Erik Jonsson School of Engineering and Computer Science

Named in honor of one of the three founders of Texas Instruments, Inc. and of The University of Texas at Dallas, the Erik Jonsson School of Engineering and Computer Science provides undergraduate degree preparation for professional practice as an engineer or computer scientist. Particular emphasis is placed on developing strong analytical and problem solving abilities as a foundation for graduate study in these fields.

The school's curricula emphasize electronic information processing devices and technologies that are involved with the acquisition, interpretation, transmission, and utilization of information. The school offers four degree programs: Computer Science, Electrical Engineering, Telecommunications Engineering and Software Engineering. The Computer Science program emphasizes the design and analysis of efficient parallel and sequential algorithms with applications in VLSI layout and routing, distributed networks and operating systems, image processing, computational geometry, automation and robotics. The Software Engineering program concentrates on all aspects of software development including requirements engineering, software architecture and design, program testing, validation, and quality assurance. 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 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 Engineering, Telecommunications Engineering, Software Engineering and Computer Science 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 is developed and integrated throughout the curriculum in a sequential development leading to advanced work and includes both analytical and experimental studies. Established cooperative education programs with area industry further supplement design experiences.

The University of Texas at Dallas is located at the heart of a high concentration of companies that specialize in the areas of microelectronics, telecommunications, signal processing and optics. The Erik Jonsson School of Engineering and Computer Science maintains close relationships with these companies and has established cooperative programs through which students can obtain industrial experience to complement their classroom instruction. Details of specific cooperative programs between Computer Science and Engineering students and local companies are available in the respective program offices.

Industrial Practice Programs

The Industrial Practice Programs (IP Programs or IPP) of the Erik Jonsson School of Engineering and Computer Science include the school's Cooperative Education, Internship, and Curricular Practical Training Programs. These programs combine classroom learning with paid work experience. Qualified students are referred to participating employers seeking candidates for career-related, pre-professional work assignments. The programs enhance a student's education and career preparation by integrating classroom theory with on-the-job performance, providing an understanding of work environments and professional requirements, testing career and professional goals, developing confidence, maturity and skills in human relations, and establishing contacts and interests.

Students are expected to register with and follow the rules of the IP Programs when working in any position titled by the employer as an Internship or a Cooperative Education assignment. Also, the Jonsson School offers one credit hour ECSC courses that may fill UTD free elective requirements and provide students the opportunity to evaluate their work experience.

For more information about the IP programs, call (972)883-4363. The IP Programs Office is located in ECS South 2.502.

Computer Science (B.S.) and Software Engineering (B.S.S.E)

Faculty

Professors: Farokh Bastani, Ramaswamy Chandrasekaran, Ding-Zhu Du, András Faragó, Gopal Gupta, Dung T. Huynh, Dan Moldovan, Simeon C. Ntafos, Balaji Raghavachari, Hsing-Mean (Edwin) Sha, Ivan H. Sudborough, Bhavani Thuraisingham, Klaus Truemper (Emeritus), Kang Zang, Si-Qing Zheng

Associate Professors: Sergey Bereg, Lawrence Chung, Jorge A. Cobb, Galigekere R. Dattatreya, Sanda Harabagiu, Vasileios Hatzivassiloglou, Jason Jue, Rym Mili, Ivor P. Page, B. Prabhakaran, Ravi Prakash, Haim Schweitzer, S. Venkatesan, Yuke Wang, W. Eric Wong, I-Ling Yen

Assistant Professors: Joao Cangussu, Kendra M.L. Cooper, Ovidiu Daescu, Jing Dong, Murat Kantarcioglu, Latifur Khan, Yang Liu, Ying Liu, Neeraj Mittal, Vincent Ng, Kamil Sarac, Weili Wu

Senior Lecturers: Tim Farage, Herman Harrison, Sam Karrah, Lawrence King, Rafael Lacambra, Greg Osbirn, David Russo, Martha Sanchez, Cort Steinhorst, Anthony Sullivan, Laurie Thompson, Nancy Van Ness

The Computer Science Department offers the B.S. degree in Computer Science and the B.S. degree in Software Engineering. Both are based on a solid foundation of mathematics, including calculus, linear algebra, and discrete mathematics. These programs of study are designed to offer students opportunities to prepare for an industrial, business, or governmental career in a rapidly changing profession and to prepare for graduate study in a field in which further education is strongly recommended. The two programs have the same basis in core computer science, including the analysis of algorithms and data structures, modern programming methodologies, and the study of operating systems. The Computer Science program continues with courses in advanced data structures, programming languages, telecommunications networks, and automata theory, while the Software Engineering program include courses in requirements engineering, software validation and testing, and software architecture, culminating in a challenging project course in which students must demonstrate use of software engineering techniques. Both programs offer a rich choice of elective studies, including courses in artificial intelligence, computer graphics, databases, and compiler design.

The school offers a "fast track" B.S. / M.S. option; see Fast Track Baccalaureate/Master's Degree Program.

Mission of the Department of Computer Science

The mission of the Department of Computer Science is to prepare undergraduate and graduate students for productive careers in industry, academia, and government by providing an outstanding environment for teaching, learning, and research in the theory and applications of computing. The Department places high priority on establishing and maintaining innovative research programs to enhance its education quality and make it an important regional, national, and international resource center for discovering, integrating, and applying new knowledge and technologies.

Goals for the Computer Science Program

The undergraduate Computer Science program is committed to provide students with a high-quality education and prepare them for long and successful careers in industry and government.

Our graduates, while eminently ready for immediate employment, will also be fully ready for focused training as required for specific positions in Computer Science and closely related areas. Graduates interested in highly technical careers, research, and/or academia will be fully prepared to further their education in graduate school.

Educational Objectives for the Computer Science Program

On completion of the BS program, students will:

1. have a comprehensive general education background;
2. have solid knowledge in fundamental areas of Computer Science;
3. have the ability to apply their knowledge to the solution of practical and useful problems;
4. have the ability to communicate effectively and work collaboratively;
5. be able to become successful professionals and, if they desire, be able to pursue graduate study;
6. recognize the need for lifelong learning and have the knowledge and skills that prepare them to adapt to rapid technological changes; and
7. understand the ethical, societal, and global issues associated with the computing field.

Bachelor of Science in Computer Science
Degree Requirements (125 hours)

I. Core Curriculum Requirements[1]: 42 hours

A. Communication (6 hours)
- 3 hours Communication (RHET 1302)
- 3 hours Professional and Technical Communication (ECS 3390)[2]

B. Social and Behavioral Sciences (15 hours)
- 6 hours Government (GOVT 2301 and 2302)
- 6 hours American History
- 3 hours Social and Behavioral Science (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)[3]

E. Science (9 hours)
- 6 hours Lecture courses (PHYS 2325 and 2326)[4]
- 2 hours Laboratory courses (PHYS 2125 and 2126)[4]
- 4 hours Science Elective[4]

[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: 62 hours

Major Preparatory Courses (22 hours beyond Core Curriculum)
- CS 1337 Computer Science I
- CS 2110 Introduction to Digital Systems Laboratory
- CS 2305 Discrete Mathematics for Computing I
- CS 2310 Introduction to Digital Systems
- CS 2336 Computer Science II
- MATH 2417 Calculus I[3]
- MATH 2418 Linear Algebra
- MATH 2419 Calculus II[3]
- PHYS 2125 Physics Laboratory I[4]
- PHYS 2126 Physics Laboratory II[4]
- PHYS 2325 Mechanics[4]
- PHYS 2326 Electromagnetism and Waves[4]
- 4 hours Science Elective[4]

Major Core Courses (31 hours beyond Core Curriculum)
- CS 3305 Discrete Mathematics for Computing II
- CS/SE 3341 Probability and Statistics in Computer Science and Software Engineering
- CS/SE 3345 Data Structures and Introduction to Algorithmic Analysis
- CS/SE 3354 Software Engineering
- CS 4337 Organization of Programming Languages
- CS/SE 4340 Computer Architecture
- CS/SE 4348 Operating Systems Concepts
- CS 4349 Advanced Algorithm Design and Analysis
- CS 4384 Automata Theory
- CS 4485 Computer Science Project
- ECS 3390 Professional and Technical Communication[2]
- ISSS 3360 Politics and Values in Business and Technology[5]

Major Guided Electives (9 hours)

CS guided electives are 4000 level CS courses approved by the student's CS advisor. The following courses may be used as guided electives without the explicit approval of an advisor:
- CGS/CS 4314 Intelligent Systems Analysis

CGS/CS 4315 Intelligent Systems Design
CGS/CS 4352 Human Computer Interaction I
CGS/CS 4353 Human Computer Interaction II
CS/MATH 4334 Numerical Analysis
CS 4336 Advanced Java Programming
CS/SE 4347 Database Systems
CS 4361 Computer Graphics
CS 4365 Artificial Intelligence
CS 4375 Introduction to Machine Learning
CS/SE 4376 Object-Oriented Programming Systems
CS 4386 Compiler Design
CS 4389 Data and Applications Security
CS/TE 4390 Computer Networks
CS 4391 Introduction to Computer Vision
CS 4392 Computer Animation
CS 4393 Computer and Network Security
CS 4394 Implementation of Modern Operating Systems
CS 4396 Networking Laboratory
CS 4397 Embedded Computer Systems
CS 4398 Digital Forensics
CS/SE 4399 Senior Honors in Computer Science/Software Engineering
EE 4325 Introduction to VLSI Design
SE 4351 Requirements Engineering
SE 4352 Software Architecture and Design
SE 4367 Software Testing, Verification, Validation and Quality Assurance
SE 4381 Software Project Planning and Management
SE 4485 Software Engineering Project

[2] Hours fulfill the communication elective 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] Nine hours of Science are counted under Science Core. Three hours are counted under Major Preparatory Courses. Students should consult an advisor for specific classes that satisfy this requirement.
[5] Hours contribute to the Social and Behavioral Sciences component of the Core Curriculum

III. Elective Requirements: 21 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 (15 hours)

All students must accumulate at least 120 hours of university credit to graduate. 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.

At least 9 hours of electives (out of the 21 hours required) must be outside Science and Engineering. At least 6 hours (out of the designated 21) should be in Humanities, Arts, and other areas that broaden the student's educational experience. Consult an advisor for specific classes.

Fast Track Baccalaureate/Master's Degrees

In response to the need for post-baccalaureate education in the exciting field of computer science, a Fast Track program is available to exceptionally well-qualified students who choose their courses carefully. At the end of five years of successful study, it is possible to earn both the B.S. and the M.S. degrees in Computer Science (or M.S. in Computer Science with Major in Software Engineering). Being within 30 hours of graduation, a student admitted to the graduate program and accepted into the Fast Track program may, during the senior year, take 15 graduate hours that may be used to complete the baccalaureate degree and also to satisfy requirements for the master's degree.

Interested students should see the Associate Dean of Undergraduate Education (ADU) for specific admission requirements to the Fast Track program.

Honors Programs

The Department of Computer Science offers upper-division Honors for outstanding students in both the B.S. in Computer Science and B.S. in Software Engineering degree programs. These programs offer special sections of designated classes and other activities designed to enhance the educational experience of exceptional students. Admission to the Honors programs requires a 3.50 or better GPA in at least 30 hours of coursework. Graduation with Honors requires a 3.50 or better GPA and completion of at least 6 honors classes, including a Senior Thesis or Senior Design Project class. For more details, contact the Office of Undergraduate Advising (ECS South 2.502; 972-883-2004).

Minors

A minor in Computer Science requires 21 credit hours earned through the following courses:

CS 1337 Computer Science I
CS 2305 Discrete Mathematics for Computing I
CS 2336 Computer Science II
CS 3305 Discrete Mathematics for Computing II
CS/SE 3345 Data Structures and Introduction to Algorithmic Analysis
CS/SE 3354 Software Engineering
CS 43XX Elective (any 4000-level organized CS class)

A minor in Information Assurance requires 30 credit hours earned through the following courses:

CS 1337 Computer Science I
CS 2305 Discrete Mathematics for Computing I
CS 2336 Computer Science II
CS 3305 Discrete Mathematics for Computing II
CS/SE 3345 Data Structures and Introduction to Algorithmic Analysis
CS/SE 4347 Database Systems
CS/SE 4348 Operating Systems Concepts
CS 4389 Data and Applications Security
CS 4393 Computer and Network Security
CS 4398 Digital Forensics

Certificates

A Certificate in Information Assurance can be obtained by completing the following (as well as any required prerequisites):

CS 4389 Data and Applications Security
CS 4393 Computer and Network Security
CS 4398 Digital Forensics

The certificate is intended for those individuals who are working in the industry and who already have background similar to a BS-CS degree. CS and SE majors that complete the required classes, as well as students that complete the Minor in Information Assurance will be awarded certificates in Information Assurance.

Goals of the Software Engineering Program

The focus of the Software Engineering degree is to provide world class education in modern software engineering. The overall goals of the Bachelor of Science in Software Engineering Program are:

1. To prepare students for software engineering positions in industry or government;
~~1.~~2. To prepare students for graduate study in Software Engineering; and
3. To provide a solid foundation in Computer Science and Software Engineering principles that will allow graduates to adapt effectively in a quickly changing field.

Educational Objectives of the Software Engineering Program

The current objectives for graduates of the Bachelor of Science in Software Engineering Program are to:

1. effectively apply knowledge of programming, algorithms, data structures, and software engineering to the development of complex software systems;
2. communicate technical concepts effectively in both written documents and oral presentations;
3. design and analyze software at the component, subsystem, and software architecture levels and make informed, sound software design tradeoffs;
4. understand the social and ethical issues that arise in their work and deal with them professionally;
5. understand the importance of all phases of the software lifecycle, with emphasis on the need to plan for change and continuously vie to improve the software process;
6. work effectively in a software development team and with other engineering professionals;
7. appreciate the need for lifelong learning and adapt to rapid technological changes.

Bachelor of Science in Software Engineering Degree Requirements (124 hours)

I. Core Curriculum Requirements[1]: 42 hours

A. Communication (6 hours)
- 3 hours Communication (RHET 1302)
- 3 hours Professional and Technical Communication (ECS 3390)[2]

B. Social and Behavioral Sciences (15 hours)
- 6 hours Government (GOVT 2301 and 2302)
- 6 hours American History
- 3 hours Social and Behavioral Science (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)[3]

E. Science (9 hours)
- 6 hours Lecture courses (PHYS 2325 and 2326)
- 2 hours Laboratory courses (PHYS 2125 and 2126)
- 4 hours Science Elective[4]

[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: 64 hours

Major Preparatory Courses (18 hours beyond Core Curriculum)
- CS 1337 Computer Science I
- CS 2305 Discrete Mathematics for Computing I
- CS 2336 Computer Science II
- MATH 2417 Calculus 1[3]
- MATH 2418 Linear Algebra
- MATH 2419 Calculus II[3]
- PHYS 2125 Physics Laboratory I[4]
- PHYS 2126 Physics Laboratory II[4]
- PHYS 2325 Mechanics[4]
- PHYS 2326 Electromagnetism and Waves[4]
- 4 hours Science Elective[4]

Major Core Courses (34 hours beyond Core Curriculum)
- CS/SE 3341 Probability and Statistics in Computer Science and Software Engineering
- CS/SE 3345 Data Structures and Algorithmic Analysis
- CS/SE 3354 Software Engineering
- CS/SE 4340 Computer Architecture
- CS/SE 4348 Operating Systems Concepts
- ECS 3390 Professional and Technical Communication[2]

ISSS 3360 Politics and Values in Business and Technology[5]
SE 3306 Mathematical Foundations of Software Engineering
SE 4351 Requirements Engineering
SE 4352 Software Architecture and Design
SE 4367 Software Testing, Verification, Validation and Quality Assurance
SE 4381 Software Project Planning and Management
SE 4485 Software Engineering Project

Major Guided Electives (12 hours)

SE guided electives are 4000 level CS/SE courses approved by the student's CS/SE advisor. The following courses may be used as guided electives without the explicit approval of an advisor:

CGS/CS 4314 Intelligent Systems Analysis
CGS/CS 4315 Intelligent Systems Design
CGS/CS 4352 Human Computer Interactions I
CGS/CS 4353 Human Computer Interactions II
CS/MATH 4334 Numerical Analysis
CS 4337 Organization of Programming Languages
CS/SE 4347 Database Systems
CS 4349 Advanced Algorithm Design and Analysis
CS 4361 Computer Graphics
CS 4365 Artificial Intelligence
CS 4375 Introduction to Machine Learning
CS/SE 4376 Object Oriented Programming Systems
CS 4485 Senior Design Project
CS 4384 Automata Theory
CS 4386 Compiler Design
CS 4389 Data and Applications Security
CS/TE 4390 Computer Networks
CS 4391 Introduction to Computer Vision
CS 4392 Computer Animation
CS 4393 Computer and Network Security
CS 4394 Implementation of Modern Operating Systems
CS 4396 Networking Laboratory
CS 4397 Embedded Computer Systems
CS 4398 Digital Forensics
CS/SE 4399 Senior Honors in Computer Science/Software Engineering
EE 4325 Introduction to VLSI Design

Application Domains (9- hours)

An important aspect of Software Engineering education is the use of software engineering concepts in a particular application domain. Students should use two of their three guided electives to complete one of the applications domains below. Additional application domains may become available. Completing an application domain may require careful scheduling since many of these classes will not be offered every semester. It is strongly encouraged that you consult with an advisor.

Networks (9 hours)

CS/TE 4390 Computer Networks
CS 4393 Computer and Network Security
CS 4396 Networking Laboratory

Information Assurance (9 hours)

CS 4389 Data and Applications Security
CS 4393 Computer and Network Security
CS 4398 Digital Forensics

Embedded Systems (9 hours)

CS/SE 4348 Operating Systems Concepts
CS 4394 Implementation of Modern Operating Systems

CS 4397 Embedded Computer Systems

Computer Imaging (9 hours)
CS 4361 Computer Graphics
CS 4391 Introduction to Computer Vision
CS 4392 Computer Animation

Artificial Intelligence and Cognitive Modeling (9 hours; take 3 of 4)
CS 4365 Artificial Intelligence
CS 4375 Introduction to Machine Learning
CGS 4314 Intelligent Systems Analysis
CGS 4315 Intelligent Systems Design

Human-Computer Interaction (9 hours)
CS 4361 Computer Graphics
CGS 4352 Human Computer Interactions I
CGS 4353 Human Computer Interactions II

[2] Hours fulfill the communication elective 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] Nine hours of Science are counted under Science Core. Three hours are counted as Major Preparatory Courses. Students should consult an advisor for specific classes that satisfy this requirement.
[5] Hours contribute to the Social and Behavioral Sciences component of the Core Curriculum

III. Elective Requirements: 18 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 (12 hours)
All students must accumulate at least 124 hours of university credit to graduate. 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 post-baccalaureate education in the exciting field of software engineering, a Fast Track program is available to exceptionally well-qualified students who choose their courses carefully. At the end of five years of successful study, it is possible to earn both the B.S. degree in Software Engineering and the M.S. degree in Computer Science or the M.S. degree in Computer Science with Major in Software Engineering. Being within 30 hours of graduation, a student admitted to the graduate program and accepted into the Fast Track program may, during the senior year, take 15 graduate hours that may be used to complete the baccalaureate degree and also to satisfy the requirements for the master's degree.

Interested students should see the Associate Dean of Undergraduate Education (ADU) for specific admission requirements to the Fast Track program.

Honors Programs

The Department of Computer Science offers upper-division Honors for outstanding students in both the B.S. in Computer Science and B.S. in Software Engineering degree programs. These programs offer special sections of designated classes and other activities designed to enhance the educational experience of exceptional students. Admission to the Honors programs requires a 3.50 or better GPA in at least 30 hours of coursework. Graduation with Honors requires a 3.50 or better GPA and completion of at least 6 honors classes, including a Senior Thesis or Senior Design Project class. For more details, contact the Office of Undergraduate Advising (ECS South 2.502; 972-883-2004).

Minors

A minor in Software Engineering requires 21 credit hours earned through the following courses:

CS 1337 Computer Science I
CS 2305 Discrete Mathematics for Computing I
CS 2336 Computer Science II
CS/SE 3345 Data Structures and Introduction to Algorithmic Analysis
CS/SE 3354 Software Engineering
SE 3306 Mathematical Foundations of Softwa re Engineering
SE 43XX Elective (any 4000-level organized SE class)

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, Philipos 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 adopted 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 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 Objectives 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 Requirements[1]: 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 1311and 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 hours[4]

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 I[2]
   MATH 2419 Calculus II[2]
   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 Communication[5]
   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 Technology[6]

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. <u>Elective Requirements</u>: 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.

~~3 + 2 Programs~~

~~The University of Texas at Dallas offers "3 + 2" programs with Abilene Christian University, Austin College, Paul Quinn College, and Texas Woman's University. These programs combine the strengths of these respective institutions with those of The University of Texas at Dallas and permit students to earn two undergraduate degrees simultaneously while preparing for a professional career in engineering. Full-time undergraduate students attend one of the institutions listed above, majoring in mathematics, physics, or computer science for three years, and then continue their education for two years at The University of Texas at Dallas, majoring in electrical engineering. After completion of the program, students receive the Bachelor of Science degree in their chosen major from one of the above institutions and the B.S.E.E. degree from U.T. Dallas. Further details of the individual programs and persons to contact at the respective institutions can be obtained from the U.T. Dallas Electrical Engineering Program Office.~~

Minors

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

Telecommunications Engineering (B.S.T.E.)

Affiliated Faculty

Professors: Farokh Bastani, Cyrus D. Cantrell III, Andras Farago, Andrea F. Fumagelli, John H.L. Hansen, Kamran Kiasaleh, Philipos C. Loizou, Duncan L. MacFarlane, Bill Pervin, Lakshman Tamil, Balaji Raghavachari, S.Q. Zheng

Associate Professors: Jorge Cobb, Jason Jue, Aria Nosratinia, Balakrishnan Prabhakaran, Ravi Prakash, Murat Torlak, S. Venkatesan, Yuke Wang, Eric Wong

Assistant Professors: Latifur Khan, Neeraj Mittal, Mohammad Saquib , Kamil Sarac

Senior Lecturers: Pete Bernardin, William Boyd, Nathan Dodge, Muhammad Kalam, PK Rajasekaran, Marco Tacca

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 focus of the Telecommunications Engineering degree is to provide excellent education in modern communications networks and systems and prepare the students for outstanding careers in telecommunications, data communications, network architecture, wireless, and optical networking.

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 Telecommunications Engineering (TE) Program

The focus of the Telecommunications Engineering degree is to provide excellent education in modern communications networks and systems. Our graduates are trained in a variety of subfields of telecommunications engineering at the systems level. This prepares them for rewarding and successful careers in telecommunications, data communications, network architecture, wireless, optical networking and next generation networks.

TE Undergraduate Program Educational Objectives (PEOs)

The focus of the UTD's Telecommunications Engineering degree is to provide excellent education in modern communications networks and systems. Our graduates shall be uniquely qualified to apply traditional engineering design and problem solving skills in modern telecommunications.

Additional PEOs

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

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 Telecommunications Engineering Degree Requirements (125 hours)

I. <u>Core Curriculum Requirements</u>[1]: 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)[3]
   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: 71 hours[4]

Major Preparatory Courses (20 hours beyond Core Curriculum)
- CHEM 1111 General Chemistry Laboratory I[3]
- CHEM 1311 General Chemistry I[3]
- CS 1337 Computer Science I
- CS 2336 Computer Science II
- EE 1102 Introduction to Experimental Techniques
- EE 2110 Introduction to Digital Systems Laboratory
- EE 2310 Introduction to Digital Systems
- MATH 2417 Calculus I[2]
- MATH 2419 Calculus II[2]
- MATH 2420 Differential Equations With Applications
- PHYS 2125 Physics Laboratory I[3]
- PHYS 2126 Physics Laboratory II[3]
- PHYS 2325 Mechanics [3]
- PHYS 2326 Electromagnetism and Waves[3]

Major Core Courses (51 hours beyond Core Curriculum)
- CS 4340 Computer Architecture
- CS/TE 4348 Operating Systems Concepts
- CS/TE 4390 Computer Networks
- ECS 3390 Professional and Technical Communication[5]
- EE/TE 3101 Electrical Network Analysis Laboratory
- EE/TE 3102 Signals and Systems Laboratory
- EE 3150 Communications Systems Laboratory
- EE 3300 Advanced Engineering Mathematics
- EE/TE 3301 Electrical Network Analysis
- EE/TE 3302 Signals and Systems
- EE/TE 3341 Probability Theory and Statistics
- EE 3350 Communications Systems
- 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
- TE 3307 Discrete Mathematics
- TE 3346 Computer Algorithms and Data Structures
- TE 438X Senior Design Project I
- TE 438X Senior Design Project II
- ISSS 3360 Politics and Values in Business and Technology[5]

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

[3] Nine hours of science are counted under Science Core. Three hours are counted under Major Preparatory Courses.

[4] Students must have passed each of the CS, Math, Science, EE and TE courses listed above, and each of their prerequisites, with a grade of C- or better.

[5] Hours fulfill the communication component requirement 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.

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Minors

The School of Engineering and Computer Science does not offer minors in Telecommunications Engineering at this time.