*
EE 5200	Advanced Digital Communications I (3) *prereq: EE 3040, EE 4200*
EE 5210	Advanced Digital Communications II (3) *prereq: EE 5200*
EE 5220	Principles of Signal Compression (3) *prereq: EE 3040, EE 4200*
EE 5230	Wireless Communications (3) *prereq: EE 5200, coreq: EE 5210*
EE 5240	Computer Aided Design of Communication Sys (3) *prereq: EE 5200, EE 5210*
EE 5250	Optical Communications (3) *prereq: EE 5200, EE 5210*
EE 5320	Vehicle Electrification (3) *prereq: EE 3300, EE 3700*
EE 5330	Computer Method in Power Systems (3) *prereq:EE 3020, EE 4310*
EE 5340	Power System Stability (3) *prereq:EE 4310*
EE 5350	Power System Protection (3) *prereq: EE 4310*
EE 5360	Renewable Energy (3) *prereq: EE 4310*
EE 5370	Faulted Power Systems (3) *prereq: EE 4310*
EE 5400	Advanced Computer Networks (3) *prereq: EE 4400*
EE 5410	Mobile Ad Hoc Networks (3) *prereq: EE 4400*
EE 5440	Computer System Architecture (3) *prereq: EE 4440*
EE 5450	Advanced Topics in Embedded Systems (3) *prereq: EE 4450*
EE 5480	Advanced Topics in Computer Architectures (3) *prereq: EE 5440*
EE 5540	Special Topics in EE (3) *prereq: graduate standing*
EE 5600	Linear Systems Analysis (3) *prereq: EE 4620*
EE 5610	Stochastic Systems and Estimation (3) *prereq: EE 3040, EE 3600*
EE 5630	Optimal Control Theory (3) *prereq: EE 4620*
EE 5640	Nonlinear Control Systems (3) *prereq: EE 4620 or EE 5600*
EE 5820	Neural Computation (3) *prereq: EE 3040, EE 4820*
EE 5960	Comprehensive Exam (-0-) *prereq: Dept permit*
EE 5970	Graduate Research (1-3) *prereq: Dept permit*
EE 5980	Graduate Directed Study (1-3) *prereq: Dept permit*
EE 5990	Thesis (3) *prereq: Dept permit*

TENTATIVE SEMESTER SCHEDULE OF CLASSES

(Our "Best Guess" for courses by semester, the actual offering may vary depending on budget and student demand; some courses may be offered in summer session depending on student demand and faculty availability)

FALL	SPRING
EE4130	EE4220
EE4200	*EE4229
EE4240	EE4230
EE4300	EE4300
EE4310	EE4310
EE4320	EE4320
EE4330	EE4340
EE4400	EE4440
EE4440	EE4480
EE4450	EE4610
EE4600	EE4630
EE4620	*EE4689
*EE4689	EE4820
EE4710	EE5150
EE4810	EE5160
EE5130	EE5210
EE5140	EE5230
EE5200	EE5320
EE5220	EE5360
EE5330	EE5370
EE5340	EE5440
EE5350	EE5600
EE5400	EE5630
EE5610	EE5820

*Laboratory courses (1 unit)

VIII. WRITING REQUIREMENT

Unless you are exempt by Admissions office you must take the upper division writing proficiency exam (WPE) **in your very first semester as a graduate student!!!** It is your responsibility to take the exam at the proper time. You register for the exam as UNIV4000, which is listed in the schedule of classes along with the other "UNIV" courses. A permit to enroll in UNIV 4000 is obtained from the Testing Center located in the Library South Wing. You will not be allowed to enroll in the Comprehensive Exam or Thesis courses unless you pass the Writing Proficiency Exam.

If you fail the exam the first time, you must either retake the exam or enroll in UNIV4010, the upper division writing proficiency course. You must meet with a consultant in the University Writing Center who will help you decide which course of action to take to fulfill the WPE requirement. In either case, the requirement must be satisfied within the first two semesters or prior to the completion of 12 units, whichever comes later. Check the schedule of classes for details. Help is also available in the University Writing Center to correct deficiencies in your writing. You must be able to write effectively in order to succeed in the profession.

IX. COMPREHENSIVE EXAMINATION/THESIS

Every graduate student must choose one of two options, comprehensive examination or thesis. These are described below:

Comprehensive Examination: The comprehensive examination is listed as EE5960, and counts zero units toward the 30-unit degree requirement. It consists of two 3-hour exams chosen from the fields of specialization: Communications, Computer Engineering, Control Systems, Power, Biomedical Engineering, and Systems Engineering. You should take the examination during your last semester of attendance. Since the exams cover both the 4000-level and 5000-level material, you should be close to finishing the courses on your program. The exam is given late in the semester, usually during the 14th week of instruction. It is given over the course of one week, so you will have to come in twice to take the exams.

Prior to registering for EE5960, you must complete a form (available at the Department Coordinator's office) which shows you have obtained approval to take the exam. In order to obtain approval, you need to form a three-member comprehensive exam committee, drawn from faculty members in your areas of concentration.

Thesis: Thesis is a valuable choice for graduate students. It can be essential for those planning to pursue a doctoral degree (Ph.D.). However, those with limited ability in English, and those employed full-time are advised to carefully investigate whether the thesis option is appropriate. Discuss this with an adviser.

Thesis normally consists of a total of 9 units, which counts toward the 18-unit minimum requirement of 5000-level courses in the specialization. The units are distributed as 3 units of EE5970 (research), 3 units of EE5980 (graduate directed study) and 3 units of EE5990 (thesis). Typically, the units of research are spread over two or three semesters. You should enroll in EE5990 during the semester that you plan to complete your thesis.

Therefore, a minimum of three semesters should be allocated to complete a thesis. There are detailed requirements on the link http://www.calstatela.edu/graduatethesis regarding preparation of the manuscript and submission to the library. If you don't follow all of those instructions, your graduation could be delayed.

A graduate student submitting a Master's Thesis to the library to finish up all MSEE work must be **enrolled in CSULA during that semester** in order to graduate. If the student used up all the units of EE5990 and has not completed the thesis, then the student will have to enroll in UNIV 9000 through PaGE program to maintain active status in the semester in which the student plans to submit the thesis document. More information about UNIV 9000 can be found on this link http://www.calstatela.edu/page/university-9000-univ-9000.

X. PROFESSIONAL ACTIVITIES

You cannot expect to learn to become a successful Electrical Engineer by simply attending classes, doing homework, and taking exams. Preparation for the profession requires far more than that! Professionalism is a way of life that goes far beyond the classroom.

But don't despair - There are convenient opportunities to supplement your classroom instruction in order to be better prepared to enter the profession upon graduation. A primary opportunity exists in the Institute of Electrical Electronics Engineers (IEEE). The department faculty is fully committed to the concept that EVERY Electrical Engineering major should be a member of this organization, and such membership could not possibly be more convenient.

The Institute of Electrical and Electronics Engineers is the world's largest professional engineering society, founded in 1884. The student branch of IEEE at Cal State LA is indeed very active. The branch ranks among the largest student branches in the world. Everyone engaged in the electrical and electronics field is invited to join the over 350,000 engineers and students who are members of IEEE.

As a student member, the dues are only a fraction of the regular member dues, and they entitle you to all of the privileges of membership. Included with your membership is POTENTIALS, the IEEE student magazine. It focuses upon the student members' needs and concerns while in school and as they prepare to become working members of the profession. Also included with student membership is the world acclaimed technical magazine, SPECTRUM. Upon graduation, you can access the IEEE online job database to extend the range of your job search. IEEE also sponsors a large number of conferences, workshops, and career fairs to help engineering students to develop their careers.

Throughout the year, the CSULA student branch of IEEE holds general meetings, usually once a month, during which engineering leaders from the many companies located in our area present technical talks. Participation in the student branch activities enhances your future career by offering leadership experience, and activities such as field trips, employment seminars, and design projects. It also allows you to meet socially with your professional peers and faculty members.

MicroMouse is a signature project sponsored by the IEEE student chapter. Initiated in 1970's, MicroMouse has become worldwide competition which provides excellent opportunity for engineering students to work together to build a practical robotic system that can navigate through a maze autonomously. The design of MicroMouse involves application of skills from multiple areas of specialization such as computer engineering, control systems, and electronics. Recently, the CSULA MicroMouse teams have won multiple prizes in regional competitions.

To engage more students in hands-on design practice, our IEEE chapter has extended the scope of Micromouse project. Each year, Jr. Robotics Design Competition is hosted to encourage students working on fun robotics projects, such as "mini Robot Track Race" and "SumoBot Fight Contest". Interested students can sign up with IEEE board to receive a robotic kit, implement their design and attend the competition. IEEE student chapter also hosts robotics workshops to introduce basic knowledge and provide hands-on practice on useful topics such as "how to program a microprocessor", "how to read from a sensor", and "how to drive a motor", etc.

If you are not currently a member, the Faculty of this Department strongly recommend that you join and take advantage of all the benefits that membership confers. To join, go to http://www.ieee.org, on the membership page, click on "Join IEEE as a student member".

There are several other student organizations on campus which are also available to help connect you to professional and career development opportunities in engineering. These include Tau Beta Pi, Society of Women Engineers, Biomedical Engineering Society, National Society of Black Engineers, and Society of Hispanic Engineering and Science Students.

XI - APPLYING FOR GRADUATION

Well, you look like you are going to make it. You have followed the instructions in this handbook, and can now see the light at the end of the tunnel. You appear to be close to graduation.

But graduation does not happen automatically. **YOU MUST APPLY** for it. Application forms are available in Administration 409 during the filing periods for graduation as listed in the class schedule. You fill out the application form, take it to your advisor to sign and then to the cashier to pay the fee and process the application. The deadlines are listed in the Schedule of Classes. Generally, you must apply about **6 months** before you expect to graduate. Do not wait until the last minute!

XII - ACADEMIC STANDARDS

You are joining an academic community. Along with the privileges of membership go certain obligations. Failure to meet established standards will result in your being expelled from the university.

We hope that behavior standards never become an issue, but it is important that you prove worthy of the trust we place in you. Honesty is extremely important both for the operation the university and for your personal development. Any form of cheating on examinations will lead to one or more serious sanctions, including dismissal from the university. The faculty is committed to carefully monitoring examinations and to taking strong action if any dishonest activity is detected. Details are given in the University catalog. Note that plagiarism in writing papers is a form of cheating. Read the section of the catalog, and ask the faculty if you have any questions.

In order to be in good academic standing, you must maintain a minimum of a B average. If your grade point average on your program falls below B (3.0), it means that you are not meeting the academic standards of the department, and you are in danger of not being permitted to continue toward your degree. If your average falls below B, you are immediately placed on **academic (scholastic) probation,** which represents a form of final warning. If after being placed on academic probation you do not raise your average to 3.0 after completion of 12 units or two semesters in residence, whichever comes later, you will be disqualified from pursuing the MS degree in Electrical Engineering.

If your grade point average falls more than 9 grade points below B, you will be disqualified from pursuing the MS degree in Electrical Engineering. Disqualification from the MS program is permanent. There are no second chances. You may apply and be admitted to another degree program on this campus on the recommendation of the new department and of the graduate dean.

XIII - GRADUATE STUDY IN ELECTRICAL ENGINEERING
CALIFORNIA STATE UNIVERSITY, LOS ANGELES

The Master of Science degree in Electrical Engineering at California State University, Los Angeles, is designed for engineers who wish to prepare for advancement in their profession, whether in management research and development, sales, manufacturing, construction, consulting, teaching, or any of the expanding number of fields requiring highly educated electrical engineers.

The graduate program in Electrical Engineering at Cal State L.A. is organized to accommodate the need of engineers employed full time as well as those interested in accelerating their programs by attending full time. Courses are scheduled both during the day and at hours to suit the needs of those working in the profession.

Instruction is offered on a semester based system. Each of the two semesters that comprise the academic year (fall and spring) is 16 weeks in duration.

The university is located at the eastern edge of Los Angeles and adjacent to the western San Gabriel Valley. The convenient location ensures easy access by freeway and major surface streets, as well as by bus & metro-line from all parts of the Greater Los Angeles metropolitan area.

Admission to the Graduate Program

Applicants to the program must have a Bachelor of Science degree in Electrical Engineering (from an accredited college or university) with a minimum 2.50 grade point average (A = 4.0) in the last 60 semester units attempted in the undergraduate program.

Applicants with a Bachelor of Science degree in an allied field (e.g. Computer Science, Physics, Mathematics) may be admitted to conditionally classified graduate standing until prescribed prerequisites have been successfully completed. The GRE is not required for entering the program.

The Writing Proficiency Examination requirement is determined by Admissions office upon evaluation of the student's undergraduate degree.

Degree Requirements

A total of 30 semester units is required, including at least 18 units of 5000 level courses. A minimum of a B, 3.0 grade point average is required. Completion of the program requires the writing of an acceptable thesis or successful completion of a comprehensive examination.

FOR FURTHER INFORMATION

Further information about the program in Electrical Engineering may be obtained from the Department of Electrical and Computer Engineering website http://www.calstatela.edu/ecst/ece, or by calling (323) 343-4470. Admission information and application forms may be obtained online at: http://www.calstatela.edu/ecst/ece/admission-0

AREAS OF INSTRUCTION AND RESEARCH

Illustrative of the areas from which students select courses that will prepare them for their area of special interest are the following blocks of Engineering courses for graduate students. Unit values are indicated in parenthesis.

COMMUNICATION SYSTEMS	**BIOMEDICAL ENGINEERING**
EE 4200 Digital Communication Systems (3) *prereq: EE 3200, EE 3040*	EE 4200 Digital Communication Systems (3) *prereq: EE 3200, EE 3040*
EE 4210 Coding for Communications (3) *prereq: EE 3200*	EE 4220 Digital Signal Processing (3) *prereq: EE 3200*
EE 4220 Digital Signal Processing (3) *prereq: EE 3200*	EE 4229 Digital Signal Processing Lab (1) *prereq: EE 3020, coreq EE 4220*
EE 4229 Digital Signal Processing Lab (1) *prereq: EE 3020, coreq EE 4220*	EE 4250 Digital Image Processing (3) *prereq: EE 3200*
EE 4230 Antennas (3) *coreq: EE 3050*	EE 4710 Analog Integrated Circuits (3) *prereq: EE 3700*
EE 4240 Fiber Optics (3) *prereq: EE 3200*	EE 4720 CMOS VLSI Design (3) *prereq; EE 3720*
EE 4250 Digital Image Processing (3) *prereq: EE 3200*	EE 4600 Control Systems II (3) *prereq: EE 3600*
EE 4400 Data Communications & Networking (3) *prereq: EE 3200*	EE 4810 Biomedical Devices (3) *prereq: EE 2040*
EE 5200 Advanced Digital Communications I (3) *prereq: EE 3040, EE 4200*	EE 4820 Biomedical Signal Processing (3) *prereq: EE 3020*
EE 5210 Advanced Digital Communications II (3) *prereq: EE 5200*	EE 5130 System Analysis and Design (3) *prereq: EE 4130*
EE 5220 Principles of Signal Compression (3) *prereq: EE 3040, EE 4200*	EE 5200 Advanced Digital Communications I (3) *prereq: EE 3040, EE 4200*
EE 5230 Wireless Communications (3) *prereq: EE 5200, coreq: EE 5210*	EE 5220 Principles of Signal Compression (3) *prereq: EE 3040, EE 4200*
EE 5240 Computer Aided Design of Communication Sys (3) *prereq: EE 5200, EE 5210*	EE 5610 Stochastic Systems and Estimation (3) *prereq: EE 3040, EE 3600*
EE 5250 Optical Communications (3) *prereq: EE 5200, EE 5210*	EE 5630 Optimal Control Theory (3) *prereq: EE 4620*
EE 5410 Mobile Ad Hoc Networks (3) *prereq: EE 4400*	EE 5820 Neural Computation (3) *prereq: EE 3040, EE 4820*
COMPUTER ENGINEERING	**POWER SYSTEMS**
EE 4400 Data Communications & Networking (3) *prereq: EE 3200*	EE 4300 Intro to Power Systems Engineering (3) *prereq: EE 3300*
EE 4420 Multimedia Networking (3) *prereq: EE 4400*	EE 4310 Power System Analysis (3) *prereq: EE 4300*
EE 4440 Computer Organization (3) *prereq: EE 3450*	EE 4320 Electric Power Distribution (3) *coreq: EE 4300*
EE 4450 Embedded Architectures (3) *prereq: EE 3450*	EE 4330 Power Electronics (3) *prereq: EE 3700*
EE 4480 Advanced Digital Design (3) *prereq or coreq: EE 4440*	EE 4340 Electromagnetic Energy Conversion (3) *prereq: EE 3300*
EE 5400 Advanced Computer Networks (3) *prereq: EE 4400*	EE 5320 Vehicle Electrification (3) *prereq: EE 3300, EE 3700*
EE 5410 Mobile Ad Hoc Networks (3) *prereq: EE 4400*	EE 5330 Computer Method in Power Systems (3) *prereq: EE 3020, EE 4310*
EE 5440 Computer System Architecture (3) *prereq: EE 4440*	EE 5340 Power System Stability (3) *prereq: EE 3600, EE 4310*
EE 5450 Advanced Topics in Embedded Systems (3) *prereq: EE 4450*	EE 5350 Power System Protection (3) *prereq: EE 4310*
EE 5480 Advanced Topics in Computer Architectures(3) *prereq: EE 5440*	EE 5360 Renewable Energy (3) *prereq: EE 4310*
	EE 5370 Faulted Power Systems (3) *prereq: EE 4310*
SYSTEMS ENGINEERING	
EE 4130 Systems Engineering (3) *prereq: EE 3600*	**ADDITIONAL COURSES**
EE 5130 System Analysis and Design (3) *prereq: EE 4130*	EE 4540 Special Topics in EE (1-3) *prereq: graduate standing*
EE 5140 Systems Risk Analysis (3) *prereq: EE 4130*	EE 4730 Optoelectronics (3) *prereq: EE 3700*
EE 5150 Systems Performance Analysis (3) *prereq: EE 4130*	EE 4990 Undergraduate Directed Study (1-3) *prereq: Dept permit*
EE 5160 Systems Architecture (3) *prereq: EE 4130*	EE 5540 Special Topics in EE (3) *prereq: graduate standing*
	EE 5960 Comprehensive Exam (-0-) *prereq: Dept permit*

CONTROL SYSTEMS	EE 5970 Graduate Research (1-3) *prereq: Dept permit*
EE 4600 Control Systems II (3) *prereq: EE 3600*	EE 5980 Graduate Directed Study (1-3) *prereq: Dept permit*
EE 4610 Digital Control Systems (3) *prereq: EE 3600*	EE 5990 Thesis (3) *prereq: Dept permit*
EE 4620 Modern Control Systems (3) *prereq: EE 3020*	
EE 4689 Control Systems Lab (1) *coreq: EE 3600*	
EE 5600 Linear Systems Analysis (3) *prereq: EE 4620*	
EE 5610 Stochastic Systems and Estimation (3) *prereq: EE 3040, EE 3600*	
EE 5630 Optimal Control Theory (3) *prereq: EE 4620*	
EE 5640 Nonlinear Control Systems (3) *prereq: EE 4620 or EE 5600*	