Department of Computer Science

Computer Science (BS)

The Computer Science Department offers the BS degree in Computer Science and the BS degree in Software Engineering. Both are based on a solid foundation of mathematics, including calculus, 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 includes 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, and compiler design.

The school offers a "fast track" BS / MS 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.

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 BS 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 semester credit hours]¹

Faculty
Professors Emeritus: William J. Pervin, Klaus Truemper
Associate Professors: Sergey Bereg, Lawrence Chung, Jorge A. Cobb, Xiaohu Guo, Kevin Hamlen, Zhiqiang Lin, Yang Liu, Andrian Marcus, Neeraj Mittal, Yu-Chung (Vincent) Ng, Kamil Sarac, Haim Schweitzer, Rym Zalila-Wenkstern
Assistant Professors: Álvaro Cárdenas, Vibhav Gogate, Cong Liu, Ryan McMahan, Benjamin Raichel, Nicholas Ruozzi, Lingming Zhang
Research Professor: Ranavir Bose
UT Dallas Affiliated Faculty: Milind Dawande, Eakta Jain

I. Core Curriculum Requirements: 42 semester credit hours²

Communication: 6 semester credit hours

  [RHET 1302](https://catalog.utdallas.edu/2016/undergraduate/programs/ecs/computer-science) Rhetoric
  [ECS 3390](https://catalog.utdallas.edu/2016/undergraduate/programs/ecs/computer-science) Professional and Technical Communication³

Mathematics: 3 semester credit hours

  [MATH 2413](https://catalog.utdallas.edu/2016/undergraduate/programs/ecs/computer-science) Differential Calculus⁴
  or [MATH 2417](https://catalog.utdallas.edu/2016/undergraduate/programs/ecs/computer-science) Calculus I⁴

Life and Physical Sciences: 6 semester credit hours
PHYS 2325 Mechanics\textsuperscript{5}
PHYS 2326 Electromagnetism and Waves\textsuperscript{5}

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\textsuperscript{6}

Component Area Option: 6 semester credit hours
MATH 2413 Differential Calculus\textsuperscript{4}
or MATH 2417 Calculus I\textsuperscript{4}
MATH 2419 Calculus II\textsuperscript{4}
PHYS 2125 Physics Laboratory I\textsuperscript{5}

II. Major Requirements: 71 semester credit hours

Major Preparatory Courses: 20 semester credit hours beyond Core Curriculum
ECS 1100 Introduction to Engineering and Computer Science\textsuperscript{7}
CS 1200 Introduction to Computer Science and Software Engineering
CS 1337 Computer Science I
CS 2305 Discrete Mathematics for Computing I
CS 2336 Computer Science II
MATH 2413 Differential Calculus\textsuperscript{4}
or MATH 2417 Calculus I\textsuperscript{4}
MATH 2418 Linear Algebra
MATH 2414 Integral Calculus\(^4\)
or MATH 2419 Calculus II\(^4\)

PHYS 2125 Physics Laboratory I\(^5\)

PHYS 2126 Physics Laboratory II

PHYS 2325 Mechanics\(^5\)

PHYS 2326 Electromagnetism and Waves\(^5\)
3 semester credit hours Science Elective

**Major Core Courses: 42 semester credit 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\(^6\)

ECS 3390 Professional and Technical Communication\(^3\)

CS 4141 Digital Systems Laboratory

CS 4337 Organization of Programming Languages

CS 4341 Digital Logic and Computer Design

CS 4347 Database Systems

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 semester credit 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 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
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: 11 semester credit hours

Free Electives: 11 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 post-baccalaureate education in the exciting field of computer science, a Fast Track program is available to well-qualified UT Dallas undergraduate students. Qualified seniors may take up to 15 graduate semester credit 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 requirements.

Honors Programs

The Department of Computer Science offers an Honors Program called Computer Science Computing Scholars (CS2). (CS2) is an intense Bachelor of Science in Computer Science Degree Program created for exceptionally gifted students who wish to pursue a demanding course of study enriched throughout with research experiences. The Computing Scholars Program has a specially designed curriculum. Courses integrate discussion of current research, recent discoveries, and open problems into a rich logical progression of firmly related topics. Course numbers for the Core Curriculum Requirements and Major Requirements are the same as those for the Bachelor of Science in Computer Science, but Computing Scholars take honors versions of the following courses: ECS 1100, CS 2305, CS 3305, CS 3340, CS 3341, CS 3345, CS 3354, CS 4141, CS 4337, CS 4341, CS 4348, CS 4349, CS 4384, and CS 4485.

Admission to the program is mainly by nomination and invitation. Those invited to join the Computing Scholars Honors Program will have successfully completed a full and challenging high school curriculum, will have achieved high scores on the SAT or ACT tests, and will be about to graduate from high school, or equivalent, with high class rank. Successful participants will graduate with the added distinction of a Computing Scholars Honors Diploma.

For more information about this program students should contact the Computer Science Department leadership.

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 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. Incoming freshmen must enroll and complete requirements of UNIV 1010 and the corresponding school-related freshman seminar course. 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 are counted under Science core, and one semester credit hour of Physics (PHYS 2125) is counted as Component Area Option Core.

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

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