



The University of Texas at Dallas Online Catalog

2006-2008 Undergraduate Catalog

[Introduction \(home\)](#)
[Contents / Site Map](#)
[Admissions](#)
[Academic Policies and Procedures](#)
[Registration](#)
[Resources for Study and Campus Life](#)
[Tuition and Fees](#)
[Financial Aid](#)
[Degree Programs](#)
[Undergraduate Programs](#)
[Course Descriptions](#)
[Academic Calendar](#)
[Administration](#)
[Board of Regents](#)
[Faculty](#)
[Correspondence Directory](#)
[Appendices](#)
[Alphabetical Index](#)
[Search the 2006-2008 UG catalog:](#)

[UTD Home Page](#)
[Online Catalogs Index](#)
[Graduate Catalog](#)

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Electrical Engineering (B.S.E.E. and B.S.T.E.)

Faculty

Professors: Larry P. Ammann, Poras T. Balsara, Andrew Blanchard, Cyrus D. Cantrell III, David E. Daniel, John P. Fonseka, William R. Frensley, Andrea F. Fumagelli, Bruce Gnade, John H. L. Hansen, C. R. Helms, Louis R. Hunt, Nasser Kehtarnavaz, Kamran Kiasaleh, Gil Lee, Philippos C. Loizou, Duncan L. MacFarlane, Raimund J. Ober, Lawrence J. Overzet, William Pervin, Carl Sechen, Don W. Shaw (Emeritus), Lakshman S. Tamil, T. R. Viswanathan, Robert M. Wallace, Dian Zhou

Associate Professors: Naofal Al-Dhahir, Dinesh Bhatia, Gerald O. Burnham, Dale M. Byrne, Matthew Goeckner, Jiyoung Kim, Jeong-Bong Lee, Jin Liu, Aria Nosratinia, Mehrdad Nourani, Murat Torlak

Assistant Professors: Walter Hu, Hoi Lee, Hlaing Minn, Issa Panahi, Rama Sangireddy, Mohammad Saquib

Senior Lecturers: Charles Bernardin, William Boyd, Andrew Cilia, Nathan Dodge, Ed Esposito, Muhammad Kalam, Ricardo Saad, P.K. Rajasekaran, Marco Tacca

The Electrical Engineering Department offers two engineering programs: Electrical Engineering and Telecommunications Engineering. The Electrical Engineering program offers students an opportunity to acquire a solid foundation in the broad areas of electrical engineering and emphasizes advanced study in digital systems, telecommunications, and microelectronics.

The Electrical Engineering program offers students a solid educational foundation in the areas of electrical networks, electronics, electromagnetics, computers, digital systems, and communications and is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Mastery of these areas provides students with the ability to adapt and maintain leadership roles in their post-baccalaureate pursuits through the application of fundamental principles to a rapidly changing and growing discipline.

Students in the Electrical Engineering program take either the general program or specialize in microelectronics or telecommunications, and can take advanced courses in computer hardware and software; the analysis and design of analog and digital communication systems; analog and digital signal processing; the analysis, design, and fabrication of microelectronic components and systems; and guided and unguided wave propagation. A broad choice of electives (within and external to electrical engineering) allows students to broaden their education as well as develop expertise in areas of particular interest. In keeping with the role of a professional, students are expected to develop communication skills and an awareness of the relationship between technology and society.

The Telecommunications Engineering program is interdisciplinary. Telecommunications Engineering requires a blend of knowledge from the areas of Electrical Engineering, Computer Science, and Economics/Policy.

The Electrical and Telecommunications Engineering programs are based on a solid foundation of science and mathematics coursework. Students in these programs are given an opportunity to learn to extend their abilities to analyze and solve complex problems and to design new uses of technology to serve today's society. The engineering programs provide an integrated educational experience directed toward the development of the ability to apply pertinent knowledge to the identification and solution of practical problems in electrical and telecommunications engineering. These programs ensure that the design experience, which includes both analytical and experimental studies, is integrated throughout the curriculum in a sequential development leading to advanced work. Design problems are frequently assigned in both lecture and laboratory courses. Each student is required to complete a major design project during the senior year. In addition, established cooperative education programs with area industry further supplement design experiences.

Mission of the Electrical Engineering Program

The focus of the Electrical Engineering degree is to provide excellent education in modern electrical engineering practice. Our graduates are uniquely qualified for rewarding and successful careers in materials, devices, circuits, digital systems, signal processing, and communications. In the spring of 2005 the EE faculty adapted a new set of Program Educational objectives which refined the prior objectives and established measurements and benchmarks to monitor progress. The ECS Office of Assessment developed a new Alumni Survey instrument to measure progress toward these objectives and conducted a preliminary survey to collect data. The results of this survey should be available in the fall of 2005. The Electrical Engineering faculty will set the thresholds for performance based

ENGINEERING AND COMPUTER SCIENCE

[General Information](#)
[Computer Science](#)
[Electrical Engineering](#)
[Software Engineering](#)
[Telecommunications Engineering](#)

on this survey in the fall of 2005.

Specific Program Educational Objectives

One broad goal for the Erik Jonsson School is an excellent education for our students. Our earlier Program Educational Objectives (PEOs) toward this goal are:

- Preparation for a successful, long-lived, engineering career
- Perform, review and assess sophisticated engineering design and manufacturing
- Further the necessities of innovation, functionality, safety, and economy in engineering
- Critical thinking, decision making and communicating
- Ability to contribute and to lead engineering teams
- Place engineering design and decision making in a market and societal context.

Additional Program Educational Objective for a high quality educational infrastructure include:

- Growing and maintaining an outstanding faculty that remains motivated and empowers
- Excellent facilities, including teaching laboratories, computing facilities and classrooms with advanced presentation capabilities.

Our most recent set of Program Educational Objectives and the measurement associated with each is listed below:

- **A successful long-lived engineering career.** *Measurement:* The percentage of our graduates still working as engineers five (5) years after graduation.
- **Meeting the needs of local industry.** *Measurement:* The percentage of our graduates receiving job offers from the top twenty (20) local engineering firms.
- **Leading engineering teams.** *Measurement:* The percentage of our graduates lead engineering design team supervising two or more engineers in a designing effort within five (5) years after graduation.
- **Actively use engineering skills to mentor and promote the engineering profession in populations still underrepresented in it.** *Measurement:* The percentage of our graduates involved in such activities within five (5) years after graduation.
- **Actively pursuing life-long learning.** *Measurement:* The percentage of our graduates either attending graduate school or taking additional college level course work to enhance their skills five (5) years after graduation.

High School Preparation

Engineering education requires a strong high school preparation. Pre-engineering students should have high school preparation of at least one-half year in trigonometry and at least one year each in elementary algebra, intermediate and advanced algebra, plane geometry, chemistry, and physics, thus developing their competencies to the highest possible levels and preparing to move immediately into demanding college courses in calculus, calculus-based physics, and chemistry for science majors. It is also essential that pre-engineering students have the competence to read rapidly and with comprehension, and to write clearly and correctly.

Lower-Division Study

All lower-division students in either Electrical Engineering or Telecommunications Engineering concentrate on mathematics, science and introductory engineering courses, building competence in these cornerstone areas for future application in upper-division engineering courses. The following requirements apply both to students seeking to transfer to U.T. Dallas from other institutions as well as to those currently enrolled at U.T. Dallas, whether in another school or in the Erik Jonsson School of Engineering and Computer Science.

ABET Requirements

All engineering degree plans must satisfy the requirements specified by the Accreditation Board for Engineering and Technology (ABET). The course work must include at least:

1. One year (32 SCH) of an appropriate combination of mathematics and basic sciences;
2. One-half year (16 SCH) of humanities and social sciences;
3. One and one-half years (48 SCH) of engineering topics.

Although the electrical engineering and telecommunications engineering curricula that follow have been designed to meet these criteria, students have the responsibility, in consultation with an advisor, to monitor their own choice of courses carefully to be certain that all academic requirements for graduation are being satisfied. Students are strongly encouraged to take courses in such subjects as accounting, industrial management, finance, personnel administration, and engineering economy.

Bachelor of Science in Electrical Engineering Degree Requirements (128 hours)

I. Core Curriculum Requirements¹: 42 hours

- A. Communication (6 hours)
 - 3 hours Communication (RHET 1302)
 - 3 hours Professional and Technical Communication (ECS 3390)⁵
- B. Social and Behavioral Sciences (15 hours)
 - 6 hours Government (GOVT 2301 and 2302)
 - 6 hours American History
 - 3 hours Social and Behavioral Science elective (ISSS 3360)
- C. Humanities and Fine Arts (6 hours)
 - 3 hours Fine Arts (ARTS 1301)
 - 3 hours Humanities (HUMA 1301)
- D. Mathematics and Quantitative Reasoning (6 hours)
 - 6 hours Calculus (MATH 2417 and 2419)²
- E. Science (9 hours)
 - 8 hours Physics (PHYS 2325, 2125, 2326 and 2126)
 - 4 hours Chemistry (CHEM 1311 and 1111)³

¹ Curriculum Requirements can be fulfilled by other approved courses from accredited institutions of higher education. The courses listed in parentheses are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at U.T. Dallas.

II. Major Requirements: 74 hours⁴

Major Preparatory Courses (20 hours beyond Core Curriculum)

- CHEM 1111 General Chemistry Laboratory I^{3,4}
- CHEM 1311 General Chemistry I^{3,4}
- CS 1337 Computer Science I
- EE 1102 Introduction to Experimental Techniques
- EE 2110 Introduction to Digital Systems Laboratory
- EE 2300 Applied Linear Algebra for Engineers
- EE 2310 Introduction to Digital Systems
- MATH 2417 Calculus I²
- MATH 2419 Calculus II²
- MATH 2420 Differential Equations with Applications
- PHYS 2125 Physics Laboratory I
- PHYS 2126 Physics Laboratory II
- PHYS 2325 Mechanics
- PHYS 2326 Electromagnetism and Waves

Major Core Courses (45 hours beyond Core Curriculum)

- ECS 3390 Professional and Technical Communication⁵
- EE/TE 3101 Electrical Network Analysis Laboratory
- EE/TE 3102 Signals and Systems Laboratory
- EE 3110 Electronic Devices Laboratory
- EE 3111 Electronic Circuits Laboratory
- EE 3120 Digital Circuits Laboratory
- EE 3150 Communications Systems Laboratory
- EE 3300 Advanced Engineering Mathematics
- EE/TE 3301 Electrical Network Analysis
- EE/TE 3302 Signals and Systems
- EE 3310 Electronic Devices
- EE 3311 Electronic Circuits
- EE 3320 Digital Circuits
- EE/TE 3341 Probability Theory and Statistics
- EE 3350 Communications Systems
- EE 4301 Electromagnetic Engineering I
- EE 4310 Systems and Controls
- EE 4368 RF Circuit Design Principles
- EE 438X Senior Design Project I
- EE 438X Senior Design Project II

ISSS 3360 Politics, Values-Business and Technology⁶

Major Guided Electives (9 hours)

Students pursuing the general program take 9 semester hours from either list below.

Students pursuing a concentration in Microelectronics take 3 of the following courses:

- EE 4302 Electromagnetic Engineering II
- EE 4304 Computer Architecture
- EE 4325 Introduction to VLSI Design
- EE 4330 Integrated Circuit Technology

EE 4340 Analog Integrated Circuit Analysis and Design
 EE 4341 Digital Integrated Circuit Analysis and Design
 EE/TE 4382 Individually Supervised Senior Design Project I
 (Microelectronics)
 EE 4391 Technology of Plasma Class and Laboratory
 Students pursuing a concentration in Telecommunications take 3
 of the following courses:
 EE 4360 Digital Communications
 EE 4361 Introduction to Digital Signal Processing
 EE/TE 4365 Introduction to Wireless Communication
 EE/TE 4367 Telecommunications Switching and Transmission
 EE 4390 Introduction to Telecommunication Networks
 EE 4392 Introduction to Optical Systems

² Six hours of Calculus are counted under Mathematics Core, and two hours of Calculus are counted as Major Preparatory Courses.

³ One hour of Chemistry is counted under Science core, and three hours are counted as Major Preparatory Courses.

⁴ Students must pass each of the EE, CS, Math and Science courses listed in this degree plan and each of their prerequisites, with a grade of C- or better.

⁵ Hours fulfill the communication component of the Core Curriculum

⁶ Hours contribute to the Social and Behavioral Sciences component of the Core Curriculum

III. Elective Requirements: 12 hours

Advanced Electives (6 hours)

All students are required to take at least six hours of advanced electives outside their major

field of study. These must be either upper-division classes or lower-division classes that have prerequisites.

Free Electives (6 hours)

Both lower- and upper-division courses may count as free electives but students must

complete at least 51 hours of upper-division credit to qualify for graduation. Not all courses

offered by the University can be used as a free elective. Please consult with your advisor.

Fast Track Baccalaureate/Master's Degrees

In response to the need for advanced education in electrical engineering, a Fast Track program is available to exceptionally well-qualified U.T. Dallas undergraduate students who meet the requirements for admission to the graduate school. The Fast Track program is designed to accelerate a student's education so that both a B.S.E.E. and an M.S.E.E. degree can be earned in five years of full-time study. This is accomplished by (1) taking courses (typically electives) during one or more summer semesters, and (2) beginning graduate course work during the senior year. Details of the requirements for admission to this program are available from the Associate Dean.

Minors

The Department of Electrical Engineering does not offer minors at this time.



Statement on Equal Educational Opportunity

The University of Texas at Dallas is committed to an educational and working environment that provides equal opportunity to all members of the University community. In accordance with federal and state law, the University prohibits unlawful discrimination on the basis of race, color, religion, national origin, gender, age, disability, and veteran status. Discrimination on the basis of sexual orientation is also prohibited pursuant to University policy.

