Electrical and Computer Engineering, M.S.

The Department offers M.S. and Ph.D. degrees in Electrical and Computer Engineering with a concentration in Electrical Engineering and in Computer Engineering. Because most graduate courses are not repeated every quarter, students should make every effort to begin their graduate program in the fall.

Detailed descriptions of the two concentrations are as follows.

**Electrical Engineering Concentration (EE)**

The Electrical Engineering faculty study the following areas: optical and solid-state devices, including quantum electronics and optics, integrated electro-optics, design of semiconductor devices and materials, analog and mixed-signal IC design, microwave circuits antenna and devices, and nano imaging; systems engineering and signal processing, including communication theory, signal processing, power electronics, neural networks, communications networks, systems engineering, and control systems. Related communication networks topics are also addressed by the Networked Systems M.S. and Ph.D. degrees.

**Computer Engineering Concentration (CPE)**

The concentration in Computer Engineering provides students with a solid base in the design, development, and evaluation of computer systems and software. Thrust areas include computer architecture, software design, and embedded systems, but the program is highly customizable to the specific interests of the student. The research activities of the faculty in this concentration include parallel and networked computer systems, distributed software architectures and databases, real-time and embedded computer systems, VLSI architectures, computer design automation, low-power design, computer communication protocols and networks, security, programming languages for parallel/distributed processing, knowledge management, service-oriented architectures, and software engineering.

Two plans are offered for the M.S.: a thesis option and a comprehensive examination option. For either option, students are required to develop a complete program of study with advice from their faculty advisor. The graduate advisor must approve the study plan. Part-time study toward the M.S. is available. The program of study must be completed within four calendar years from first enrollment.

**Plan I: Thesis Option**

The thesis option requires completion of 12 courses of study; an original research investigation; the completion of an M.S. thesis; and approval of the thesis by a thesis committee. The thesis committee is composed of three full-time faculty members with the faculty advisor of the student serving as the chair. Required undergraduate core courses and graduate seminar courses, such as EECS 290, EECS 292, EECS 293, EECS 294, and EECS 295, may not be counted toward the 12 courses. No more than one course of EECS 299 and one undergraduate elective course may be counted toward the 12 courses. Up to four of the required 12 courses may be from EECS 296 (M.S. Thesis Research) with the approval of the student’s thesis advisor. Additional concentration-specific requirements are as follows; a list of core and concentration courses is given at the end of this section.

**Electrical Engineering Concentration:**

At least seven concentration courses in the Electrical Engineering Concentration (EE) must be completed. All courses must be completed with a grade of B (3.0) or better.

**Computer Engineering Concentration:**

Three core courses in the Computer Engineering Concentration (CPE) must be completed: EECS 211, EECS 213, and EECS 215. At least four additional concentration or approved courses must also be completed. All courses must be completed with a grade of B (3.0) or better.

**Plan II: Comprehensive Examination Option**

The comprehensive examination option requires the completion of 12 courses and a comprehensive examination. Only one EECS 299 course can be counted if the EECS 299 course is four or more units. Undergraduate core courses and graduate seminar courses, such as EECS 290, EECS 292, EECS 293, EECS 294, and EECS 295, may not be counted toward the 12 courses requirement. No more than two of undergraduate elective courses may be counted. In fulfillment of the comprehensive examination element of the M.S. program, students can choose one of the two alternatives: 1) EECS 290 Curricular Practical Training or 2) EECS 294 Electrical Engineering and Computer Science Colloquium. Either of the two alternatives may be taken for 1 unit and completed with a satisfactory grade to fulfill the comprehensive exam requirements. Additional concentration-specific requirements are as follows; a list of core and concentration courses is given at the end of this section.

**Electrical Engineering Concentration:**

Students enrolled in the Electrical Engineering (EE) concentration who choose the Comprehensive Examination option must select one of the following plans of study.

**Circuits and Devices Plan of Study:**

Select four of the following:

- EECS 270A Advanced Analog Integrated Circuit Design I
- EECS 270B Advanced Analog Integrated Circuit Design II
- EECS 277A Advanced Semiconductor Devices I
**Systems Plan of Study:**
Select four of the following: ¹

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECS 240</td>
<td>Random Processes</td>
</tr>
<tr>
<td>EECS 241A</td>
<td>Digital Communications I</td>
</tr>
<tr>
<td>EECS 250</td>
<td>Digital Signal Processing I</td>
</tr>
<tr>
<td>EECS 251A</td>
<td>Detection, Estimation, and Demodulation Theory</td>
</tr>
<tr>
<td>EECS 260A</td>
<td>Linear Systems I</td>
</tr>
<tr>
<td>EECS 267A</td>
<td>Industrial and Power Electronics</td>
</tr>
</tbody>
</table>

At least five additional courses from the list of EE concentration courses must be completed. All must be completed with a grade of B (3.0) or better.

¹ If all six courses are not offered in an academic year, students who graduate in that year can petition to replace the courses that are not offered by EECS 242 and/or EECS 244.

**Electrical Engineering Concentration Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EECS 202A- 202B</td>
<td>Principles of Imaging and Techniques in Medical Imaging I: X-ray, Nuclear, and NMR Imaging</td>
</tr>
<tr>
<td>EECS 202C</td>
<td>Techniques in Medical Imaging II: Ultrasound, Electrophysiological, Optical</td>
</tr>
<tr>
<td>EECS 203A</td>
<td>Digital Image Processing</td>
</tr>
<tr>
<td>EECS 213</td>
<td>Computer Architecture</td>
</tr>
<tr>
<td>EECS 215</td>
<td>Design and Analysis of Algorithms</td>
</tr>
<tr>
<td>EECS 217</td>
<td>VLSI System Design</td>
</tr>
<tr>
<td>EECS 229</td>
<td>Low Power SoC Design</td>
</tr>
<tr>
<td>EECS 240</td>
<td>Random Processes</td>
</tr>
<tr>
<td>EECS 241A- 241B</td>
<td>Digital Communications I and Digital Communications II</td>
</tr>
<tr>
<td>EECS 242</td>
<td>Information Theory</td>
</tr>
<tr>
<td>EECS 243</td>
<td>Error Correcting Codes</td>
</tr>
<tr>
<td>EECS 244</td>
<td>Wireless Communications</td>
</tr>
<tr>
<td>EECS 245</td>
<td>Space-Time Coding</td>
</tr>
<tr>
<td>EECS 247</td>
<td>Information Storage</td>
</tr>
<tr>
<td>EECS 248A</td>
<td>Computer and Communication Networks</td>
</tr>
<tr>
<td>EECS 250</td>
<td>Digital Signal Processing I</td>
</tr>
<tr>
<td>EECS 251A- 251B</td>
<td>Detection, Estimation, and Demodulation Theory and Detection, Estimation, and Demodulation Theory</td>
</tr>
<tr>
<td>EECS 260A</td>
<td>Linear Systems I</td>
</tr>
<tr>
<td>EECS 261A</td>
<td>Linear Optimization Methods</td>
</tr>
<tr>
<td>EECS 267A- 267B</td>
<td>Industrial and Power Electronics and Topics in Industrial and Power Electronics</td>
</tr>
<tr>
<td>EECS 270A- 270B</td>
<td>Advanced Analog Integrated Circuit Design I and Advanced Analog Integrated Circuit Design II</td>
</tr>
<tr>
<td>EECS 270C</td>
<td>Design of Integrated Circuits for Broadband Applications</td>
</tr>
<tr>
<td>EECS 270D</td>
<td>Radio-Frequency Integrated Circuit Design</td>
</tr>
<tr>
<td>EECS 272</td>
<td>Topics in Electrical Engineering</td>
</tr>
<tr>
<td>EECS 275A- 275B</td>
<td>Very Large Scale Integration (VLSI) Project and Very Large Scale Integration (VLSI) Project Testing</td>
</tr>
<tr>
<td>EECS 277A</td>
<td>Advanced Semiconductor Devices I</td>
</tr>
<tr>
<td>EECS 277B</td>
<td>Advanced Semiconductor Devices II</td>
</tr>
</tbody>
</table>
Computer Engineering Concentration Courses

Computer Engineering Concentration:
Three core courses in the Computer Engineering Concentration (CPE) must be completed: EECS 211, EECS 213, and EECS 215. At least five additional concentration or approved courses must also be completed. All courses must be completed with a grade of B (3.0) or better.

Computer Engineering Concentration:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EECS 211</td>
<td>Advanced System Software ¹</td>
</tr>
<tr>
<td>EECS 213</td>
<td>Computer Architecture ¹</td>
</tr>
<tr>
<td>EECS 215</td>
<td>Design and Analysis of Algorithms ¹</td>
</tr>
<tr>
<td>EECS 217</td>
<td>VLSI System Design</td>
</tr>
<tr>
<td>EECS 220</td>
<td>Advanced Digital Signal Processing Architecture</td>
</tr>
<tr>
<td>EECS 221</td>
<td>Topics in Computer Engineering</td>
</tr>
<tr>
<td>EECS 222</td>
<td>Embedded System Modeling</td>
</tr>
<tr>
<td>EECS 223</td>
<td>Real-Time Computer Systems</td>
</tr>
<tr>
<td>EECS 224</td>
<td>High-Performance Computing</td>
</tr>
<tr>
<td>EECS 225</td>
<td>Embedded Systems Design</td>
</tr>
<tr>
<td>EECS 226</td>
<td>Embedded System Software</td>
</tr>
<tr>
<td>EECS 227</td>
<td>Cyber-Physical System Design</td>
</tr>
<tr>
<td>EECS 229</td>
<td>Low Power SoC Design</td>
</tr>
<tr>
<td>EECS 230</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>EECS 248A</td>
<td>Computer and Communication Networks</td>
</tr>
<tr>
<td>EECS 298</td>
<td>Topics in Electrical Engineering and Computer Science</td>
</tr>
<tr>
<td>COMPSCI 233</td>
<td>Networking Laboratory</td>
</tr>
<tr>
<td>COMPSCI 234</td>
<td>Advanced Networks</td>
</tr>
<tr>
<td>COMPSCI 236</td>
<td>Wireless and Mobile Networking</td>
</tr>
</tbody>
</table>

¹ This course is also a core course.

In addition to fulfilling the course requirements outlined above, it is a University requirement for the Master of Science degree that students fulfill a minimum of 36 units of study.

Program in Law and Graduate Studies (J.D./M.S.-ECE; J.D./Ph.D.-ECE)

Highly qualified students interested in combining the study of law with graduate qualifications in the ECE program are invited to undertake concurrent degree study under the auspices of UC Irvine’s Program in Law and Graduate Studies (PLGS). Students in this program pursue a coordinated curriculum leading to a J.D. degree from the School of Law in conjunction with a Master’s or Ph.D. degree in the ECE program. Additional information is available from the PLGS Program Director's Office, 949-824-4158, or by email to plgs@uci.edu. A full description of the program, with links to all relevant application information can be found at the School of Law Concurrent Degree Programs website (http://www.law.uci.edu/academics/interdisciplinary-studies/concurrent-degrees.html) and in the Law School section (http://catalogue.uci.edu/schooloflaw/#lawandgraduatestudiestext) of the Catalogue.