Mission Statement
The Department of Computer Science mission is to advance the knowledge of computer science and technology through education, research, and service for the betterment of industry, government, and society.

Vision Statement
The department seeks to become a competitive doctoral-granting department and to expand its depth and breadth in the research and study of applied computing.

Computer Science Goals
1. Graduating students with strong technical backgrounds and communication skills.
2. Graduating students who understand the values and requirements of responsible professionalism and lifelong learning.
3. Building a sustainable research program.
4. Developing international visibility for our research.
5. Providing quality service to the university, the profession, and the community.

Overview
The Department of Computer Science offers two degree options for students - a Bachelor of Arts (B.A.) and a Bachelor of Science (B.S.). The Bachelor of Science degree program in Computer Science is accredited by ABET, Inc.

The department offers courses in computer architecture, data structures and algorithms, automata theory, compilers, operating system, object-oriented design and implementation, Web programming, software engineering, computer graphics, computer networks, distributed systems, computer security, digital forensics, database design, data mining, machine learning, human computer interaction, social computing, artificial intelligence, and several programming languages including C, C++, Java, Assembly, LISP, Perl, PHP, and JavaScript.

Computer Science graduates can further their studies in graduate schools or seek employment in industry, such as software development; computer applications in the petroleum, aerospace, and chemical industries; and secondary school teaching.

Teacher Certification
Students may pursue a B.A. or B.S. degree with teacher certification in Computer Science for Texas public schools (grades 8-12). Students follow the curriculum sequence outlined by their major department or college. Undergraduates interested in certification are strongly encouraged to see an academic advisor early in their undergraduate program. Students seeking teacher certification must complete 21 hours of the professional sequence courses under the College of Education:

<table>
<thead>
<tr>
<th>Education Core</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 4332</td>
<td>Secondary Teaching: Curriculum and Technology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CI 3325</td>
<td>Adolescent Growth and Development</td>
<td>3</td>
<td></td>
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Field-Based Block

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 4343</td>
<td>Instructional Strategies for the Secondary Teacher</td>
<td>3</td>
</tr>
<tr>
<td>CI 4370</td>
<td>Classroom Management, Ethics, and Legal Issues in Secondary Teaching</td>
<td>3</td>
</tr>
<tr>
<td>RDG 3323</td>
<td>Teaching Reading in the Content Areas</td>
<td>3</td>
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Student Teaching

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>EDST 4681</td>
<td>Student Teaching 8-12</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Hours: 21

1 Please note that students must take CI 4332 and CI 3325 prior to participating in a field-based block.

For information about admission requirements to the teacher certification program refer to the Office of Educator Preparation (OEP) (http://mycatalog.txstate.edu/undergraduate/education/office-of-educator-preparation) section in this catalog. Graduate or post-baccalaureate students should also contact the OEP for further information. The three types of students the OEP provides services to are undergraduate students seeking certification, graduate students seeking certification, and post-baccalaureate students seeking certification only. Admission to teacher education is required for students who want to be certified to teach in Texas accredited schools.

Bachelor of Arts (B.A.)
- Major in Computer Science (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-ba)
- Major in Computer Science (Teacher Certification in Computer Science, Grades 8-12) (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-teacher-certification-grades-8-12-ba)

Bachelor of Science (B.S.)
- Major in Computer Science (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-bs)
- Major in Computer Science (Computer Engineering Concentration) (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-concentration-engineering-bs)
- Major in Computer Science (Teacher Certification in Computer Science, Grades 8-12) (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-teacher-certification-grades-8-12-bs)

Minor
- Computer Science (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/computer-science-minor)
- Second Teaching Field in Computer Science (Grades 8-12) (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/second-teaching-field-computer-science)

Certificate
- Computer Science (http://mycatalog.txstate.edu/undergraduate/science-engineering/computer/science-certificate)
Information about graduate programs can be found in the Graduate Catalog (http://mycatalog.txstate.edu/graduate).

Courses in Computer Science (CS)

CS 1308. Computer Literacy and the Internet.
A study of the uses of computers and their effects on society. Text processing, spreadsheets, databases, and Web programming. Does not count for computer science credit towards a minor, a BS, or a BA in computer science.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter
TCCN: COSC 1300

CS 1319. Fundamentals of Computer Science.
Provides fundamental knowledge of the six layers of computer science as per the ACM CS0 curriculum. The information, hardware, programming, operating system, applications, and communications layers are presented plus appropriate open computer laboratory exercises. Does not count for computer science credit towards a minor, BS, or BA in computer science.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: COSC 1315

CS 1428. Foundations of Computer Science I.
Introductory course for computer science majors, minors and others desiring technical introduction to computer science. Contains overview of history and structure of the digital computer, including binary data representation. Problem solving, algorithm development, structured programming, good coding style, and control structures of C++ are emphasized. Prerequisite or co-requisite: MATH 1315.
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter
TCCN: COSC 1420

CS 2308. Foundations of Computer Science II.
Fundamentals of object-oriented programming. Introduction to abstract data types (ADTs) including lists, stacks, and queues. Searching and sorting. Pointers and dynamic memory allocation. A continuation of CS 1428. Prerequisite: CS 1428 with a grade of C or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: COSC 2315

CS 2315. Computer Ethics.
This course is primarily for computer science majors, focusing on the ethical codes of the professional societies, the philosophical bases of ethical decision-making, and the examination of several contemporary case studies. Prerequisites: CS 1428, ENG 1310, COMM 1310, and PHIL 1305 or PHIL 1320 with grades of C or higher. (WI).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Writing Intensive
Grade Mode: Standard Letter
TCCN: COSC 2325

CS 2318. Assembly Language.
A course covering assembly language programming, including instruction sets, addressing modes, instruction formats, looping, logic, data representation, subroutines and recursion; and the interface between hardware and software. Prerequisites: MATH 2358 and CS 2308 with grades of C or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: COSC 2325

CS 2420. Digital Logic.
An introduction to fundamental computer technologies, including Boolean logic design, logic circuits and devices, and basic computer hardware. A laboratory providing hands-on experience with electricity, combinational and sequential digital circuits, and computer hardware. Prerequisite: CS 1428 with a grade of C or higher.
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter
TCCN: COSC 2420

CS 3320. Internet Software Development.
A course providing foundations for the construction and design of static and dynamic Web pages with database applications. This will include server-side and client-side software development. Prerequisite: CS 2308 with a grade of C or higher, or consent of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: COSC 3320

Use of fundamental hardware components. Topics include ALU’s, single and multiple cycle datapath and control, RISC vs. CISC, pipelining, caches, I/O, virtual memory and related performance issues. Prerequisites: (CS 2420 or EE 2420), (CS 2315 or EE 2400), and (CS 2318 or EE 3420) with grades of C or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: COSC 3335
CS 3358. Data Structures.
A course covering classic data structures and an introduction to object-oriented development. Prerequisites: CS 2308 and MATH 2358 with grades of C or higher. 
Grade Mode: Standard Letter 
about Data Structures

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

CS 3369. Embedded Computer Systems.
This course studies the architecture of embedded systems, micro-controllers, their peripherals, languages, and operating systems and the special techniques required to use them. Prerequisites: CS 2318 and CS 2420 with grades of C or higher.
Grade Mode: Standard Letter 
about Embedded Computer Systems

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

CS 3378. Theory of Automata.
An introduction to automata theory, computability, and formal languages. Prerequisite: CS 3358 with a grade of C or higher.
Grade Mode: Standard Letter 
about Theory of Automata

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

CS 3379. Software Engineering.
The study of software design, implementation, and validation techniques through team projects. Structured analysis, programming style, and project documentation are emphasized in large software projects. Prerequisites: (CS 2315 or EE 2400) and CS 3358 with grades of C or higher. (WI).
Grade Mode: Standard Letter 
about Software Engineering

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Writing Intensive

CS 4100. Computer Science Internship.
Provides on-the-job training supervised by computer scientists in industry internship programs approved by the department. Prerequisite: CS majors and minors only. (WI).
Grade Mode: Credit/No Credit 
about Computer Science Internship

1 Credit Hour. 0 Lecture Contact Hours. 20 Lab Contact Hours.

CS 4298. Undergraduate Research I.
Supervised individual research project in a mentor-student relationship with a computer science faculty member. Cannot be given degree credit until the satisfactory completion of CS 4299. Prerequisites: Junior standing; major GPA of 3.00; departmental approval.
Grade Mode: Credit/No Credit 
about Undergraduate Research I

2 Credit Hours. 1 Lecture Contact Hour. 2 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing

CS 4299. Undergraduate Research II.
Supervised individual research projects in a mentor-student relationship with a computer science faculty member. Prerequisites: CS 4298 and departmental approval.
Grade Mode: Standard Letter 
about Undergraduate Research II

2 Credit Hours. 1 Lecture Contact Hour. 2 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing

CS 4310. Computer Networks.
A survey of network architectures and their components. Emphasis will be on media access, network and transport layer protocols. Prerequisite: CS 3358 with a grade of C or higher.
Grade Mode: Standard Letter 
about Computer Networks

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

CS 4315. Introduction to Data Mining.
This course covers fundamental concepts and techniques in data mining and information retrieval. Data mining topics include classification, cluster analysis and pattern mining. Information retrieval topics include Boolean retrieval, vector space model, and Web search. Prerequisite: CS 3358 with a grade of C or higher.
Grade Mode: Standard Letter 
about Introduction to Data Mining

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

CS 4318. Program Translators.
A study of computer languages, data structures, algorithms, and theory used in constructing compilers and other program translators. Prerequisite: CS 3358 with a grade of C or higher.
Grade Mode: Standard Letter 
about Program Translators

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Principles and methods in human factors and ergonomics applied to the design and use of computer systems. Prerequisite: CS 3358 with a grade of C or higher. (WI).
Grade Mode: Standard Letter 
about Human Factors of Computer Systems

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Writing Intensive

Principles of operating systems. Algorithms for CPU scheduling, memory management, cooperating sequential processes and device management. Prerequisites: (CS 2318 or EE 3420) and CS 3358 with a grade of C or higher.
Grade Mode: Standard Letter 
about Operating Systems

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
CS 4332. Introduction to Database Systems.
Introduction to database concepts, data models, file structures, query languages, database management systems. Prerequisite: CS 3358 with a grade of C or higher.
about Introduction to Database Systems
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
about Introduction to Database Systems

CS 4346. Introduction to Artificial Intelligence.
An introduction to the basic concepts of artificial intelligence; search techniques, knowledge representation, problem solving. Prerequisite: CS 3358 with a grade of C or higher.
about Introduction to Artificial Intelligence
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
about Introduction to Artificial Intelligence

CS 4350. Unix Systems Programming.
Fundamentals of Unix operating systems, Unix file system and environment, C memory allocation, development tools, processes and signals, threads, device drivers, and programming for security. Prerequisite: CS 3358 with a grade of C or higher.
about Unix Systems Programming
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
about Unix Systems Programming

CS 4354. Object-Oriented Design and Implementation.
An in-depth study of object-oriented design and implementation issues with emphasis on understanding the life cycle of object-oriented software, Unified Modeling Language, inheritance and polymorphism, designing remote and persistent objects, and exception handling. In-depth study of Java object-oriented language. Java will be used for implementing the exercises. Prerequisite: CS 3398.
about Object-Oriented Design and Implementation
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
about Object-Oriented Design and Implementation

CS 4358A. Introduction to Digital Forensics.
This course is an introduction to digital forensics that describes the techniques and tools used in criminal and civil investigations that involve computing systems, digital devices, and networks. Hands-on experience will be acquired through projects. Prerequisite: CS 4350 or consent of instructor.

about Introduction to Digital Forensics
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Topics
Grade Mode: Standard Letter
about Introduction to Digital Forensics

CS 4378P. Introduction to Digital Multimedia.
Concepts, problems and techniques in digital multimedia. Topics include digital representation of video and data compression. Applications, primarily in education and business presentations, and new and potential capabilities, such as video on demand and virtual reality. Prerequisite: CS 3358 with a grade of C or higher.
about Introduction to Digital Multimedia
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Topics
Grade Mode: Standard Letter
about Introduction to Digital Multimedia

CS 4378V. Introduction to Machine Learning.
Provides systematic introduction to machine learning, covering basic theoretical as well as practical aspects of the use of machine learning methods. Topics include learning theory, learning methods, recent learning models, etc. Application examples include multimedia information retrieval, text recognition, computer vision, etc. Prerequisite: CS 3358 grade of C or higher.
about Introduction to Machine Learning
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Topics
Grade Mode: Standard Letter
about Introduction to Machine Learning

CS 4378W. Introduction to Human Computer Interaction.
Introduces HCI topics specifically highlighted by new input modalities such as eye-tracking. Considers new input modalities as new channels for data gathering including multimedia compression, interface design, usability evaluation, biometrics. Application of HCI as interdisciplinary research tool also will be discussed. Prerequisite: CS 3358 with grade of C or higher.
about Introduction to Human Computer Interaction
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Topics
Grade Mode: Standard Letter
about Introduction to Human Computer Interaction

CS 4378Z. Practical Game Development.
Course teaches practical aspects of computer game design and implementation. Topics include graphics game engines, game physics, AI methods applied to games, and software architectures for computer games. Students will gain knowledge and skills needed for game development via team projects.
about Practical Game Development
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Topics
Grade Mode: Standard Letter
about Practical Game Development
CS 4379A. Software Testing.
The concepts used in a formal testing of safety critical and high-quality software applications are investigated. Topics include, but are not limited to, test design, static and dynamic testing tools, and formal testing documentation. Prerequisite: CS 3398 with a grade of C or higher. about Software Testing

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Standard Letter  
about Software Testing

CS 4379B. Introduction to Graphical User Interfaces.
This course covers abstract and practical foundations of graphical user interface design, evaluation, and implementation. It discusses the fundamentals of computer graphics and interactive computer/human interfaces. The course includes a survey of usability measures, the major GUI standards, and GUI tools. Prerequisite: CS 3358 with a grade of C or higher.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Standard Letter  
about Introduction to Graphical User Interfaces

CS 4379Q. Introduction to Recommender Systems.
This course covers the basic concepts of recommender systems, including personalization algorithms, evaluation tools, and user experiences. We will discuss how recommender systems are deployed in e-commerce sites, social networks, and many other online systems. Additionally, we will review current research in the field. Prerequisite: CS 3358 with a grade of “C” or higher, or consent of instructor.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Standard Letter  
about Introduction to Recommender Systems

CS 4379Y. Introduction to Green Computing. 
Reducing energy consumption of mobile devices, cloud computing platforms, and supercomputers is a paramount but daunting problem. This course covers fundamental concepts and techniques in green computing, including a hardware energy efficiency roadmap; energy efficient software design, resource management, and storage solutions; and green data centers and mobile computing. Prerequisites: CS 3339 and CS 3358 with grades of C or higher.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Standard Letter  
about Introduction to Green Computing

CS 4380. Parallel Programming.
This course teaches practical aspects of parallel programming. The covered topics include multi-core processors and shared-memory programming, hardware accelerator programming, and distributed-memory machines and message-passing programming. The students will gain the knowledge and skills needed for developing parallel software by writing programs for a variety of parallel computers. Prerequisite: CS 3358 with a grade of “D” or higher; or instructor consent.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Standard Letter  
about Parallel Programming

a study of the hardware and software used in graphic representation and interpretation of data. Prerequisites: CS 3358 with a grade of C or higher and familiarity with trigonometric functions.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Standard Letter  
about Computer Graphics

CS 4395. Independent Study in Computer Science. 
Open to undergraduate students on an independent basis by arrangement with the faculty member concerned. Requires department chair approval.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Credit/No Credit  
about Independent Study in Computer Science

CS 4398. Software Engineering Project. 
Students undertake a software development project. They work in teams, developing requirements and designs which they will implement and test. Prerequisite: CS 3398 with a grade of C or higher.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Standard Letter  
about Software Engineering Project