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](https://catalog.utdallas.edu/2019/undergraduate/programs/ecs/computer-science).

The Computer Science Department and the Department of Mathematical Sciences in the School of Natural Sciences and Mathematics jointly offer a **BS degree in Data Science**.

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.

Bachelor of Science in Computer Science

Degree Requirements [124 semester credit hours]¹

View an Example of Degree Requirements by Semester

Faculty


Professors Emeritus: William J. Pervin, Ivan Hal Sudborough, Klaus Truemper

Associate Professors: Alvaro Cárdenas, Lawrence Chung, Jorge A. Cobb, Vibhav Gogate, Yang Liu, Ryan McMahan, Neeraj Mittal, Sriraam Natarajan, Tien Nguyen, Haim Schweitzer, Rym Zalila-Wenkstern

Assistant Professors: Kyle Fox, Shuang Hao, Cong Liu, Benjamin Raichel, Nicholas Ruozzi, Shiyi Wei, Lingming Zhang


I. Core Curriculum Requirements: 42 semester credit hours²

Communication: 6 semester credit hours

RHET 1302 Rhetoric

ECS 3390 Professional and Technical Communication³
Mathematics: 3 semester credit hours

- **MATH 2413** Differential Calculus\(^4\)
- or **MATH 2417** Calculus I\(^4\)

Life and Physical Sciences: 6 semester credit hours

- **PHYS 2325** Mechanics\(^5\)
- **PHYS 2326** Electromagnetism and Waves\(^5\)

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 2361** Social Issues and Ethics in Science and Technology\(^6\) (Awaiting Core Approval from THECB)

Component Area Option: 6 semester credit hours

- **MATH 2413** Differential Calculus\(^4\)
- or **MATH 2417** Calculus I\(^4\)
- **MATH 2419** Calculus II\(^4\)
- **PHYS 2125** Physics Laboratory I\(^5\)

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\(^7\)
- **CS 1200** Introduction to Computer Science and Software Engineering
- **CS 1337** Computer Science I
Discrete Mathematics for Computing I
Computer Science II
Differential Calculus
or Calculus I
Linear Algebra
Integral Calculus
or Calculus II
Physics Laboratory I
Physics Laboratory II
Mechanics
Electromagnetism and Waves
3 semester credit hours Science Elective

Major Core Courses: 42 semester credit hours beyond Core Curriculum

Professional Responsibility in Computer Science and Software Engineering
Discrete Mathematics for Computing II
Computer Architecture
Probability and Statistics in Computer Science and Software Engineering
Data Structures and Introduction to Algorithmic Analysis
Software Engineering
C/C++ Programming in a UNIX Environment
Social Issues and Ethics in Science and Technology (Awaiting Core Approval from THECB)
Professional and Technical Communication
Digital Systems Laboratory
Organization of Programming Languages
Digital Logic and Computer Design
Database Systems
Operating Systems Concepts
Advanced Algorithm Design and Analysis
Automata Theory
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 Design
- **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

Certificate in Information Assurance

A Certificate in Information Assurance is offered by the Department of Computer Science. It can be obtained by completing the following (as well as any required prerequisites):

https://catalog.utdallas.edu/2019/undergraduate/programs/ecs/computer-science
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.

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