

STRONG LINKS TO INDUSTRY

MORE INFORMATION

Telecommunications

Current research in the field of telecommunications is pursued in the following areas: blind source separation, channel estimation in non-stationary environment, adaptive interference cancellation in communications systems, adaptive echo cancellation, and quality of service in IP networks.

Computer engineering

The Computer Engineering Laboratory has state-of-the-art computers systems for computer architecture design, microprocessor programming, and digital system development.

Digital signal processing

Digital Signal Processing (DSP) Laboratory is under the management of Dr. Kuo and Dr. Liu. Here, the research emphasis is on real-time DSP applications, wireless communication and networking. The projects conducted in the lab include: active noise control (ANC), active vibration control (AVC) systems, biomedical signal processing, and wireless sensor networks. The lab is comprised of a diverse range of signal processing equipment, including a number of TMS320C5510 and TMS320C32x kits, spectrum analyzers, microphones, amplifiers, analog filters, and power amplifiers.

Acoustic and noise cancellation

This lab supports the theory, analysis, and design of active noise and vibration cancellation research. Projects include active noise control (ANC) for infant incubator, global ANC, snore cancellation, ANC for motorcycle helmet and so on. This lab has an anechoic chamber to support the related research projects.

Integrated Circuit Design Laboratory

Electrical Engineering Design Laboratory has computers equipped with state of the art software tools that can be used to design electrical engineering systems and circuits. The computers are also equipped with several National Instruments (NI) training equipment that helps students develop and test their own designs.

R & D Special Projects

This laboratory supports unusual circuit design requirements including specialized amplifiers, consumer electronics (model railroad electronics, high efficiency power supplies and magnetic component design).

Graduate students in the Department of Electrical Engineering have internship opportunities with industries and hospitals in the Chicagoland area, across the nation and around the world. Many of those internships lead to full-time employment with some of the nation's most respected companies. NIU graduates can be found working at the following companies:

Analog Devices	Mitsubishi
Agilent	Motorola
ComEd	National Instruments
Danfoss	Northrop Grumman
Electro-motive Diesel	Qualcomm
Hamilton Sundstrand	Tektronix
IBM	Teledyne
Ingenium	Tellabs
Intel	Texas Instruments
Lucent	Yaskawa Electric
M/A-Com	Molex
Martin Marietta	Philips
Microsoft	Woodward Governor



Operating the Pulsed Laser Deposition System

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GRADUATE STUDY
ELECTRICAL ENGINEERING

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ABOUT THE PROGRAM

The graduate program in electrical engineering in the NIU College of Engineering and Engineering Technology is designed to help students develop the latest technical skills while stimulating the creativity needed to be a leader in this constantly evolving field.

From modernizing the power grid to designing intelligent highways to pioneering medical breakthroughs, electrical engineers will play a leading role in the decades ahead, and the graduate program at NIU prepares students for all of those fields – and more.

Graduate programs in the NIU Department of Electrical Engineering include:

- **Biomedical Engineering** – Creating and improving medical imaging systems, medical implants, diagnostic instruments, etc.
- **Communications** – Designing, building and maintaining next-generation cell phones, satellite communication systems, etc.
- **Digital Signal Processing** – Cultivating skills that can be applied in fields ranging from computer science and communications to medicine and national security.
- **Control Systems** – Designing, building and maintaining the electronic control systems used in automobiles, aircraft, manufacturing, etc.
- **Electromagnetics** – Designing and building components and systems used in microwave and fiber optic communication systems, as well as radar and other applications.
- **Microelectronics** – Designing and fabricating microelectronic and nanoelectronic devices and computer chips.
- **Power Electronics** – Designing and creating electronic and control circuits for use in next-generation power supplies, motion controllers and alternative energy systems.

Application Requirements

Applicants must have an undergraduate degree in electrical engineering, physics, mathematical sciences, chemistry, computer science or another science and engineering discipline. Submissions must include GRE general scores, undergraduate transcripts, letters of recommendation and other supporting materials. For those for whom English is not a native language, TOEFL scores also are required.

Program Options

The Department of Electrical Engineering offers a thesis option for those planning to pursue a work at the doctoral level and a non-thesis option designed primarily for practicing professionals who wish to pursue advanced study.



Design and Testing of a New Medical Diagnostic System, a Ballistocardiogram

RESEARCH OPPORTUNITIES

Graduate students have the opportunity to conduct advanced research with an adviser and to oversee and assist undergraduate assistants with research.

Research Labs

The Department of Electrical Engineering boasts an array of state-of-the-art laboratories, including one of the largest Class 100-1000 clean rooms in the state of Illinois (6,000 square feet). The facility allows students to produce micro and nanoelectric devices and circuits. Other laboratories include facilities devoted to the following areas:

Power electronics

The Power Electronics Laboratory has ongoing activities related to the efficient conversion of power. Recent projects include fluorescent lamp dimming ballast, vehicle power system converters, and a wind turbine controller.

Control and robotics

This lab supports teaching and research activities in intelligent control, robotics, digital control, neural networks, fuzzy systems and digital image processing. This laboratory supports research on digital control, intelligent control and image processing in robotics, industrial automation, manufacturing and other related systems.

Very Large Scale Level (VLSL) circuit design

Integrated Circuit Design Laboratory is an undergraduate/graduate laboratory that serves students in the Department of Electrical Engineering for their coursework as well as their research. In general, the lab is equipped for two categories of activities: VLSI designs and FPGA related digital designs. In the first category, students develop circuits for both analog and digital designs. Design tools and simulators such as SPICE, Modelsim, and so on, are available to students. They can also use circuit layout tools such as Mentor Graphics and Lasi for their IC design projects. In the FPGA related digital designs, a variety of development boards and tools are available. Also design and development tools such as Xilinx ISE package and ModelSim are installed on all computers in the lab and also in the college computer lab. To facilitate unrestricted student access to the lab from a distance, a Remote Laboratory Access (RLA) was developed for the lab, which has been in

operation for the last two years. The RLA allows students, as well as instructors teaching digital designs, to remotely access the lab and do all experiments on the FPGA development boards and receive the results. The system uses Internet access and a server-client protocol to perform. IC Design Lab serves courses in Integrated Circuit Engineering ELE435/535, Analog VLSI Engineering ELE436/536, Advance Integrated Circuit Engineering ELE630, Design with Field Programmable Logic Devices, and Embedded Designs using FPGA Technology ELE498/598B.

Biomedical engineering

The Biomedical Engineering Lab supports teaching and research in Biomedical Engineering. The laboratory is equipped to design and test medical systems and devices using state-of-the-art equipment:

- *CleveMed telemetry devices*: for a variety of medical applications.
- *Electrocardiography*: Atria 3100 Electrocardiogram (ECG)
- *Ultrasound Imaging*: GE ultrasound system.
- *Fourier Transform Infrared Spectroscopy*: Perkin-Elmer FTIR spectrometer
- *Ultraviolet/Visible Spectroscopy*: Perkin-Elmer UV/VIS spectrometer
- *Biomedical Virtual Instruments*: National Instruments Electronic boards (ELVIS) for design and building medical devices.
- *Electroencephalography*: EEG system for brain scanning.

Microwave antenna design

Our UHF Ferrite Tiled Anechoic Chamber is optimized for the frequency band of 350 MHz. Complete antenna characterization is possible including pattern and impedance determination. Scaling allows antenna fabrication up through microwave frequencies. The Microwaves Laboratory includes state-of-the-art measurement equipment such as Vector network analyzers, signal analyzers, oscilloscopes, and function generators that can be used in microwaves and RF circuit design. The lab has also microwave circuit education kits and antenna radiation measurement setup that enhances learning via hands-on applications.