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

**Associate Professors:** Sergey Bereg, Lawrence Chung, Jorge A. Cobb, Kendra M.L. Cooper, Ovidiu Daescu, Sanka Harabagiu, Murat Kantarcioglu, Latifur Khan, Yang Liu, Neeraj Mittal, Vincent Ng, Ivor P. Page, Ravi Prakash, Kamil Sarac, Haim Schweitzer, S. Venkatesan, Yuke Wang, W. Eric Wong, Weili Wu, Rym Zalila-Wenkstern

**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
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.

Bachelor of Science in Computer Science

Degree Requirements (124 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 (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
SE 4485 Software Engineering Project

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
- **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 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.

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