Courses of Instruction

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Course and Subject Guide

The "Course and Subject Guide," found in the Courses of Instruction section of this book, serves as a table of contents and provides quick access to subject areas and prefixes.

Department of Electrical Engineering

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Introduction

The Department of Electrical Engineering at the University of North Texas commits to achieving excellence in research and graduate education in major electrical engineering areas. Our primary goals include: (1) to provide high quality innovative educational programs at the undergraduate and graduate levels to foster learning, ethical standards, and leadership qualities; (2) to pursue excellence in research at the frontiers of electrical engineering; (3) to facilitate access to our faculty expertise and our modern facilities, and (4) to serve the industry, the profession, and other constituents in North Texas, the state and the nation.

Research Laboratories

The Department of Electrical Engineering has state-of-the-art instructional and research laboratories and software to provide practical and advanced hands-on experiences. Some laboratories and instrumentation from other departments are also available for interdisciplinary work.

The **Analog, RF and Mixed-Signal Design Laboratory** supports teaching, research and development of RF, microwave systems and antenna designs. Researchers in this laboratory design, fabricate and test new RF/microwave/millimeter-wave circuits both in the board level and the chip level. Researchers also design new antennas for different applications. All activities are supported by facilities for simulations, prototyping and measurement of RF/microwave components and systems.

The **Autonomous Systems Laboratory** focuses on information assurance, decision making and video communications aspects in autonomous systems, such as unattended aerial vehicles (UAVs). The laboratory consists of infrastructure and simulation tools necessary to develop protocols for autonomous systems and to analyze their performance. The laboratory has several indoor and outdoor robots that are used to develop and test decentralized decision-making and task-scheduling algorithms. The laboratory's infrastructure includes a wireless video sensor network platform suitable for simulating applications such as video surveillance.

The **Communications and Signal Processing Laboratory (CSPL)** focuses on design and development of advanced communication techniques to provide efficient and robust information transmission over wired and wireless networks. Working in concert with academia and industry partners, CSPL is dedicated to research in coding, information theory, encryption, wireless networking and software defined radio.

The **Computer-Aided Design (CAD) Laboratory** supports teaching and research activities related to analog, digital, mixed signal, VLSI/SoC design, test and test verification. Resources include Cadence, Xilinx, LabVIEW, MATLAB, Advanced Design Systems, and Mentor Graphics.

Research in the **Speech, Music and Digital Signal Processing Laboratory** involves the study of different acoustic aspects, including speech (production, perception, transmission, analysis and synthesis, recognition, and speaker identification), ultrasound, hearing prosthetics, music (analysis, synthesis and transcription), and management of acoustic signals with applications of digital signal processing methods and devices. Researchers are interested in human–computer verbal dialog interfaces and in the influence of auditory perception on emotions. The laboratory is equipped with a large acoustic booth, audio analyzers, and modern hardware and software.

The main goal of the **Vision, Robotics and Control Systems Laboratory** is to support research in the areas of pattern recognition, image processing, computer vision, computational intelligence, robotics and allied areas. The laboratory consists of infrastructure and simulation tools for computer vision and pattern recognition applications and control systems design.

The **Wireless Systems and Sensor Networks Research Laboratory** focuses on system-level issues that are critical for the design of high-performance wireless networks and intelligent sensor networks. Current research topics include energy efficient networking protocols for distributed sensor networks, experimental and theoretical study of wireless system performance, statistical and real-time signal processing, measurement and modeling of wireless channels, optimum network deployment and connectivity, and development of sensor networks for environmental monitoring applications.

Degree Program

The department offers a graduate program leading to the following degree:

- Master of Science with a major in electrical engineering.

Master of Science

Program Objectives

1. Graduates will achieve master's-level proficiency in electrical engineering subjects that include digital and analog circuit design, adaptive and statistical signal processing, coding theory, control system design, and computer vision and image analysis.
2. Graduates will attain a broad background in electrical engineering that provides them with a number of choices for future specialization, if needed.
3. Graduates will attain proficiency in both oral and written communication that is needed for achieving success in their future careers.
4. Graduates will learn how to learn and thereby attain the ability to pursue life-long learning and continued professional development.
5. Graduates will have experience in project-based learning and hence will be ready to engage in high-tech careers upon their graduation.

Admission Requirements

The student must satisfy all the general admission requirements of the Toulouse School of Graduate Studies as well as the admission requirements of the electrical engineering department as follows:

1. Competitive score on the Graduate Record Examination (GRE); or graduation from the UNT undergraduate electrical engineering program or a related program at UNT with an overall GPA of 3.0 or better within three years of earning the bachelor's degree.
2. Acceptable scores on the TOEFL for applicants whose native language is not English.
3. A GPA of at least 3.0 on undergraduate electrical engineering course work.
4. Course work in mathematics.

An overall evaluation of credentials is used as a basis for admission to the program. Leveling courses will be required for applicants with degrees other than electrical engineering.

Admission to Candidacy

After removal of all deficiencies and upon completion of all the leveling courses described below, the student is required to submit a formal degree plan to his or her advisor and the dean of the School of Graduate Studies. Failure to fulfill these requirements may prevent a student from enrolling the following term/semester. Admission to candidacy is granted by the Dean of Graduate Studies after the degree plan has been approved.

Leveling Courses

- Mathematics through multivariable calculus
- Physics including mechanics, electricity and magnetism
- EENG 2620, Signals and Systems
- EENG 2710, Digital Logic Design
- EENG 3520, Electronics II
- EENG 3710, Computer Organization
- EENG 3810, Communications Systems

All entering students must demonstrate knowledge of the material covered in the leveling courses by:

- completing the courses at UNT,
- completing similar courses at another recognized institution, or
- evidence based on employment experience.

A student may be required to pass a placement examination to fulfill this requirement.

Degree Requirements

Option A: Thesis option with 24 semester hours of organized course work excluding undergraduate prerequisites and leveling courses, in addition to 6 hours of EENG 5950, Master's Thesis.

Option B: Non-Thesis option with 30 semester hours of organized course work and 3 semester hours of EENG 5890, Directed Study.

Course Selection

- Three core courses with a grade of B or better.
- At least 18 (thesis option) or 21 (non-thesis option) semester hours of graduate electrical engineering courses, excluding the following: EENG 5890, EENG 5900, and EENG 5950.
- No more than 6 semester hours of EENG 5890, or EENG 5900 may apply to the degree program.
- Leveling courses: A student whose undergraduate major is not electrical engineering must take additional leveling courses determined by the electrical engineering graduate advisor on an individual basis.

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