Department of Electrical and Computer Engineering

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The department offers graduate study and research leading to the Master of Science degree in Electrical Engineering, the Master of Engineering in Electrical Engineering, and the Doctor of Philosophy degree in Electrical Engineering. Fields in which the student may specialize include communication systems, computation systems, energy and materials, Micro-Electro-Mechanical Systems (MEMS), optical systems and photonics, and sensors and systems. Information regarding active research programs is available at http://ece.montana.edu/research/ .

Admission

Admission to our graduate program requires a bachelor's degree in electrical or computer engineering or a closely related field (for example, physics, computer science, mathematics, etc.). Students with bachelor's degrees in fields other than electrical and computer engineering (ECE) complete several additional courses to gain proficiency in key undergraduate ECE areas. For complete details on the application process including deadlines, test scores, financial assistance and more, please see the department website: http://ece.montana.edu/research/applying.htm.

Degree Requirements

Students may pursue the Master of Engineering (M.Eng.) degree, Electrical Engineering option; the Master of Science (M.S.) degree in Electrical Engineering under either Plan A (thesis) or Plan B (professional paper); and the Doctor of Philosophy (Ph.D.) degree in Electrical Engineering. Please refer to the Program information tab for degree requirement details.

Research Experience

Research experience is required of all Master's of Science and Doctoral students. This requirement is met by students in the Doctoral program and the MS Plan A program through their thesis work, whereas students in the MS Plan B program must fulfill this requirement through satisfactory participation in an acceptable research or practice-oriented project approved by the student's adviser. Each student in MS Plan B must register for EELE 575 Research/Prof Paper/Project for three credits.

Research

Faculty and graduate students participate in research in many important fields, including:

- Communication Systems: wireless communication systems, ad-hoc networks, fiber optic communication components and systems, micro-machined mm-wave components, antennas, and atmospheric propagation.
- Computation Systems: biologically inspired signal processing, DSP hardware, novel computational techniques using FPGAs, micro-controllers and embedded systems, digital signal processing, optimal filtering, spectral envelope estimation, compression, audio and acoustical signal processing, acoustic animal detection and recognition and machine learning.
- Energy and Materials: fuel cells, fuel cell materials, fuel cell modeling and control; renewable resource and fuel cell distributed generation systems; fuzzy logic and neural network applications to power system control; load management; reduced-component power electronic design and motor drives.
- Micro-Electro-Mechanical Systems (MEMS): micro-machined components for millimeter-wavelength systems; MEMS tip-tilt and variable-focus mirrors and Micro-Optical-Electro-Mechanical Systems (MOEMS) components in optical imaging and spectroscopic systems; MEMS capacitive and inductive sensors.
- Optical Systems and Photonics: Micro-Optical-Electro-Mechanical Systems (MOEMS), micro-machined mirrors and applications in confocal microscopes, spectrometers, and sensors; optics of nanostructures and near-field optical interactions; optical remote sensing systems and applications; lidar development and applications to measuring atmospheric aerosols, clouds, and gases; radiometric and polarimetric imaging system development and calibration; optical sensors for detecting explosives and biological species; optical communication components, systems, and networks.
- Sensors and Systems: MEMS sensors and components; micro-machined sensors; lidars, laser sensors, radiometric and polarimetric imagers (see Optics section above); electronic sensors and systems for data acquisition and optical system control; acoustic and audio sensing of environmental noise and wildlife.

Research facilities in the department include: state-of-the-art electronics laboratories; optics laboratories with a variety of lasers, imagers, and electro-optical measurement tools; the Montana Microfabrication Facility with class 100, 1000, and 10,000 capabilities; a machine shop; a microwave and millimeter-wave electronics laboratory; a power and power electronics research laboratory, fuel cell characterization facilities; an audio and acoustics laboratory; and roof-port and roof-top facilities for optical remote sensing. Students have access to all the leading electronics, electromagnetic, and optical design and analysis software resources.

Degrees Offered

- M. Eng in, Electrical Engineering (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/meng-electrical-engineering-option/)
- M.S. in Electrical Engineering Plan A (thesis) (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/ms-electrical-engineering-plan-a/)
- M.S. in Electrical Engineering Plan B (professional paper) (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/ms-electrical-engineering-plan-b/)
- Ph.D. in Electrical Engineering (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/phd-electrical-computer-engineering-option/)
- Ph.D. in Materials Science (http://catalog.montana.edu/graduate/letters-science/chemistry-biochemistry/phd-materials-science/)

Interdisciplinary Degrees Offered

- M.S. in Optics and Photonics Plan A (thesis) (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/ms-optics-plan-a/)
- M.S. in Optics and Photonics Plan B (professional paper) (http://catalog.montana.edu/graduate/engineering/electrical-computer-engineering/ms-optics-plan-b/)

Additional information is available in the Electrical & Computer Engineering Department's Graduate Student Handbook. (http://ece.montana.edu/grad/gradbook.pdf)