

# Department of Electrical Engineering

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**Murali Varanasi, Chair**

## Faculty

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## Introduction

The Department of Electrical Engineering at the University of North Texas provides an innovative program in electrical engineering, combining cognitive skills, industry-university joint projects and business skills with courses that form the foundation of electrical engineering discipline. Combining theory and practice, the curriculum is designed to serve the citizens and industries in Texas, particularly the North Texas region, and the nation.

The department is housed in a new facility designed to promote intellectual and scholarly endeavors of faculty and students. The department currently offers a Bachelor of Science degree and a Master of Science degree. There are currently 10 faculty members, and the department is actively recruiting several additional outstanding faculty. Research interests of the faculty include digital signal processing, radar and image processing, pattern recognition and wireless sensor networks.

The department received support from the National Science Foundation to offer an “Innovative Design- and Project-Oriented Electrical Engineering Program” under the Department-Level Reform initiative.

## Mission

Consistent with the mission of the College of Engineering, the Department of Electrical Engineering is committed to innovation and excellence in teaching, research and service. The mission of the department is to:

- provide high quality innovative educational programs at the undergraduate and graduate levels;
  - prepare graduates for the high technology field by promoting lifelong learning, ethical standards and leadership qualities;
  - pursue excellence in scholarly research at the frontiers of electrical engineering; and
  - commit our faculty expertise and our modern facilities to the service of the industry, the profession, and other constituents in North Texas, the state and the nation.
- Our strategy to introduce innovations in undergraduate education is based on the following major features:
- partnership between industry and the university,
  - focus on active learning and “learning to learn,” and
  - emphasis on teams and laboratory activities applied to real-world problems and introduction of business practices and concepts at the undergraduate and graduate levels.

## Program Educational Objectives

1. Graduates will be productive in the professional practice of electrical engineering and related fields. They will obtain employment appropriate to their background, interests and education and will advance in their careers.
2. Graduates will engage in life-long learning demonstrated by advanced education/degrees, professional development activities, and/or other career appropriate options.
3. Graduates employed within engineering fields will demonstrate technical competence in identifying, formulating, analyzing, and creating engineering solutions.

Our innovative bachelor’s program is designed to satisfy the ABET criteria for accreditation of engineering programs.

## Program Outcomes

Upon completion of the Bachelor of Science with a major in electrical engineering, students are enabled to achieve the following outcomes:

1. Apply knowledge of mathematics, engineering and science.
2. Design and conduct experiments to verify and validate the design projects they develop and analyze and interpret data.
3. Develop project-based learning skills through design and implementation of a system, component or process that meets the needs within realistic constraints.
4. Function in multi-disciplinary teams.
5. Identify, formulate and solve engineering problems.

6. Have an understanding of professional and ethical responsibility.
7. Communicate effectively.
8. Achieve broad education necessary to understand the impact of electrical engineering solutions in a global and societal context.
9. Understand learning processes and concepts of learning to learn, and engage in lifelong learning.
10. Achieve knowledge of contemporary issues.
11. Use techniques, skills and computer-based tools for conducting experiments and carrying out designs.
12. Develop an appreciation for principles of business practices and entrepreneurship.

We ensure that our undergraduate courses satisfy one or more of the above outcomes in addition to enriching our students' educational experience at UNT.

In order to accomplish the objectives in pursuing excellence in scholarly and applied research, the faculty of the department is committed to:

- establishing high standards for research and scholarship,
- fostering excellence and diversity in research,
- creating an inspiring academic environment for the students through integration of research and education, and
- serving the society and the profession through technological advances in basic and applied research.

## Programs of Study

The department currently offers undergraduate and graduate programs in the following area:

- Bachelor of Science, and
- Master of Science, both with a major in electrical engineering.

## Bachelor of Science with a Major in Electrical Engineering

The Bachelor of Science degree with a major in electrical engineering is an innovative undergraduate program designed to combine the best practices in electrical engineering education. This design- and project-oriented program integrates concepts, analysis, design and development of state-of-the-art electrical and electronic systems. Through course work, students have "learning-to-learn" experiences and projects that are taught by industry and university personnel. This active learning experience emphasizes knowledge and skills so that students can solve real-world electrical engineering problems. The one-year sequence of business and marketing courses encourages students to develop a global markets outlook.

The courses in the program are designed to cover both the breadth and depth of electrical engineering. The breadth of the curriculum is provided through course work in circuits, signals and systems, logic design, electromagnetics, electronics, communications, and analog and digital design projects. The depth of the curriculum is provided through courses in electronics, computer organization, computer networks, VLSI design, and advanced elective courses. Project courses in digital signal processing and communication system design provide additional depth. The design projects are integrated into the course work so that students can learn to solve practical engineering problems in a creative and relevant setting. In addition, project courses ensure that students have an opportunity to solve multidisciplinary engineering problems by working in teams and to develop effective oral and written communication skills.

The program also puts a strong emphasis on studies in art, business, management, humanities, physics and chemistry, social sciences, professionalism and engineering ethics, which fulfill objectives appropriate to the electrical engineering profession.

The bachelor of science degree with a major in electrical engineering is designed to meet ABET criteria.

## Degree Requirements

1. **Hours Required and General/College Requirements:** A minimum of 128 semester hours, of which 42 must be advanced courses, and fulfillment of degree requirements for the Bachelor of Science degree as specified in the "General University Requirements" in the Academics section of this catalog and the College of Engineering requirements.

2. **Major Requirements:** A minimum of 36 semester hours, including EENG 2610, EENG 2620, EENG 2710, EENG 3410, EENG 3510, EENG 3520, EENG 3710, EENG 3810, EENG 4710, EENG 4810 and two elective courses offered as EENG 4010 and completion of 18 semester hours of project courses, EENG 1910, EENG 1920, EENG 2910, EENG 2920, EENG 3910, EENG 3920, EENG 4910 and EENG 4990.

3. **Other Required Courses:**

- a. MATH 1710, MATH 1720, MATH 2700, MATH 2730, MATH 3310 and MATH 3680.
- b. CHEM 1410/CHEM 1430, PHYS 1710/PHYS 1730, PHYS 2220/PHYS 2240.
- c. CSCE 1020.
- d. MGMT 3830, MGMT 3850.

4. **Minor:** Optional.

5. **Electives:** See four-year plan.

6. **Other Requirements:** A grade point average of at least 2.5 is required for all electrical engineering courses.

### **BS with a Major in Electrical Engineering**

*Following is one suggested four-year degree plan. Students are encouraged to see their advisor each semester for help with program decisions and enrollment. Students are responsible for meeting all course prerequisites.*

#### **FRESHMAN YEAR**

<b>FALL</b>	<b>HOURS</b>
CHEM 1410, General Chemistry for Science Majors	3
CHEM 1430, General Chemistry Laboratory	1
CSCE 1020, Program Development	4
EENG 1910, Project I: Learning to Learn	2
ENGL 1310, College Writing I or ENGL 1313, Computer Assisted College Writing I*	3
MATH 1710, Calculus I	<u>4</u>
Total	17

<b>SPRING</b>	<b>HOURS</b>
EENG 1920, Project II: Introduction to Electrical Engineering	2
EENG 2710, Digital Logic Design	3
TECM 2700, Technical Writing**	3
MATH 1720, Calculus II	3
MGMT 3830, Operations Management	3
PHYS 1710, Mechanics	3
PHYS 1730, Laboratory in Mechanics	<u>1</u>
Total	18

#### **SOPHOMORE YEAR**

<b>FALL</b>	<b>HOURS</b>
EENG 2610, Circuit Analysis	3
EENG 2910, Project III: Digital System Design	2
HIST 2610, United States History to 1865*	3
MATH 3310, Differential Equations for Engineering Majors	3
PHYS 2220, Electricity and Magnetism	3
PHYS 2240, Laboratory in Wave Motion, Electricity, Magnetism and Optics	<u>1</u>
Total	15

<b>SPRING</b>	<b>HOURS</b>
EENG 2620, Signals and Systems	3
EENG 2920, Project IV: Analog Circuit Design	2
HIST 2620, United States History Since 1865*	3
MATH 3680, Applied Statistics	3
MGMT 3850, Entrepreneurship	3
PSCI 1040, American Government I*	<u>3</u>
Total	17

#### **JUNIOR YEAR**

<b>FALL</b>	<b>HOURS</b>
EENG 3410, Engineering Electromagnetics	3
EENG 3510, Electronics I	3
EENG 3910, Project V: DSP System Design	2
ENGR 2060, Professional Presentations (may be used to satisfy a portion of the Understanding the Human Community requirement*)	3
MATH 2700, Linear Algebra and Vector Geometry	3
PSCI 1050, American Government II*	<u>3</u>
Total	17

<b>SPRING</b>	<b>HOURS</b>
EENG 3520, Electronics II (Circuits and Applications)	3
EENG 3710, Computer Organization	3
EENG 3810, Communication Systems	3
EENG 3920, Project VI: Modern Communication System Design	2
MATH 2730, Multivariable Calculus	<u>3</u>
Total	14

#### **SENIOR YEAR**

<b>FALL</b>	<b>HOURS</b>
EENG 4010, Topics in Electrical Engineering	3
EENG 4710, VLSI Design	3
EENG 4910, Project VII: Senior Design I Understanding the Human Community*	3
Visual and Performing Arts*	<u>3</u>
Total	15

<b>SPRING</b>	<b>HOURS</b>
EENG 4010, Topics in Electrical Engineering	3
EENG 4810, Computer Networks	3
EENG 4990, Project VIII: Senior Design II Humanities*	3
Social and Behavioral Sciences*	<u>3</u>
Total	15

*\*See the University Core Curriculum section of this catalog for approved list of course options.*

*\*\* See College of Engineering degree requirements section of this catalog for approved list of course options.*

*Actual degree plans may vary depending on availability of courses in a given semester.*

*Some courses may require prerequisites not listed.*

## Dual Degree Program

### Bachelor of Science with a Major in Electrical Engineering and Bachelor of Science with a Major in Mathematics

The dual degree program in mathematics and engineering combines the strengths of Texas Woman's University (TWU) and University of North Texas to permit students to earn two degrees simultaneously while preparing for a professional career in engineering.

Undergraduate students attend TWU for three years as mathematics majors in the Department of Mathematics and Computer Science, then continue their education in the College of Engineering at UNT for approximately two additional years. After completion of the program, students receive the Bachelor of Science degree with a major in mathematics from TWU and the Bachelor of Science degree with a major in electrical engineering from UNT.

The following outline of courses is designed to satisfy the requirements of the TWU undergraduate core curriculum and of a Bachelor of Science degree in mathematics. Additional courses will be required by UNT. For the TWU degree, a total of at least 124 hours is required, including 36 advanced hours. Certain course work completed at UNT will be taken in transfer to complete the TWU degree. Interested students should consult the current undergraduate catalog for details regarding the TWU Undergraduate Core Curriculum. The minor suggested in the mathematics degree at TWU is computer science. However, the engineering major selected at UNT may serve as the minor for the TWU degree. If the degree in engineering at UNT is not completed, the student may complete the TWU degree in mathematics with appropriate additional work.

Scholarships and/or summer employment are available for the academically able student. Through TWU's Cooperative Education program, students may earn academic credit and income while gaining on-the-job experience related to engineering.

A 2.5 grade point average (GPA) is the minimum criterion for transfer admission consideration into most UNT engineering programs after completion of the first three years of work at TWU. Those applicants who have completed all foundation courses for engineering (see UNT catalog), have a 2.5 GPA in the foundation course work and a 2.5 GPA in all transferable work, will be admitted upon application to UNT. No grade lower than C is accepted in any mathematics or computer science courses at TWU. While a 2.0 GPA is the UNT requirement for admission after completion of 60 semester credit hours

at TWU, a 2.5 is required for admission into UNT College of Engineering degree programs. Students may apply for concurrent enrollment at UNT prior to completion of their work at TWU by using the appropriate application and following the admissions procedure listed in the UNT catalog.

#### Suggested Courses

The courses listed below will be accepted by the College of Engineering at University of North Texas for those students who successfully transfer from Texas Woman's University into Electrical Engineering within the College of Engineering, provided the student has duly received credit for the courses at TWU. The student should work closely with academic advisors at TWU and UNT to assure that he or she has satisfied core curriculum at both universities.

At TWU, students take a broad range of courses in mathematics, computer science, humanities, and social and natural sciences, as well as the basic introductory courses needed to enter studies in engineering.

#### BS with a Major in Electrical Engineering/ BS with a Major in Mathematics

*Following is one suggested five-year degree plan. Students are encouraged to see their advisor each semester for help with program decisions and enrollment. Students are responsible for meeting all course prerequisites.*

<b>FIRST YEAR (TWU)*</b>		
<b>FALL</b>		<b>HOURS</b>
Total		17
<b>SPRING</b>		<b>HOURS</b>
Total		18
<b>SECOND YEAR (TWU)*</b>		
<b>FALL</b>		<b>HOURS</b>
Total		15
<b>SPRING</b>		<b>HOURS</b>
Total		19
<b>THIRD YEAR (TWU)*</b>		
<b>FALL</b>		<b>HOURS</b>
Total		18
<b>SPRING</b>		<b>HOURS</b>
Total		18
<b>FOURTH YEAR (UNT)</b>		
<b>FALL</b>		<b>HOURS</b>
EENG 1910, Project I – Learning to Learn		2
EENG 2610, Circuit Analysis		3
EENG 2910, Project III - Digital System Design		2
TECM 2700, Technical Writing		3
MGMT 3830, Operations Management		<u>3</u>
Total		13

SPRING	HOURS
EENG 1920, Project II – Introduction to Electrical Engineering	2
EENG 2620, Signals and Systems	3
EENG 2920, Project IV - Analog Circuit Design	2
EENG 3410, Engineering Electromagnetics	3
EENG 3510, Electronics I	<u>3</u>
Total	13
SUMMER	HOURS
EENG 3910, Project V - DSP System Design	2
ENGR 2060, Professional Presentations	<u>3</u>
Total	5
FIFTH YEAR (UNT)	
FALL	HOURS
EENG 3520, Electronics II	3
EENG 3710, Computer Organization	3
EENG 3810, Communication Systems	3
EENG 3920, Project VI - Modern Communication System Design	2
MGMT 3850, Entrepreneurship	<u>3</u>
Total	14
SPRING	HOURS
EENG 4010, Topics in Electrical Engineering	3
EENG 4010, Topics in Electrical Engineering	3
EENG 4710, VLSI Design	3
EENG 4810, Computer Networks	3
EENG 4910, Project VII - Senior Design I	<u>3</u>
Total	15
SUMMER	HOURS
EENG 4990, Project VIII - Senior Design II	<u>3</u>
Total	3

*\*See the Texas Woman's University catalog for degree requirements for the Bachelor of Science with a major in mathematics.*

*Actual degree plans may vary depending on availability of courses in a given semester.*

*Some courses may require prerequisites not listed.*

## Graduate Degrees

The Department of Electrical Engineering offers a degree program leading to the Master of Science. For information, consult the *Graduate Catalog*.

## 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.

# Department of Engineering Technology

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**Nourredine Boubekri, Chair**

## Faculty

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## Introduction

Engineering technology is the profession in which a knowledge of mathematics and natural sciences gained by higher education, experience and practice is devoted primarily to the implementation and extension of existing technology for the benefit of humanity (Engineering Technology Council, 1994). Increasing technological aspects of all modern activities have led to the need for highly skilled persons to design, construct, install, maintain, manage, operate, produce and sell sophisticated technical systems and products.

Departmental programs emphasize integrated design and the application of theoretical concepts. Classes of carefully coordinated laboratory experiences and lectures are utilized. Courses emphasize theoretical concepts and principles for solutions applicable to modern technological problems. Students are prepared for rapidly changing life experiences with mathematics, science and general education. This preparation is designed to enable graduates to remain current, as well as advance, in their professional field.

## Vision

The Department of Engineering Technology is committed to leadership — in education and research — in contemporary and innovative engineering and technology areas, locally, nationally and internationally.