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; and
- 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
- two sets 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**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEE 201</td>
<td>Research Methodology</td>
</tr>
<tr>
<td>EEE 244</td>
<td>Electrical Engineering Computational Methods and Applications</td>
</tr>
</tbody>
</table>

Select two of the following:  
EEE 211  Microwave Engineering
EEE 230  Analog and Mixed Signal Integrated Circuit Design
EEE 241  Linear Systems Analysis
EEE 250  Modern Power Transmission Systems
EEE 260  Statistical Theory of Communication
EEE 285  Micro-Computer System Design I

Select from the following and other areas so that the overall program totals at least 30 units:  

**Electives (15-20 Units)**

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  Statistical Theory of Communication  
EEE 261  Information Theory, Coding, and Detection  
EEE 262  Wireless Communications Systems  
EEE 264  Advanced Topics in Wireless Communications  
EEE 265  Optoelectronic Engineering  
EEE 267  Fiber Optic Communications  
EEE 272  High Speed Digital System Design  

**Communication 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  

**Control 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 258  Advanced Topics in Power Systems  
EEE 259  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  

**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  
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  

**Computer Architecture & Digital Design**

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  Statistical Theory of Communication  
EEE 261  Information Theory, Coding, and Detection  
EEE 262  Wireless Communications Systems  
EEE 264  Advanced Topics in Wireless Communications  
EEE 265  Optoelectronic Engineering  
EEE 267  Fiber Optic Communications  
EEE 272  High Speed Digital System Design  

**Culminating Requirement (1-6 Units)**

EEE 500  Culminating Experience

**Total Units**  30-36

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 15 units if completing a 5 unit Plan A thesis, select at least 18 units if completing a 2 unit Plan B project, and select at least 20 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.