

# Department of Electrical Engineering

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## Murali Varanasi, Chair

*Graduate Faculty:* Deng, Fu, Garcia, Guturu, Li, Varanasi.

## 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

Research areas within the department include the following.

**RF and Sensors:** Research in this area focuses on the general topics related to advanced RF sensing systems over a wide range of frequencies. The RF sensing systems include radio-frequency identification (RFID) systems, RADAR, remote sensing, medical imaging, underground penetrating and wireless-sensing networking systems.

**Computer-Aided Design (CAD) and VLSI:** The research interests in this area focus on innovative algorithms for VLSI testing, low-power VLSI design, innovative ASIC and computer architecture, nano-scale logic device modeling, design and simulation, VLSI interconnect modeling and simulation, and VLSI physical design.

**Intelligent Signal Processing:** Research in this area focuses on the design and development of advanced signal processing algorithms and systems for industrial, space electronic systems and defense

technology. The specific research areas include signal detection and estimation, space-time signal processing, signal design and diversity for sensor systems, information fusion from various sensor sources, infrared and microwave imaging, robust signal processing, pattern recognition, and target identification.

**Wireless Communications:** The research in this area focuses on system-level issues that are critical for the design of high-performance wireless networks and sensor networks. The research topics include measurement and modeling of wireless channels, experimental and theoretical system performance evaluation, channel coding and modulation, integrated communications and positioning, integrated communications and positioning, real-time signal processing, coding, and information theory.

**Computer Vision and Image Processing:** Research in this area includes object recognition and tracking, dynamic scene analysis pattern recognition, multi-sensor multi-view data fusion, statistical regularization methods for ill-posed problems in vision, and medical imaging.

### Other research areas in the department include:

These include channel modeling and measurement, innovative wireless imaging systems, analog and mixed-signal IC design, semiconductor device modeling and design, wireless sensor network design, sensor and sensor interface design, bioinformatics, artificial intelligence, speech-driven animation, and cognitively based learning-to-learn education.

## 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 integrated circuit design, analog 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. Acceptable score on the Graduate Record Examination (GRE).
2. Acceptable scores on the TOEFL for applicants whose native language is not English.
3. Acceptable GPA 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 (as described below), the student is required to submit a formal degree plan to his or her adviser 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 3810, Communications Systems

All entering students must demonstrate knowledge of the material covered in these courses. An entering student may demonstrate the knowledge by:

- Completing the courses at UNT
- Completing similar courses at another recognized institution
- Evidence based on employment experience.

A student may be required to pass a placement examination to demonstrate his or her knowledge.

### 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

- At least 12 hours of graduate electrical engineering courses.
- No more than 6 semester hours of special problems or directed study courses.
- Leveling courses: Students whose undergraduate majors were not electrical engineering must take additional leveling courses that will be determined by the electrical engineering graduate adviser on an individual basis.

### Courses of Instruction

All Courses of Instruction are located in one section at the back of this catalog.

### 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.

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## Department of Engineering Technology

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The department serves two basic roles. In the broader sense, it provides exposure to technology for general understanding and interpretation of industry founded in theory and practice. In a more practical sense, the department provides technology-based education that results in professional careers in industry. Career opportunities for graduates are in industry/business.