Erik Jonsson School of Engineering and Computer Science

Department of Electrical Engineering

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

Faculty


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**Research Professors:** Walter Duncan, Sam Schichijo

**Research Assistant Professor:** Wooil Kim

**Senior Lecturers:** Charles P. Bernardin, Nathan B. Dodge, Edward J. Esposito, Jung Lee, Randall E. Lehmann, P. K. Rajasekaran, Ricardo Saad, Marco Tacca

**Affiliated Faculty:** Larry P. Ammann (Math Sciences), Leonidas Bleris (Bioengineering), Yves J. Chabal (Materials Science and Engineering), Matthew Goeckner (Math Sciences), Bruce E. Gnade (Materials Science and Engineering), Jiyoung Kim (Materials Science and Engineering), Moon J. Kim (Materials Science and Engineering), Yang Liu (Computer Science), Mario A. Rotea (Mechanical Engineering), Mathukumalli Vidyasagar (Bioengineering), Robert M. Wallace (Materials Science and Engineering), Stephen Yurkovich (Systems Engineering)

The Electrical Engineering Department offers a bachelor’s degree in Electrical 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, digital signal processing, communications, analog systems, RF/microwave, 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 a broad general program in electrical engineering and can then 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 Electrical Engineering program is based on a solid foundation of science and mathematics coursework. Students in this program are given an opportunity to learn and extend their abilities to analyze and solve complex problems and to design new uses of technology to serve today's society. The engineering programs at UT Dallas 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 other related engineering fields. 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 serve to 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 adopted a new set of Program Educational Objectives that refined the prior objectives and established measurements and benchmarks to monitor progress. A feedback mechanism using Alumni Surveys (by the ECS Office of Assessment) and other tools are used to measure progress toward these objectives.

**Program Educational Objectives for Electrical Engineering**

One broad goal for the Erik Jonsson School is an excellent education for our students.

Within a few years of graduation, graduates of the Electrical Engineering program should:

- Have a successful, long-lived engineering based career path
Meet the needs of industry
Contribute to, and/or lead engineering based teams
Actively pursue continuing (lifelong) learning

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 Electrical 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 UT Dallas from other institutions as well as to those currently enrolled at UT Dallas, whether in another school or in the Erik Jonsson School of Engineering and Computer Science.

ABET Accreditation
The B.S. program in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Academic Progress in Electrical Engineering
In order to make satisfactory academic progress as an Electrical Engineering major, a student must meet all University requirements for academic progress, and must earn a grade of C- or better in each of the major core courses. No “Major Requirement” course (as listed under Section II of the B.S.E.E. degree requirement) may be taken until the student has obtained a grade of C- or better in each of the prerequisites (if a higher grade requirement is stated for a specific class, the higher requirement applies).

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

I. Core Curriculum Requirements\(^1\): 42 hours
Communication (6 hours)
  3 hours Communication (RHET 1302)
  3 hours Professional and Technical Communication (ECS 3390)

Social and Behavioral Sciences (15 hours)
  6 hours Government (GOVT 2301 and GOVT 2302)
  6 hours American History
  3 hours Social and Behavioral Science elective (ECS 3361)

Humanities and Fine Arts (6 hours)
  3 hours Fine Arts (ARTS 1301)
  3 hours Humanities (HUMA 1301)

Mathematics and Quantitative Reasoning (6 hours)
  6 hours Calculus (MATH 2417 and MATH 2419)

Science (9 hours)
  8 hours Physics (PHYS 2325, PHYS 2125, PHYS 2326 and PHYS 2126)
  4 hours Chemistry (CHEM 1311 and CHEM 1111)

II. Major Requirements: 76 hours

Major Preparatory Courses (22 hours beyond Core Curriculum)
  CHEM 1111 General Chemistry Laboratory
  CHEM 1311 General Chemistry
  CS 1325 Introduction to Programming
  ECS 1200 Introduction to Engineering and Computer Science
  EE 1202 Introduction to Electrical Engineering
  ENGR 2300 Linear Algebra for Engineers
  EE 2310 Introduction to Digital Systems
  MATH 2417 Calculus
  MATH 2419 Calculus II
  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 3361  Social Issues and Ethics in Computer Science and Engineering\(^7\)
ECS 3390  Professional and Technical Communication\(^2\)
EE 3101  Electrical Network Analysis Laboratory
EE 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
ENGR 3300  Advanced Engineering Mathematics
EE 3301  Electrical Network Analysis
EE 3302  Signals and Systems
EE 3310  Electronic Devices
EE 3311  Electronic Circuits
EE 3320  Digital Circuits
ENGR 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 4388  Senior Design Project I
EE 4389  Senior Design Project II

Major Guided Electives (9 hours)

Students pursuing the general program take 9 semester hours from any other 4000 level Electrical Engineering courses. 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 4391 Technology of Plasma

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

EE 4360 Digital Communications
EE 4361 Introduction to Digital Signal Processing
EE 4365 Introduction to Wireless Communication
EE 4367 Telecommunications Networks
EE 4390 Computer Networks
EE 4392 Introduction to Optical Systems

III. Elective Requirements: 10 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. Four of these hours may be satisfied with MATH 2420 counted under Major Preparatory courses.

Free Electives (8 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.

Degree programs in the Erik Jonsson School of Engineering and Computer Science are governed by various accreditation boards that place restrictions on classes used to meet the curricular requirements of degrees they certify. For this reason, not all classes offered by the University can be used to meet elective requirements. Please check with your academic advisor before enrolling in classes you hope to use as free electives.

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 UT 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 for Undergraduate Education.

Honors Program

The Department of Electrical Engineering offers upper-division Honors for outstanding students in the B.S. Electrical Engineering degree program. This program offers special sections of designated classes and other activities designed to enhance the educational experience of exceptional students. Admission to the Honors programs requires a 3.500 or better GPA in at least 30 hours of coursework. Graduation with Honors requires a 3.500 or better GPA and completion of at least 6 honors classes. These honors classes must include either Senior Honors in Electrical Engineering (EE 4399) or Undergraduate Research in Electrical Engineering (EE 4V98) and a Senior Honors Thesis must be completed within one of those two classes. (While the topics may be related, the Senior Thesis does not replace the need for the student to complete a regular Senior Design Project). The other 5 honors classes can come from a mixture of Graduate level (up to a count of 4) classes and special honor sections of regular undergraduate EE classes (up to a count of 2). Current undergraduate honors courses include but are not limited to EE 2310(H), EE 3350(H), EE 4302, EE 4399, and EE 4V98. Course grades in the 6 honors classes used to determine Honors status must be B- or higher to qualify.

Departmental Honors with Distinction may be awarded to students whose Senior Honors Thesis is judged by a faculty committee to be of exemplary quality. Only students graduating with Departmental Honors are eligible. Thesis/projects must be submitted by the deadline that applies to M.S. Theses in the graduating semester to allow for proper evaluation. Students interested in Honors with Distinction are encouraged to start working on their thesis/project a year prior to graduation.

Minors

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

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 UT Dallas.

2. Hours fulfill the communication component of the Core Curriculum.

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

4. One hour of Chemistry is counted under Science core, and three hours are counted as Major Preparatory Courses.
5. 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.

6. Transfer students with sufficient background may petition to substitute upper level hours in the major for this class.

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

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