

Department of Computer Science

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Degree Programs Offered

- BA, major in Computer Science
- BA, major in Computer Science (with teacher certification)
- BS, major in Computer Science
- BS, major in Computer Science (with teacher certification)

Minor Offered

- Computer Science

The Department of Computer Science offers courses in computer architecture, computer ethics, compilers, operating systems, Unix system programming, object-oriented design and implementation, web programming with database applications, software engineering, computer graphics, data base design, computer networks, distributed systems, automata theory, human factors, artificial intelligence, and several programming languages including C, C++, Java Assembly, LISP, HTML, Perl, PHP, and JavaScript. Descriptions of the topics courses listed on these departmental pages are available on the department's Web page, http://www.cs.txstate.edu/courses/courses_list.php?deg=UGRAD.

Computer Science graduates work in every sector of industry: hardware manufacture; software development; computer applications in the petroleum, aerospace, and chemical industries; and secondary school teaching. In addition, for persons who already hold a baccalaureate degree, the department offers a Certificate in Computer Science. Please refer to the Texas State graduate catalog.

The Bachelor of Science degree program in Computer Science is accredited by the Computing Accreditation Commission of ABET, Inc.

Teacher Certification

Students may earn Computer Science (Texas Grades 8-12) certifications through a BA or BS in Computer Science. Initial or additional certification may also be acquired as a post-baccalaureate or graduate student. Students interested in certification are strongly encouraged to see the Computer Science Advisor early in their undergraduate program or certification process.

For students who are seeking teacher certification within their major and are not in the College of Science, but would like a second teaching field in Computer Science (Texas Grades 8-12) the requirements are: CS 1308, 1428, 2308, 2318, 3358, 12 hours CS of which 9 hours is advanced.

Mission Statement

The mission of the Department of Computer Science is to advance the knowledge of computer science and technology through teaching, research, and service to produce computer scientists and computer literate individuals for the betterment of industry, government, and society.

Computer Science Goals

1. Graduates with degrees in Computer Science will have strong technical backgrounds in computer science.
2. Graduates with degrees in Computer Science will have additional specialized skills for employment in computer related fields.
3. Graduates with degrees in Computer Science will have a positive image of their undergraduate education.
4. Graduates with degrees in Computer Science will understand the values and requirements of responsible professionalism including the necessity of ethical behavior, the impact of computing technologies in society, the appreciation for life-long learning, and the need for professional relationships.
5. Faculty in Computer Science will enjoy an environment in which they can develop and apply their abilities in teaching, research, and service.



Bachelor of Arts Major in Computer Science

Minimum required: 120 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. The student must take eight hours from: BIO 1430, 1431; PHYS 1410, 1420 or 1430, 2425; CHEM 1141 and 1341, 1142 and 1342; or GEOL 1410, 1420. The eight hours must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
4. MATH 2417 or 2471 may substitute for the MATH 1317, 1319, 1329, or 2321 requirement.
5. Choose one **CS** project course from: CS 3468 (see department), **4326** (fall, summer I), or 4398 (spring, summer II).
6. Minors and electives should be chosen in consultation with the academic advisor.

Freshman Year – 1st Semester	Hours	Freshman Year – 2nd Semester Hours	
CS 1428	4	CS 2308	3
MATH 1317, 1319, 1329, or 2321 (see gen. req. 4) ...	3	MATH 2358	3
US 1100	1	Science (see gen. req. 3)	4
ENG 1310	3	ENG 1320	3
COMM 1310	3	PHIL 1305	3
PFW one course	1		
Total	15	Total	16
Sophomore Year – 1st Semester	Hours	Sophomore Year – 2nd Semester	Hours
CS 2315	3	CS 3358	3
CS 2318	3	CS 3409	4
MATH 3398	3	Modern Language 1420	4
Modern Language 1410	4	Science (see gen. req. 3)	4
ENG Literature (see gen. req. 2)	3		
Total	16	Total	15
Junior Year – 1st Semester	Hours	Junior Year – 2nd Semester	Hours
CS 3398	3	CS Advanced Elective	3
Second ENG Literature (see gen. req. 2) or 3303 or 3313	3	Modern Language 2320	3
Modern Language 2310	3	Minor (see gen. req. 1 & 6)	3
Minor (see gen. req. 1 & 6)	3	ART, DAN, MU, or TH 2313	3
HIST 1310	3	HIST 1320	3
		PFW one course	1
Total	15	Total	16
Senior Year – 1st Semester	Hours	Senior Year – 2nd Semester	Hours
CS 4354	3	CS Advanced Elective	3
CS Project Course (see gen. req. 5)	3	CS Advanced Elective	3
Minor (see gen. req. 1 & 6)	3	Minor (see gen. req. 1 & 6)	3
Social Science component (see gen. req. 2)	3	POSI 2320	3
POSI 2310	3		
Total	15	Total	12

Bachelor of Arts
Major in Computer Science
(with Teacher Certification)

Minimum required: 129 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. The student must take eight hours from: BIO 1430, 1431; PHYS 1410, 1420 or 1430, 2425; CHEM 1141 and 1341, 1142 and 1342; or GEOL 1410, 1420. The eight hours must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
4. MATH 2417 or 2471 may substitute for the MATH 1317, 1319, 1329, or 2321 requirement.
5. Choose one **CS** project course from: CS 3468 (see department), **4326** (fall, summer I), or 4398 (spring, summer II).
6. A Secondary Education minor is required.

Freshman Year – 1 st Semester	Hours
CS 1428	4
MATH 1317, 1319, 1329, or 2321 (see gen. req. 4).....	3
US 1100	1
ENG 1310	3
COMM 1310.....	3
PFW one course	1
Total	15

Sophomore Year – 1 st Semester	Hours
CS 2315	3
CS 2318	3
MATH 3398.....	3
Modern Language 1410	4
Total	13

Sophomore Year – Summer I	Hours
ENG Literature (see gen. req. 2)	3
HIST 1310.....	3
Total	6

Junior Year – 1 st Semester	Hours
CS 3398	3
Second ENG Literature (see gen. req. 2) or 3303 or 3313	3
CS 4354	3
Modern Language 2310	3
CI 4332	3
Total	15

Junior Year – Summer I	Hours
POSI 2310.....	3
Social Science Component (see gen. req. 2).....	3
Total	6

Senior Year – 1 st Semester	Hours
CS Advanced Elective.....	3
CI 4370	3
CI 4343	3
RDG 3323.....	3
Total	12

Freshman Year – 2 nd Semester	Hours
CS 2308.....	3
MATH 2358	3
Science (see gen. req. 3).....	4
ENG 1320.....	3
PHIL 1305.....	3

Total **16**

Sophomore Year – 2 nd Semester	Hours
CS 3358.....	3
CS 3409.....	4
Modern Language 1420.....	4
Science (see gen. req. 3).....	4
Total	15

Sophomore Year – Summer II	Hours
ART, DAN, MU, or TH 2313.....	3
HIST 1320.....	3
Total	6

Junior Year – 2 nd Semester	Hours
CS Advanced Elective.....	3
CS Advanced Elective.....	3
CS Project Course (see gen. req. 5)	3
Modern Language 2320.....	3
CI 3325.....	3

Total **15**

Junior Year – Summer II	Hours
POSI 2320	3
PFW once course.....	1
Total	4

Senior Year – 2 nd Semester	Hours
EDST 4681	6

Total **6**

Bachelor of Science
Major in Computer Science
 Minimum required: 120 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same language are taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. A total of 17 hours in mathematics is required. Mathematics is recommended as a minor since the mathematics requirements, plus 3 advanced hours of mathematics, constitute a mathematics minor. Minor and electives should be chosen in consultation with the academic advisor.
5. The student must take 16 hours from: BIO 1430, 1431; PHYS 1410, 1420 or 1430, 2425; CHEM 1141 and 1341, 1142 and 1342; or GEOL 1410, 1420. Eight of the 16 hours must be from the same science (BIO, CHEM, GEOL, OR PHYS) listed above.
6. Choose one **CS** project course from: CS 3468 (see department), **4326** (fall, summer I), or 4398 (spring, summer II).
7. Minors and electives should be chosen in consultation with the academic advisor.

Freshman Year – 1st Semester	Hours	Freshman Year – 2nd Semester	Hours
CS 1428	4	CS 2308	3
MATH 2358	3	MATH 2471	4
US 1100	1	ENG 1320	3
ENG 1310	3	PHIL 1305	3
COMM 1310	3	Social Science Component (see gen. req. 2)	3
PFW one course	1		
Total	15	Total	16
Sophomore Year – 1st Semester	Hours	Sophomore Year – 2nd Semester	Hours
CS 2315	3	CS 3358	3
CS 2318	3	CS 3409	4
MATH 3398	3	MATH 2472	4
Science (see gen. req. 5)	4	Science (see gen. req. 5)	4
ENG Literature (see gen. req. 2)	3		
Total	16	Total	15
Junior Year – 1st Semester	Hours	Junior Year – 2nd Semester	Hours
CS 3398	3	CS 3339	3
CS Elective	3	CS Advanced Elective	3
Second ENG Literature (see gen. req. 2) or 3303 or 3313	3	MATH 3305	3
Science (see gen. req. 5)	4	Science (see gen. req. 5)	4
HIST 1310	3	HIST 1320	3
		PFW one course	1
Total	16	Total	17
Senior Year – 1st Semester	Hours	Senior Year – 2nd Semester	Hours
CS 4354	3	CS Advanced Elective	3
CS Project Course (see gen. req. 6)	3-4	CS Advanced Elective	3
POSI 2310	3	Minor/Elective (see gen. req. 1, 4 & 7)	3
ART, DAN, MU, or TH 2313	3	POSI 2320	3
		Elective (see gen. req. 1, 4 & 7)	0-1
Total	12-13	Total	12-13

**Bachelor of Science
Major in Computer Science
(with Teacher Certification)**

Minimum required: 134 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same language are taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. The student must take 16 hours from: BIO 1430, 1431; PHYS 1410, 1420 or 1430, 2425; CHEM 1141 and 1341, 1142 and 1342; or GEOL 1410, 1420. Eight of the 16 hours must be from the same science (BIO, CHEM, GEOL, OR PHYS) listed above.
5. Choose one **CS** project course from: CS 3468 (see department), **4326** (fall, summer I), or 4398 (spring, summer II).
6. A minor in Secondary Education is required.

Freshman Year – 1st Semester	Hours
CS 1428	4
MATH 2358.....	3
US 1100	1
ENG 1310	3
COMM 1310.....	3
PFW one course	1
Total	15

Sophomore Year – 1st Semester	Hours
CS 2315	3
CS 2318	3
MATH 3398.....	3
Science (see gen. req. 4).....	4
ENG Literature (see gen. req. 2)	3
Total	16

Sophomore Year – Summer I	Hours
HIST 1310.....	3
POSI 2310.....	3
Total	6

Junior Year – 1st Semester	Hours
CS 3398	3
CS 4354	3
CI 4332	3
Second ENG Literature (see gen. req. 2) or 3303 or 3313	3
Science (see gen. req. 4).....	4
Total	16

Junior Year – Summer I	Hours
CS Advanced Elective.....	3
CS Advanced Elective.....	3
Total	6

Freshman Year – 2nd Semester Hours	Hours
CS 2308.....	3
MATH 2471	4
ENG 1320.....	3
PHIL 1305.....	3
Social Science Component (see gen. req. 2)	3
Total	16

Sophomore Year – 2nd Semester	Hours
CS 3358.....	3
CS 3409.....	4
MATH 2472	4
Science (see gen. req. 4).....	4
Total	15

Sophomore Year – Summer II	Hours
HIST 1320.....	3
POSI 2320	3
Total	6

Junior Year – 2nd Semester	Hours
CS 3339.....	3
CS Advanced Elective.....	3
CS Project Course (see gen. req. 5)	3
CI 3325.....	3
Science (see gen. req. 4).....	4
Total	16

Junior Year – Summer II	Hours
ART, DAN, MU, or TH 2313.....	3
PFW one course	1
Total	4

Senior Year – 1 st Semester	Hours	Senior Year – 2 nd Semester	Hours
CI 4370	3	EDST 4681	6
CI 4343	3		
RDG 3323	3		
MATH 3305	3		
Total	12	Total	6

Minor in Computer Science

A minor in Computer Science consists of CS 1428, 2308, 2318, 3358, 3409 and at least six advanced CS hours. MATH 2358 and 3398 are also required as prerequisites for CS 3358 and 3409.

Courses in Computer Science (CS)

NOTE: Descriptions of the topics courses listed below are available through the department's web site: http://www.cs.txstate.edu/courses/courses_list.php?deg=UGRAD.

1308 (COSC 1300) Computer Literacy and the Internet. (2-2) 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.

1319 Fundamentals of Computer Science. (3-0) 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.

1428 (COSC 1415) Foundations of Computer Science I. (3-2) 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.

2308 (COSC 2320) Foundations of Computer Science II. (3-0) 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: C or higher in CS 1428.

2315 Computer Ethics. (3-0) 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 1318 or 1428, ENG 1310, COMM 1310, and PHIL 1305 with a grade of "C" or higher.

2318 (COSC 2325) Assembly Language. (3-0) A course covering the organization of digital computers; assembly language programming including addressing, looping, logic, shifting and masking operations, macros, subroutines, co-routines, arithmetic algorithms, and recursion. Prerequisite: MATH 2358 with a grade of "C" or higher. Prerequisite or Co-requisite: CS 2308 with a grade of "C" or higher.

2320 Internet Programming with Database Applications. (3-0) 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 programming applications. Prerequisite: CS 2308 or consent of instructor.

2358 (COSC 2315) Introduction to Data Structures. (3-0) A course covering classic data structures and an introduction to object-oriented development. Prerequisite: CS 2308 with a grade of "C" or higher. Co-requisite: MATH 3398.

2378 Topics in Computer Science. (3-0) Selected topics in computer science. May be repeated with different emphasis for additional credit. Prerequisite: Consent of instructor.

2388 Internet Programming on the World Wide Web. (3-0) An introductory course covering web page construction using HTML and Java Script. Does not count for computer science credit towards a minor, BS, or BA in computer science.

2428 Applications Programming in Visual Basic. (3-2) A self-contained programming course using Visual Basic. Does not count for computer science credit towards a BS in computer science.

3339 Computer Architecture. (3-0) 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 2315, 2318, and 3409 with a grade of "C" or higher.

3358 Data Structures. (3-0) A course covering classic data structures and an introduction to object-oriented development. Prerequisite: CS 2308 with a grade of "C" or higher. Prerequisite or Co-requisite: MATH 3398 with a grade of "C" or higher.

3378 Theory of Automata. (3-0) An introduction to automata theory, computability, and formal languages. Prerequisite: CS 3358 with a grade of "C" or higher.

(WI) **3398 Software Engineering.** (3-0) 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. Prerequisite: CS 2315 and 3358 with a grade of "C" or higher.

3409 Fundamentals of Computer Technology. (3-2) An introduction to computer hardware and the technologies used to create, capture, and communicate digital information. A laboratory provides hands-on experience with the subject matter, e.g., electricity, combinational and sequential digital circuits, VLSI, etc. Prerequisite: MATH 2358 with a grade of "C" or higher. Prerequisite or Co-requisite: CS 2318 with a grade of "C" or higher.

(WI) **3468 Embedded Computer Systems.** (3-2) 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, 3409 with a grade of "C" or higher.

4100 Computer Science Internship. (0-20) Provides on-the-job training supervised by computer scientists in industry internship programs approved by the department. Prerequisite: CS majors and minors only.

4310 Computer Networks. (3-0) 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.

4318 Program Translators. (3-0) 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.

(WI) **4326 Human Factors of Computer Systems.** (3-0) 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.

4328 Operating Systems. (3-0) Principles of operating systems. Algorithms for CPU scheduling, memory management, cooperating sequential processes and device management. Prerequisites: CS 2318 and 3358 with a grade of "C" or higher.

4332 Introduction to Database Systems. (3-0) Introduction to database concepts, data models, file structures, query languages, database management systems. Prerequisite: CS 3358 with a grade of "C" or higher.

4335 Digital Signal Processing. (3-0) The course will introduce the techniques of discrete-time systems, Z transform analysis, and filter design techniques, including lab programming with National Instruments LabVIEW and TI signal processors. Prerequisites: MATH 2472 and CS 3358 with grades of "C" or higher.

4346 Introduction to Artificial Intelligence. (3-0) 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.

4350 Unix Systems Programming. (3-0) 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.

4354 Object-Oriented Design and Implementation. (3-0) 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.

4368 Survey of Computer Languages. (3-0) A survey of computer languages. Criteria for choosing languages to be covered include history, important development paradigms and environments, and language implementations. Prerequisite: CS 3358 with a grade of “C” or higher.

4371 Computer System Security. (3-0) Course covers practical aspects of computer system security including managing and producing code for secure systems. Theory, such as cryptography, is introduced as needed. Prerequisite: CS 3358 with a grade of C or higher.

4378 Special Topics in Computer Science. (3-0) Selected topics in computer science. May be repeated with different emphasis for additional credit. Prerequisite: Consent of instructor.

4378P Introduction to Digital Multimedia. (3-0)

4378U Data Mining. (3-0)

4378V Introduction to Machine Learning. (3-0)

4378W Introduction to Human Computer Interaction (HCI). (3-0)

4378Y Forensic Systems. (3-0)

4388 Computer Graphics. (3-0) 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.

4395 Independent Study in Computer Science. (3-0) Open to undergraduate students on an independent basis by arrangement with the faculty member concerned. Requires department chair approval. Repeatable for credit with different emphasis.

(WI) **4398 Software Engineering Project.** (3-0) Students undertake a software development project. They work in teams, writing the requirements and design documents and then the teams produce and test the software. The lectures cover techniques of analysis, design, implementation and testing software. Prerequisite: CS 3398 with a grade of “C” or higher.