MS IN ELECTRICAL AND ELECTRONIC ENGINEERING

Total units required for MS: 30

Program Description

The Master of Science degree program in Electrical and Electronic Engineering is designed to provide students with advanced study in a variety of Electrical and Electronic Engineering topics, and opportunities to conduct independent research to broaden their professional scope.

The scheduling of courses and the Culminating Experience options in the program are designed to provide flexibility for working professionals. All students complete a one-unit research methodology course, three-unit computational methods course, and at least two of the designated elective area core courses. This requirement is designed to provide a strong academic foundation. In consultation with the Graduate Coordinator and faculty advisors, students then focus their studies in one or more of the following areas, adapting to the needs and interests of the practicing engineer or post-graduate candidate:

- Control Systems
- Communication Systems
- Power Systems
- Microelectronic Design
- Computer Architecture & Digital Design

Coordinated courses are offered in advanced microprocessors, electromagnetic theory and microwaves, lasers and fiber optics, semiconductor devices, robotics and intelligent machines, systems and control, networks, and communication systems. Other coordinated courses facilitate the study of estimation and stochastic control, advanced communications and signal processing, large interconnected power systems, power systems reliability, and planning, advanced design and organization of digital computer systems, and advanced integrated circuit design. The program is also sufficiently flexible to allow special independent studies of problems of current interest.

The Department has a strong relationship with the local engineering community. Students of the program have access to Department laboratories and facilities and to University computer services.

Admission Requirements

Admission as a classified graduate student in Electrical and Electronic Engineering requires:

- a BS in Electrical and Electronic Engineering or equivalent;
- at least a 3.0 GPA in the BS in Electrical Engineering or equivalent; or
- at least a 3.25 GPA in the last 60 units of the BS in Electrical and Electronic Engineering or equivalent.

Under special circumstances, a student who does not satisfy the Admission Requirements may be admitted as a conditionally classified graduate student. Deficiencies will be specified in the acceptance letter to the student and must be removed by the student before the student can become a classified graduate student.

A student registered as an unclassified graduate student should carefully note that graduate courses taken as an unclassified graduate or as an open university student cannot be used to improve the student's grade point average for admittance to the Electrical and Electronic Engineering graduate program. Only undergraduate Electrical and Electronic Engineering courses can be taken or retaken to improve the GPA of the student for admittance to the graduate program.

Admission Procedures

Applications are accepted as long as room for new students exists. However, students are strongly urged to apply by April 1 for the following fall or October 1 for the following spring. All prospective graduate students, including Sacramento State graduates, must file the following with the Office of Graduate Studies, River Front Center 215, (916) 278-6470:

- an online application for admission; and
- one set of official transcripts from all colleges and universities attended, *other than Sacramento State.*

At the same time, students not meeting the above admission requirements should submit to the Electrical and Electronic Engineering Graduate Coordinator two letters of recommendation, Graduate Record Examination scores, and/or other evidence of their potential for successful graduate study in this program.

Approximately six weeks after receipt of all items listed above, a decision regarding admission will be mailed to the applicant.

Minimum Units and Grade Requirement for the Degree

Units Required for the MS: 30

Minimum Cumulative GPA: 3.0. No more than three (3) courses in the program of study may have a grade below "B" and no course may have a grade below "C+".

Advancement to Candidacy

By the end of the first semester, after admission to the program, each student in the EEE Department is required to have a program of study approved by an elective area core faculty advisor and the Graduate Coordinator. Students will fill out a form (contract) outlining what courses they plan to take to complete the MS degree. This contract will be signed by the student and the faculty advisor, and filed in the EEE Department Office.

In addition, each student must file an application for Advancement to Candidacy with the Office of Graduate Studies indicating a proposed program of graduate study for the completion of the MS EEE. This procedure should begin as soon as the *classified* graduate student has:

- removed any deficiencies in Admission Requirements;
- completed a minimum of 12 units in the graduate program with a minimum 3.0 GPA; at least nine units of the 12 units must be EEE 200 level courses; and
- taken the Writing Placement for Graduate Students (WPG) or taken a Graduate Writing Intensive (GWI) course in their discipline within the first two semesters of coursework at California State University, Sacramento or secured approval for a WPG waiver.

Each student must be advanced to candidacy prior to registering for EEE 500.

Advancement to Candidacy forms are available in the Office of Graduate Studies and in the Electrical and Electronic Engineering Department Office.

Program Requirements

Code	Title	Units
Required Core Courses (11 Units)		**11**
EEE 201	Research Methodology	2
EEE 244	Electrical Engineering Computational Methods and Applications	3
Select two of the following:		6
EEE 211	Microwave Engineering [1]	
EEE 230	Analog and Mixed Signal Integrated Circuit Design	
EEE 241	Linear Systems Analysis	
EEE 250	Modern Power Transmission Systems	
EEE 260	Digital Communications [1]	
EEE 285	Micro-Computer System Design I	
Electives		
Select from the following and other areas so that the overall program totals at least 30 units: [2]		
Communication Systems		
EEE 211	Microwave Engineering	
EEE 212	Modern Antenna Design	
EEE 213	Microwave Devices and Circuits	
EEE 214	Computer Aided Design for Microwave Circuits	
EEE 215	Lasers	
EEE 245	Advanced Digital Signal Processing	
EEE 260	Digital Communications	
EEE 261	Information Theory, Coding, and Detection	
EEE 262	Wireless Communications Systems	
EEE 264	Advanced Topics in Wireless Communications	
EEE 265	Optoelectronic Engineering	
EEE 266	Modern Digital Communication Systems	
EEE 267	Fiber Optic Communications	
EEE 268	Telecommunications Networks	
EEE 272	High Speed Digital System Design	
Control Systems		
EEE 221	Machine Vision	
EEE 222	Electronic Neural Networks	
EEE 225	Advanced Robot Control	
EEE 241	Linear Systems Analysis	
EEE 242	Statistical Signal Processing	
EEE 243	Applied Stochastic Processes	
EEE 246	Advanced Digital Control	
EEE 249	Advanced Topics in Control and Systems	
Power Systems		
EEE 250	Modern Power Transmission Systems	
EEE 251	Power System Economics and Dispatch	
EEE 252	Power System Reliability and Planning	
EEE 253	Control and Stability of Power Systems	
EEE 254	Large Interconnected Power Systems	
EEE 255	Future Power Systems and Smart Grids	
EEE 256	Advanced Power Systems Protection	
EEE 257	Wind Energy Electrical Conversion Systems	
EEE 259	Advanced Topics in Power Systems	
Microelectronic Design		
EEE 230	Analog and Mixed Signal Integrated Circuit Design	
EEE 231	Advanced Analog and Mixed Signal Integrated Circuit Design	
EEE 232	Key Mixed-Signal Integrated Circuit Building Blocks	
EEE 234	Digital Integrated Circuit Design	
EEE 235	Mixed-Signal IC Design Laboratory	
EEE 236	Advanced Semiconductor Devices	
EEE 238	Advanced VLSI Design-For-Test I	
EEE 239	Advanced VLSI Design-For-Test II	
Computer Architecture & Digital Design		
EEE 270	Advanced Topics in Logic Design	
EEE 272	High Speed Digital System Design	
EEE/CSC 273	Hierarchical Digital Design Methodology	
EEE 274	Advanced Timing Analysis	
EEE/CSC 280	Advanced Computer Architecture	
EEE 285	Micro-Computer System Design I	
EEE 286	Microcomputer System Design II	
Culminating Requirement (0-5 Units)		
EEE 500	Culminating Experience	0 - 5
Plan A Thesis (5 units)		
Plan B Project (2 units)		
Plan C Comprehensive Exam (0 units)		
Total Units		**30**

[1] Only one of these two courses will be counted as a core requirement. The other may be taken as an elective.

[2] Select at least 14 units if completing a 5 unit Plan A thesis, or select at least 17 units if completing a 2 unit Plan B project, and select at least 19 units if completing a Plan C exam. This selection must be done in consultation with the elective area faculty advisor and the Graduate Coordinator, and may include approved courses from other areas. A maximum of 7 units of undergraduate technical electives in electrical and electronic engineering or computer engineering may be applied to this requirement if approved by the Graduate Coordinator and if they have not been used to satisfy the BS program requirements or MS EEE admission requirements.

Notes:

- **The student cannot register for the Culminating Experience until the student passes the Writing Placement for Graduate Students (WPG), and advances to candidacy**. In subsequent semesters, students will enroll in Continuous Enrollment through the College of Continuing Education after qualifications for enrollment are verified.
- **Before registering for** EEE 500, students choosing Plan A, Master Thesis (5 units), or Plan B, Master Project (2 units), must submit an approved Topic Form to the Graduate Coordinator.
- **Students opting for Plan C, Comprehensive Exam**, must have that option approved by their elective area advisor. They will not receive degree credit for EEE 500. They must complete a total of 30 units of approved coursework, including core, elective core, and elective courses. They must advance to candidacy for the degree, and take a written comprehensive exam that will cover all of the material in their MS Program of Study. After a student's first failed attempt at the Plan C examination, the student shall receive advising from the graduate

coordinator designed to prepare the student for a second attempt at the examination. Such advising may include a recommendation for the student to take additional course(s) to improve preparation for the next attempt. According to the Office of Graduate Studies policy, students are allowed no more than two attempts at the examination: however, if the EEE Department determines that there are extreme extenuating circumstances, the student may be recommended to the Office of Graduate Studies for a third attempt at the examination. Students are advised that a change from the exam option to project or thesis option is **not allowed** after the first attempt at the exam. Additionally, after two unsuccessful attempts at the exam, the student is subject to discontinuation from the graduate program. **Note:** It should be recognized that industry puts a high value on project and thesis problem-solving experience, and the demonstration of technical writing skill that these options require. Graduating under Plan C option will not provide that experience. Students taking this option should consider, with their elective area advisors, other ways of gaining that valuable experience, such as through an EEE 299 Special Problems course.

- **As soon as possible after the student has registered for** EEE 500, it is expected that the student will select a committee appropriate to the chosen plan of study. The Thesis Committee is to consist of the student's Thesis Advisor, who is the Chairperson of the student's Thesis Committee, and two other faculty members. The Project Committee is to consist of the student's Project Advisor, who is the Chairperson of the student's Project Committee, and one other faculty member. The committee members selected by the student must be approved by the Electrical and Electronic Engineering Department's Graduate Coordinator.
- **The Thesis (Plan A)** must be orally presented and defended, approved by the student's Thesis Committee, and approved by the Electrical and Electronic Engineering Graduate Coordinator prior to submittal of the Thesis to the Office of Graduate Studies.
- **The Project (Plan B)** is to culminate in a report and a device or simulation, which is to be demonstrated to the student's Project Committee. The Project Report must be approved by the student's Project Committee and approved by the Electrical and Electronic Engineering Graduate Coordinator prior to its submittal to the Office of Graduate Studies.