Erik Jonsson School of Engineering and Computer Science

Department of Electrical Engineering

Electrical Engineering (BSEE)

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.
Faculty


Professors Emeritus: Louis R. Hunt, William J. Pervin, Don Shaw

Associate Professors: Gerald O. Burnham, Yun Chiu, Rashaunda Henderson, Wenchuang (Walter) Hu, Roozbeh Jafari, Hoi Lee, Dongsheng Brian Ma, Issa M. S. Panahi, Siavash Pourkamali

Assistant Professors: Bilal Akin, Taylor Barton, Carlos A. Busso-Recabarren, Joseph Callenes-Sloan, Nicholas Gans, Myoungsoo Jung

Research Professors: Walter Duncan, Andrew Marshall, Hisashi (Sam) Shichijo

Research Assistant Professors: Hynek Boril, Abhijeet Sangwan

Senior Lecturers: Charles (Pete) Bernardin, Peter A. Blakey, Paul Deignan, Nathan B. Dodge, James Florence, Jung Lee, Randall E. Lehmann, P. K. Rajasekaran, Ricardo E. Saad, William (Bill) Swartz, Marco Tacca

UT Dallas Affiliated Faculty: Larry P. Ammann, Leonidas Bleris, Yves J. Chabal, Bruce E. Gnade, Matthew J. Goeckner, Robert D. Gregg, Jiyoung Kim, Moon J. Kim, David J. Lary, Yang Liu, Robert L. Rennaker II, Mario A. Rotea, Mathukumalli Vidyasagar, Robert M. Wallace, Chadwin D. Young, Steve Yurkovich

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 BS 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 requirements" courses. No "Major Requirements" course (as listed under Section II of the BSEE 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 semester credit hours]\(^1\)

I. Core Curriculum Requirements: 42 semester credit hours\(^2\)
Communication: 6 semester credit hours

  RHET 1302 Rhetoric
  ECS 3390 Professional and Technical Communication

Mathematics: 3 semester credit hours

  MATH 2417 Calculus I

Life and Physical Sciences: 6 semester credit hours

  PHYS 2325 Mechanics
  PHYS 2326 Electromagnetism and Waves

Language, Philosophy and Culture: 3 semester credit hours

  Select any 3 semester credit hours from Language, Philosophy and Culture core courses (see advisor)

Creative Arts: 3 semester credit hours

  Select any 3 semester credit hours from Creative Arts core courses (see advisor)

American History: 6 semester credit hours

  Select any 6 semester credit hours from American History core courses (see advisor)

Government / Political Science: 6 semester credit hours

  GOVT 2305 American National Government
  GOVT 2306 State and Local Government

Social and Behavioral Sciences: 3 semester credit hours

  ECS 3361 Social Issues and Ethics in Computer Science and Engineering

Component Area Option: 6 semester credit hours

  MATH 2417 Calculus I
  MATH 2419 Calculus II
  PHYS 2125 Physics Laboratory

II. Major Requirements: 76 semester credit hours
Major Preparatory Courses: 22 semester credit hours beyond Core Curriculum

**CHEM 1111** General Chemistry Laboratory I
**CHEM 1311** General Chemistry I
**CS 1325** Introduction to Programming
**ECS 1200** Introduction to Engineering and Computer Science\(^8\)
**EE 1202** Introduction to Electrical Engineering\(^8\)
**ENGR 2300** Linear Algebra for Engineers
**EE 2310** Introduction to Digital Systems
**MATH 2417** Calculus I\(^4\)
**MATH 2419** Calculus II\(^4\)
**MATH 2420** Differential Equations with Applications
**PHYS 2125** Physics Laboratory I\(^9\)
**PHYS 2126** Physics Laboratory II
**PHYS 2325** Mechanics\(^9\)
**PHYS 2326** Electromagnetism and Waves\(^9\)

Major Core Courses: 45 semester credit hours beyond Core Curriculum

**ECS 3361** Social Issues and Ethics in Computer Science and Engineering\(^6\)
**ECS 3390** Professional and Technical Communication\(^3\)
**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 semester credit hours
Students pursuing the general program take 9 semester credit hours from any other 4000 level or higher organized 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 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 semester credit hours

Free Electives: 10 semester credit hours
Both lower- and upper-division courses may count as free electives but students must complete at least 51 semester credit hours of upper-division courses 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 well-qualified UT Dallas undergraduate students. The Fast Track program is designed to accelerate a student's education so that both a BSEE and an MSEE 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 coursework during the senior year. Details 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 BS 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 (grade point average) in at least 30 semester credit 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 MS 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. Incoming freshmen must complete and pass UNIV 1010 Freshman Seminar and the corresponding school-related freshman seminar course. Erik Jonsson School of Engineering and Computer Science majors must enroll and receive
credit for ECS 1200 which will satisfy the UNIV 1010 graduation requirement. Students, including transfer students, who complete their core curriculum at UT Dallas must take UNIV 2020.

2. Curriculum Requirements can be fulfilled by other approved courses. The courses listed are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

3. Semester credit hours fulfill the communication component of the Core Curriculum.

4. Three semester credit hours of Calculus are counted under Mathematics Core, and five semester credit hours of Calculus are counted as Component Area Option Core.

5. Six semester credit hours of Physics (PHYS 2325 and PHYS 2326) are counted under Science Core and one hour (PHYS 2125) is counted under the Component Area Option Core.

6. Semester credit hours contribute to the Social and Behavioral Sciences component of the Core Curriculum.

7. 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.

8. Transfer students with sufficient background may petition to substitute upper-division semester credit hours in the major for this class.

9. Six hours of Physics (PHYS 2325 and PHYS 2326) are counted under Science Core and one hour (PHYS 2125) is counted under the Component Area Option Core.

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