Electrical Engineering, MS, PhD

Department: Electrical and Computer Engineering Department
College: College of Engineering

Overview

About This Degree

The Electrical and Computer Engineering Department is listed in the top 100 college departments according to *U.S. News & World Report,* and it brings in approximately $2 million in research funding annually. Students graduate with nearly 100% job placement and have among the highest starting salaries of all degree programs.

Electrical engineering students have the opportunity to study in many different areas and graduates will be prepared for careers as electrical engineers in almost any kind of industry. Students have regular access to faculty for mentoring in both research pursuits and career advisement.

Students may take courses in several different areas within electrical engineering, including control systems, electromagnetic and microwaves, space systems, and signals and communication.

Concurrent Bachelor's/Master's Program:

The department also offers a concurrent bachelor's/master's program, which allows USU engineering students to begin taking graduate classes during their senior year as an undergraduate and to complete requirements for both the bachelor's degree and the master's degree concurrently over two years.

Career Options

Since nearly everyone uses electricity and electrical devices, graduates in electrical engineering can work in almost any kind of industry. Electrical engineers develop anything from rockets, cell phones, computers, antennas, signal towers, robotics, and more. The following are examples of areas in which electrical engineers can work:

- Scientific research and development firms
- Electrical component manufacturing companies
- Power generation, distribution, and transmission
- Manufacturers of navigation controls, medical equipment, and measurement devices
- Architectural firms

What it takes

Admissions Requirements

Non-electrical and computer engineering undergraduate majors may be accepted provisionally into the ECE graduate program if they meet the required qualifications set by the ECE graduate committee and complete the following pre-requisites with a B or better grade:

- ECE 3410 – Microelectronics I
- ECE 3640 – Signals and Systems
- ECE 3710 – Microcomputing Hardware and Software
- ECE 3870 – Electromagnetics I
- ECE 5530 – Digital System Design

Depending on the emphasis of the undergraduate degree, certain courses may be waived if the course or the equivalent was taken. Courses may also be waived by passing an exam at the discretion of the course instructor.

Students may take these prerequisites concurrently with graduate coursework depending on the amount of prerequisites they need. These situations are handled on a case-to-case basis.

Application Requirements

- Complete the online application
- Pay the $55 application fee
- Score at or above the 40th percentile on the GRE

- Have a 3.0 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation

International students have additional admissions requirements.

Admissions Deadlines

The department has the following application deadlines:

- Fall semester – January 1
- Spring semester – July 1

Master's Degree Plan Options

Students can receive the **MS** by pursuing one of two options:

- In the **Plan A** option, students complete graduate-level coursework and must write a thesis.
- The **Plan B** option requires the production of an engineering project report and is expected to reflect equivalent scholarship standards as a thesis.

Financial Assistance

Several different types of financial assistance are available, including fellowships and teaching and research assistantships. All funding decisions are made based on the academic credentials of the applicant. Most graduate students in the department are on some type of financial assistance. Since all students are considered for available financial assistance, no separate application is necessary.

A variety of additional funding opportunities are available, including scholarships, tuition awards, and travel support. Additionally, students may be eligible for subsidized health insurance through qualifying assistantships.

Program Requirements

Click here to see course requirements for the **Master of Science**.

Click here to see course requirements for the **Doctor of Philosophy**.

PhD Qualifying Exams:

As a requirement for the PhD, a student must pass a comprehensive examination after they have completed a minimum of 18 credits in the program. This consists of a written exam created by the student's supervisory committee based on the student's plan of study, as well as an oral examination, which is based on the plan of study with a particular emphasis on the subject of the student's research and dissertation proposal.

During the same semester as the comprehensive examination, students must pass a dissertation research proposal defense. Due at the time of the defense, the research proposal should be 15-20 pages long and include a thorough bibliography.

Contact

Advisor(s)

Mary Lee Anderson
Advisor
Office: ENLAB 149 A
Phone: (435) 797-8340
Email: marylee.anderson@usu.edu

Faculty

Doran Baker, PhD, University of Utah
Professor
Area: Electromagnetics, infrared measurements, engineering systems in space
Office: ENLAB 302
Phone: (435) 797-3666
Email: dbaker@engineering.usu.edu

Reyhan Baktur, PhD, Clemson University
Assistant Professor
Area: Electromagnetics
Office: ENLAB 150
Phone: (435) 797-2955
Email: reyhan.baktur@usu.edu

Scott Budge, PhD, Brigham Young University
Associate Professor
Area: Signal processing, image processing
Office: ENLAB 113
Phone: (435) 797-3433
Email: scott.budge@ece.usu.edu

Bedri Cetiner, PhD, Yildiz Technical University, Istanbul
Associate Professor
Area: Microwaves, electromagnetic, radio frequency microelectromechanical systems
Office: ENLAB 251
Phone: (435) 797-3320
Email: bedri.cetiner@usu.edu

Koushik Chakraborty, PhD, University of Wisconsin – Madison
Assistant Professor
Area: Computer Architecture
Office: ENLAB 255 B
Phone: (435) 797 9157
Email: koushik.chakraborty@usu.edu

YangQuan Chen, PhD, Nanyang Technical University
Associate Professor
Area: Intelligent control, automation mechatronics
Office: ENLAB 216
Phone: (435) 797-0148
Email: yangquan.chen@usu.edu

Jacob Gunther, PhD, Brigham Young University
Associate Professor
Area: Communications, signal processing
Office: ENLAB 172
Phone: (435) 797-7229
Email: jake.gunther@usu.edu

H. Scott Hinton, MS, Purdue University
Dean of College of Engineering
Area: Photonic switching
Office: ENGR 413
Phone: (435) 797-2776
Email: hinton@engineering.usu.edu

Todd Moon, PhD, University of Utah
Department Head, Professor
Area: Communications, signal processing
Office: ENLAB 149
Phone: (435) 797-2970
Email: todd.moon@usu.edu

Wei Ren, PhD, Brigham Young University
Associate Professor
Area: Controls
Office: ENLAB 222
Phone: (435) 797-2831
Email: wei.ren@usu.edu

Sanghamitra Roy, PhD, University of Wisconsin – Madison
Assistant Professor
Area: VLSI design, VLSI optimization
Office: ENLAB 255 C
Phone: (435) 797-9156
Email: sanghamitra.roy@usu.edu

Edmund Spencer, PhD, University of Texas – Austin
Assistant Professor
Area: Space science and engineering
Office: ENLAB 241 C
Phone: (435) 797-8203
Email: edmund.spencer@usu.edu

Charles Swenson, PhD, Cornell University
Professor
Area: Space science and engineering
Office: ENLAB 241 D
Phone: (435) 797-2958
Email: charles.swenson@usu.edu

Paul Wheeler, PhD, Brigham Young University
Associate Professor, Dual ME/MBA Advisor
Area: Microprocessors, telecommunications, signal processing
Office: ENLAB 148
Phone: (435) 797-2803
Email: paul.wheeler@usu.edu

Chris Winstead, PhD, University of Alberta, Canada
Associate Professor
Area: Analog VLSI
Office: ENLAB 304
Phone: (435) 797-2871
Email: chris.winstead@usu.edu

Get Involved

Professional Organizations, Honor Societies, and Clubs

Institute of Electrical and Electronics Engineers: This is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, and professional and

educational activities.

Society of Women Engineers: This is a national society whose mission is to stimulate women to achieve full potentials in careers as engineers and leaders, expand the image of the engineering profession as a positive force in improving the quality of life, and demonstrate the value of diversity. The SWE student chapter at USU has more than 40 participants (both men and women). Members not only enjoy the association with each other but also enjoy various activities and service projects designed to support female students studying engineering.

Labs, Centers, Research

AggieAir Flying Circus: AggieAir Flying Circus provides high-resolution, multispectral aerial imagery using a small, unmanned aerial system. The system is able to map small areas quicker, more frequently, at greater resolution, and at a smaller cost than conventional remote sensing. Some applications for AggieAir include monitoring of soil moisture and evapotranspiration in agriculture, riparian habitat mapping, road and highway surface monitoring, wetland mapping, and fish and wildlife tracking.

Anderson Center for Wireless Teaching and Research: This center provides state-of-the art wireless communication teaching and research with emphasis on industry-relevant design projects.

Center for Active Sensing and Imaging: CASI uses radar-like, laser-based LIDAR technology to measure distances instead of radio waves for a variety of industrial applications, including sitting wind farms, controlling emissions, and rapid replacement of bridges, runways, and other infrastructure.

Center for Atmospheric and Space Sciences: CASS is recognized nationally and internationally as a progressive research center with advanced space and upper atmospheric research programs. CASS scientists are tackling the adverse consequences of space weather. Undergraduate and graduate students are involved in numerous research projects in CASS that provide opportunities to program computers, analyze data, and build instrumentation.

Center for High Performance Computing: HPC at USU is a research service center that serves and expands the computational needs of the USU community. HPC at USU houses a 256-processor cluster called “Uinta,” with three networks.

Center for Self-Organizing and Intelligent Systems: CSOIS is a multi-disciplinary research group at USU that focuses on the design, development, and implementation of intelligent, autonomous mechatronic systems, with a focus on ground vehicles and robotics.

Center for Space Engineering: CSE is a multi-disciplinary group of faculty at USU involved in space technology, systems, and science. The center brings together academics, industry, and government to advance the understanding of the space environment and to train the next generation.

Energy Dynamics Laboratory: EDL bridges the gap between academia and industry, confronting the challenges of prototyping, deployment, and commercialization of enabling technologies for renewable and advanced energy systems. USU researchers originate projects to derive energy from non-fossil fuels, such as biofuels, wind, and solar power. With EDL’s collaboration, research develops through pilot projects to commercial application.

Energy Laboratory: This lab seeks to develop solutions to America's most intractable energy problems through scientific and technological innovation. It provides a cohesive framework permitting faculty, students, and partnering institutions to focus on contemporary energy-related research issues.

Environmental Management Research Group: EMRG is a research unit of the Utah Water Research Laboratory focused on integrated watershed management and systems analysis of environmental problems. EMRG provides software development, watershed and water quality modeling, and GIS data analysis service to internal and external entities directed at solving integrated watershed and environmental management-related problems of a variety of scales.

Institute for Intuitive Buildings: Because a considerable amount of energy is wasted in lighting, cooling, and ventilating commercial buildings, the I2B team will create real-time scene measurement and interpretation techniques for electric lighting systems.

Micron Research Center: This center was established in the fall of 2007 at Utah State University by a grant from the Micron Technology Foundation Inc. The goal of the MRC is to engage faculty and students from multiple disciplines in cutting-edge research in the area of 3D integrated circuits.

Rocky Mountain NASA Space Grant Consortium: RMNSGC is one of 52 National Space Grant Consortia in the United States. As a member of the consortium, USU has awarded more than 100 fellowships to students interested in aerospace-related education and careers. The majority of Space Grant student awards include a mentored research experience with university faculty and NASA scientists, engineers, and technologists.

Space Dynamics Laboratory: SDL is known for sending 500+ successful experiments into space and brings in $54 million per year in revenue, the majority coming from grants, contracts, and appropriations. SDL's expertise in the development of sensors and calibration, small satellites and real-time intelligence has made it an internationally known organization in the space arena.

Synthetic Biomanufacturing Center: SBC uses the chemical makeup present in single-cell organisms to transform raw materials into environmentally friendly products, such as low-cost bioplastics, biodiesel, light energy, and pharmaceuticals.

Utah Transportation Center: The UTC uses its expertise in natural hazards to research congestion chokepoints, evacuation occurrences, infrastructure renewal, and operations as it relates to multi-modal transportation.