ELECTRICAL AND COMPUTER ENGINEERING

Undergraduate Program Information

Overview

The undergraduate electrical engineering program of the Klipsch School is accredited by the Engineering Accreditation Commission of ABET, Inc., and stresses the development of analytical tools and physical concepts required to prepare students for immediate employment or graduate study. The program is flexible, allowing students to choose elective coursework towards concentrations in:

- artificial intelligence, machine learning, and data science,
- communications and signal processing,
- computers and microelectronics,
- controls and robotics,
- electromagnetics and photonics, or
- power,
- space systems.

Alternatively, students can select "no concentration" for the greatest flexibility in course selection.

Undergraduate Electrical Engineering Program Educational Objectives

The Klipsch School is dedicated to providing a quality, hands-on, educational experience for our students. Below are the program educational objectives (PEOs) that describe the expected accomplishments of graduates during their first few years after graduation.

1. Our graduates will obtain relevant, productive employment in the private sector, government and/or pursue an advanced degree.
2. Our graduates will be using their engineering foundation to innovate solutions to the problems of the real world.

Related Areas of Study

Electrical and computer engineering students wishing to broaden their educational experience may elect to earn additional bachelor's degrees in

- Engineering Physics
- Computer Science
- Mathematics
- Physics

Klipsch School students may also choose to earn a minor in one or more of the following fields:

- Computer Engineering
- Computer Science
- Mathematics
- Physics

Students must consult with an academic advisor in the offering department for specific requirements related to additional degrees and minors.

Transfer Credit

Credit earned at other institutions is generally accepted; however the following restrictions apply to transfer credits:

- Engineering credit must be earned at an ABET accredited school.
- Physics must be calculus based.
- If the NMSU requirement includes a lab, the transfer credit must include a lab.
- A grade of C-, or better, must have been earned.
- E E Courses numbered 300 or higher, Cornerstone and Capstone courses may not be transferred.
- Transfer credits for courses above 300 level are NOT ACCEPTED.

Master's Accelerated (BS/MS) Program (MAP)

Undergraduate students may apply for acceptance to the Master's Accelerated Program (MAP) after completing 60 semester hours of undergraduate coursework of which a minimum of 25 credit hours must be completed at NMSU. The GPA must be 2.75 or above for admission to the MAP program. The students must meet all other requirements as specified by the BSEE and MSEE programs. The MAP program allows up to 12 credits of NMSU coursework (450 level or higher) taken during the undergraduate years to be counted toward the master's program of study. Students must receive a grade of B or higher in the courses to be counted for the graduate degree. The courses must logically fit into the master's program. EE courses that are approved for the MAP are those EE electives with a corresponding graduate version:

Prefix	Title	Credits
E E 502	Electricity Markets	3
E E 506	Quantum Computing	3
E E 510	Introduction to Analog and Digital VLSI	3
E E 512	ASIC Design	3
E E 521	Microwave Engineering	3
E E 523	Analog VLSI Design	3
E E 528	Fundamentals of Photonics	4
E E 537	Power Electronics	3
E E 540	Photovoltaic Devices and Systems	3
E E 541	Antennas and Radiation	4
E E 542	Power Systems II	3
E E 543	Power Systems III	3
E E 548	Introduction to Radar	3
E E 549	Smart Antennas	3
E E 551	Control Systems Synthesis	3
E E 556	Hardware & Software Codesign	3
E E 558	Hardware Security and Trust	3
E E 562	Computer Systems Architecture	3
E E 565	Machine Learning I	3
E E 567	ARM SOC Design	3
E E 573	Signal Compression	3
E E 576	Geometric Algebra	3
E E 581	Digital Communication Systems I	3
E E 588	Advanced Image Processing	3
E E 593	Mobile Application Development	3
E E 596	Digital Image Processing	3
E E 597	Neural Signal Processing	3

For the most up to date listing of elective courses, please see the course listing in the most recent catalog. More information and the application

for the MAP program can be found at: https://honors.nmsu.edu/for-students/masters-accelerated-program-map.html.

Graduate Program Information

Overview

The Klipsch School of Electrical and Computer Engineering offers graduate work leading to the Master of Science and Doctor of Philosophy degrees. Areas of emphasis for masters and doctoral students are:

- communications,
- computer engineering,
- controls,
- digital signal processing,
- electromagnetics,
- electric energy systems,
- photonics, and
- microelectronics/VLSI.

Research in the above areas currently being conducted by the faculty ensures that doctoral candidates will work on the frontier of knowledge in these areas. The graduate programs are intended to provide broad graduate-level training in electrical engineering. In addition, appropriate courses in computer science, industrial engineering, mathematics, physics, business management, and other areas may be integrated into a graduate student's program of study (see the list of permitted course prefixes in program description for EE graduate degrees).

Students desiring to work toward an advanced degree in electrical engineering must have completed undergraduate preparation substantially equivalent to that required for the Bachelor of Science in Electrical Engineering degree at this institution. For students with undergraduate degrees in other disciplines, see below. For further information on the Klipsch School of Electrical and Computer Engineering, please consult the web page http://www.ece.nmsu.edu/ (http://ece.nmsu.edu).

Faculty Research Interests

- **Communications**: Wireless and Digital Communications, Optical Communications, Error Control Coding, Data Compression, Information Theory, Physical Layer Security, Localization and Navigation.
- **Computer Architecture, Performance, And Security**: Performance Modeling and Simulation, Micro-Architecture Power Optimization, Performance Analysis and Optimization Of Large-Scale Scientific Applications, Heterogeneous HPC Computing for Field-Deployable Systems, Hardware Security and Trust, Hardware Software Co-Design, Embedded System Security, Machine Learning and Artificial Intelligence Security.
- **Digital Signal Processing**: Processing and Analysis Of EEG Signals, Time-Frequency Analysis, and Speech Processing.
- **Electromagnetics**: Propagation Through Dispersive Media (Soil, Seawater, Foliage, Biological Tissues), UWB and Synthetic Aperture Radar Systems, Antennas, Digital Beamforming, Microwave Engineering, Electromagnetic Interference and Compatibility, and Nondestructive Evaluation.
- **Electric Energy Systems**: Renewable Energy Integration, Protection, Advanced Control and Optimization, and Customer Driven Microgrids, Public Utilities Regulation and Management.
- **Machine Learning**: Image Processing and Application Of Machine Learning and Deep Learning To Image Analysis, Focusing on Astronomy And Biomedical Image Analysis, Health Care, and Defense.
- **Microelectronics And VLSI**: Micro Integrated Circuits, Sensors, Wireless Communication With IOT Devices, Signal Processing, Robotics, Analog and Mixed-Signal VLSI Design, Integrated Power Management Circuits, and Micro-Controller Sensor Systems.
- **Photonics**: Optical Wave Propagation through Atmospheric Turbulence, Free Space Optical Communications, Optical Remote Sensing involving Spectral and Polarization Sensing Techniques, and Astronomical Instrumentation Development.
- **Space Systems**: Research in Space Weather, High-Energy Astrophysics, Autonomous Proximity Operations, and Docking Of Small Satellites.

Support for Graduate Students

A number of teaching assistantships, research assistantships and fellowships are available. Teaching assistants are recommended by individual faculty for selection by the ECE Department's Graduate Studies Committee. International students must pass university screening prior to being eligible for selection as a TA. Nominations for new TAs are made by the advisor after a student is admitted. Research assistants are hired directly by the faculty member who has received a contract or grant for research.

The College of Engineering awards graduate scholarships and fellowships on behalf of Electrical and Computer Engineering. These include:

- the MIT/Lincoln Laboratory Fellowship,
- the Paul and Valerie Klipsch Grad Scholarship,
- the Admiral Paul Arthur Grad Scholarship, and
- the Barry Neil Rappaport Grad Scholarship.

Applications can be completed on-line at https://scholarships.nmsu.edu/. The priority deadline for the Scholar Dollar$ is March 1st. The Electrical Utility Management Program has a limited number of fellowships for students interested in pursuing master's degrees in electrical energy systems.

Admission

Prospective graduate students for the Master of Science or Doctor of Philosophy in Electrical Engineering must first meet the entrance requirements of the Graduate School. The prospective US graduate student should make formal application to the Graduate Student Services office (http://gradschool.nmsu.edu (http://gradschool.nmsu.edu/)). International graduate students must start with the Admissions Office (https://isss.nmsu.edu/#admissions). Official transcripts from all undergraduate and graduate institutions must be sent directly to the Graduate School. International students must also submit their TOEFL (Test of English as a Foreign Language) scores. If the applicant meets the Graduate School's minimum requirements, the application is sent to the Klipsch School's Graduate Studies Committee for review. U.S. residents are given every chance of being successful in the pursuit of a graduate degree. If they do not meet the requirements of the Klipsch School, they can enter the Graduate School as "undeclared" where they must demonstrate competence in two or more graduate-level E E courses before they re-apply.

Requirements for Students Without BSEE Degree or Equivalent

Students without a BSEE degree or equivalent preparation will be expected to take classes covering the core knowledge required in our

BSEE program. This includes mathematics through differential equations and basic engineering physics. The student's graduate advisor will prepare an individualized deficiency schedule, based on the student's academic background and work experience.

The following courses from our undergraduate program will be considered deficiencies for students without a BSEE

Prefix	Title	Credits
ENGR 120	DC Circuit Analysis	4
ENGR 130	Digital Logic	4
ENGR 140	Introduction to Programming and Embedded Systems	4
ENGR 230	AC Circuit Analysis	4
E E 200	Linear Algebra, Probability and Statistics Applications	4
E E 240	Multivariate and Vector Calculus Applications	3
E E 317	Semiconductor Devices and Electronics I	4
E E 320	Signals and Systems I	3
E E 325	Signals and Systems II	4
E E 340	Fields and Waves	4
E E 362	Introduction to Computer Organization	4