Erik Jonsson School of Engineering and Computer Science

Department of Computer Science

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

Faculty

Professors: Farokh Bastani, R. Chandrasekaran, Ding-Zhu Du, András Faragó; Gopal Gupta, Dung T. Huynh, Jason Jue, Dan Moldovan, Simeon C. Ntafos, B. Prabhakaran, Balaji Raghavachari, Hsing-Mean (Edwin) Sha, Ivan H. Sudborough, Bhavani Thuraisingham, Klaus Truemper (Emeritus), I-Ling Yen, Kang Zhang, Si-Qing Zheng


Assistant Professors: Mark Gabel, Vibhav Gogate, Xiaohu Guo, Kevin Hamlen, Zhiqiang Lin

Senior Lecturers: Tim Farage, Herman Harrison, Shyam Karrah, Feliks Kluźniak, Linda Morales, Greg Ozbirn, Miquel Razo-Razo, Cort Steinhorst, Janell Straach, Laurie Thompson, Jay Veerasamy

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.

**Bachelor of Science in Computer Science (B.S.)**

**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.

**Program Educational Objectives for Computer Science**

Within a few years after graduation, graduates of the Computer Science program should:

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

**ABET Accreditation**

The B.S. program in Computer Science is accredited by the Computing Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).
Bachelor of Science in Computer Science

Degree Requirements (124 hours)

I. Core Curriculum Requirements: 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 (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 2413, MATH 2414 or MATH 2417, MATH 2419)

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

II. Major Requirements: 68 hours

Major Preparatory Courses (20 hours beyond Core Curriculum)
- ECS 1200 Introduction to Engineering and Computer Science
- CS 1337 Computer Science I
- CS 2305 Discrete Mathematics for Computing I
- CS 2336 Computer Science II
MATH 2413 Differential Calculus
    or MATH 2417 Calculus I
MATH 2418 Linear Algebra
MATH 2414 Integral Calculus
    or MATH 2419 Calculus II
PHYS 2125 Physics Laboratory I
PHYS 2126 Physics Laboratory II
PHYS 2325 Mechanics
PHYS 2326 Electromagnetism and Waves
4 hours Science Elective

Major Core Courses (39 hours beyond Core Curriculum)

    CS 3162 Professional Responsibility in Computer Science and Software Engineering
    CS 3305 Discrete Mathematics for Computing II
    CS 3340 Computer Architecture
    CS 3341 Probability and Statistics in Computer Science and Software Engineering
    CS 3345 Data Structures and Introduction to Algorithmic Analysis
    CS 3354 Software Engineering
    CS 3376 C/C++ Programming in a UNIX Environment
    ECS 3361 Social Issues and Ethics in Computer Science and Engineering
    ECS 3390 Professional and Technical Communication
    CS 4141 Digital Systems Laboratory
    CS 4337 Organization of Programming Languages
    CS 4341 Digital Logic and Computer Design
    CS 4348 Operating Systems Concepts
    CS 4349 Advanced Algorithm Design and Analysis
    CS 4384 Automata Theory
    CS 4485 Computer Science Project

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:

- **CS 4314** Intelligent Systems Analysis
- **CS 4315** Intelligent Systems Design
- **CS 4334** Numerical Analysis
- **CS 4336** Advanced Java
- **CS/SE 4347** Database Systems
- **CS 4352** Human Computer Interactions I
- **CS 4353** Human Computer Interactions II
- **CS 4361** Computer Graphics
- **CS 4365** Artificial Intelligence
- **CS 4375** Introduction to Machine Learning
- **CS 4376** Object-Oriented Programming Systems
- **CS 4386** Compiler Design
- **CS 4389** Data and Applications Security
- **CS 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 4395** Human Language Technologies
- **CS 4396** Networking Laboratory
- **CS 4397** Embedded Computer Systems
- **CS 4398** Digital Forensics
- **CS 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
III. Elective Requirements: 14 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 2418 counted under Major Preparatory Courses.

Free Electives (12 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 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.C.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 3.500 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, 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).
Departmental Honors with Distinction may be awarded to students whose Senior Thesis or Senior Design Project 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 and Ph.D. Dissertations 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

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 3345** Data Structures and Introduction to Algorithmic Analysis
- **CS 3354** Software Engineering
- **CS 43XX** Elective (any 4000-level organized CS class or **CS 4390**)

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 3345** Data Structures and Introduction to Algorithmic Analysis
- **CS 4347** Database Systems
- **CS 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
The certificate is intended for those individuals who are working in the industry and who already have background similar to a B.S. 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.

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

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