THE FIELD

Electrical and computer engineering (ECE) employs principles of physics, mathematics, and computer science to engineer solutions that profoundly impact the world. ECE is responsible for engineering and architecting the billions of transistors in today's computers; responsible for engineering the smartphone; and responsible for engineering the cellular, satellite, and computer networks that make-up the internet. The scale of ECE's impact is tremendous—from these nanometer-scaled transistors, circuits, and devices to the global reach of the internet. The future of ECE is exciting! On one hand, Moore's Law has ended, and ECE will have a major hand in engineering the next computing platform, and the excitement is the unknown. What will "it" be: a quantum computer, a brain-inspired platform, or . . .? On the other hand, ECE is right in the middle of the Internet of Things (IoT), where smart "things" (packed with electronic sensors, embedded computers, and intelligence) interact with the Cloud. This evolution will change the ways we live, travel, conduct commerce, play, and manage our health.

There is no minor available in electrical or computer engineering.

THE MAJORS

The department offers two undergraduate degree programs leading to the bachelor of science (BS), with majors in electrical engineering (EE) and in computer engineering (CompE). Detailed descriptions of both degree programs are available on the departmental website (ece.umass.edu). Both require a set of lower-division core courses and allow flexibility in the upper-division electives. All majors must also fulfill General Education and college requirements.

ADMISSION TO THE MAJORS

Applicants are required to have earned grades of C or better in each of the following seven courses: MATH 131; MATH 132; ENGIN 100, 110, 111, 112, 113, or 114; ECE 122; PHYSICS 151; CHEM 111 or PHYSICS 152; and ENGLWRIT 112. Students planning to apply for admission to EE or CompE should take ENGIN 112, MATH 131, and PHYSICS 151 in the first semester, and ECE 122, MATH 132, and PHYSICS 152 in the second semester. (ECE 124 is also recommended for the second semester, though it is not required for admission to CompE or EE.) Students must also be in good academic standing with a cumulative GPA of at least 2.00, and students must have a term GPA above 2.00 for the most recent "regular" term (fall or spring).

CURRICULUM

ECE's new and completely revised curriculum (first graduating class in May 2021) provides strong foundations in the ECE core during the first two years for both CompE and EE students, including second-year courses covering analytical and computational tools, circuits and electronics, signals and systems, probability and statistics, and embedded systems. ECE's "Computing Across the Curriculum" initiative reinforces connections between theory and practice across courses, and at improving students' skills in modern computing and problem solving. Three CompE core courses in the third year build on foundational courses to cover more advanced topics in systems software, computer architecture, and security engineering, leading to seven elective choices starting in the spring of the third year including courses in networking, algorithms, software system design, security, VLSI, embedded systems, Internet of Things and AI/ML engineering. Similarly, four EE core courses in the third year build on material from the foundational courses to cover more advanced topics in circuits and electronics, signal processing methods, fields and waves, and fundamentals of semiconductor devices, leading to six elective choices starting in the spring of the third year including courses in intermediate electronics, communication systems, AI/ML engineering, image processing, microwave engineering, analog IC design, antenna design, microelectronic fabrication, optoelectronics, bioelectronics and feedback control. Curricular flexibility allows for CompE's to take EE courses and vice versa. Both programs (EE and CompE) have a required Junior Design Project (one semester) and Senior Design Project (two semesters). ECE's makerspace (M5) provides opportunity for credit-based design projects.

COOPERATIVE EXPERIENCE

Internships in an industrial, hospital, or academic setting provide significant advantages to students in their education and in the opportunities available to them upon graduation. Students are encouraged to discuss opportunities with the college's career center as well as with their academic advisor.

HONORS

UMass Amherst honors (Commonwealth Honors College) and Departmental Honors programs provide engineering students with the opportunity to participate in an honors experience on campus, including honors courses, seminars, undergraduate research projects, and a senior research thesis. Students interested in participating in Departmental Honors and Commonwealth Honors College should contact the ECE Honors coordinator.

STUDY ABROAD

Engineering students are encouraged to consider study abroad. These can be one-semester or year-long experiences taking general education courses, engineering courses, and other technical electives to fulfill engineering degree requirements. Prior departmental approval is required for engineering and technical elective courses. For more information, contact the International Programs Office (413-545-2710, umass.edu/ipo).

CAREER OPPORTUNITIES

The ECE department's curricula prepare students for employment and/or graduate studies in a wide variety of technical fields. Both CompE and EE graduates are employed by the best-known engineering companies in New England including Amazon, Apple, BAE, Draper Labs, General Dynamics, Google, IBM, Intel, Lincoln Labs, Microsoft, MITRE, and Raytheon Technologies. CompE students are in high demand to fill software engineering jobs across the financial, health, and public sectors. ECE students pursue post-graduate studies at our nation's best institutions. The ECE Department expects its graduates to employ their education as a foundation for advanced study, career development and lifelong learning, and to pursue their professional and personal aspirations.

THE COLLEGE OF ENGINEERING

Modern society is faced with highly complex technological problems for which engineers are asked to provide solutions. These challenges make engineering a fascinating field of study and give prospective engineering students a wonderful opportunity to make a difference in society. Along with theoretical and practical knowledge, engineering students also gain experience by working in labs, collaborating with professors, joining research projects, participating in internships, working in the field, and completing a culminating senior project. In today's high-tech world, the engineering degree is a great foundation for careers in traditional engineering fields, as well as careers in management, sales, government, medicine, research, law, teaching, and more.

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