

- CHEM 4375. Prerequisites CHEM 2342 with C or higher.
- 4385 Metabolism. (3-0) A study of the biodegradation and biosynthesis of carbohydrates, lipids, amino acids, proteins, and nucleic acids. Prerequisite: CHEM 3375 or 4375. (MP)
- 4390 Supramolecular Chemistry. (3-0) This course is designed to be a survey of the nature of non-covalent interactions between host and guest species. Emphasis will be focused on the rational design of hosts, thermodynamic and kinetic parameters involved in binding and the applications of various binding/recognition phenomena. Prerequisite: CHEM 2342 with a grade of "C" or higher.
- 4481 Advanced Biochemistry Lab I. (2-8) The first of two laboratory courses providing instruction in the modern techniques of biochemistry. Experiments are performed on the isolation, manipulation and characterization of DNA, RNA and proteins. Students will prepare formal written reports and oral presentations. Prerequisites: CHEM 3275 with a grade of "C" or higher; CHEM 3380. (WI)

Department of Computer Science

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DEGREE PROGRAMS OFFERED

- Bachelor of Arts (BA), major in Computer Science
- Bachelor of Arts (BA), major in Computer Science (Teacher Certification in Computer Science, Grades 8-12)
- Bachelor of Science (BS), major in Computer Science
- Bachelor of Science (BS), major in Computer Science (Concentration in Computer Engineering)
- Bachelor of Science (BS), major in Computer Science (Teacher Certification in Computer Science, Grades 8-12)

MINOR OFFERED

Computer Science

CERTIFICATE OFFERED

Computer Science

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 (BA) or a Bachelor of Science (BS). 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 systems, 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, artificial intelligence, and several programming languages including C, C++, Java, Assembly, LISP, HTML, Perl, PHP, and JavaScript.

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

Certificate in Computer Science

Additionally, for persons who already hold a baccalaureate degree, the department offers a Certificate in Computer Science. Refer to the Texas State graduate catalog for more information.

Teacher Certification

Students may pursue teacher certification in Computer Science for Texas public schools grades 8-12 through a BA or BS degree. Students 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: Education Core (CI 4332, CI 3325), Field-Based Block (CI 4343, CI 4370, RDG 3323), and Student Teaching (EDST 4681). Please note that students must take CI 4332 and CI 3325 prior to participating in a field-based block.

A student also may elect certification as a post-baccalaureate or graduate student. Graduate or post-baccalaureate students should contact the Office of Educator Preparation (OEP) for further information. The OEP provides information regarding progress toward becoming a certified teacher in Texas. 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. Visit www.education.txstate.edu/oep/ for more information.

Admission to teacher education is required for students who want to be certified to teach in Texas accredited schools. Students should follow the curriculum sequence outlined by their major departments or colleges. For information about admission requirements to the program refer to the College of Education section in this catalog.

Second Teaching Field in Computer Science

For students who are seeking teacher certification in their major but would like a second teaching field in Computer Science for Texas public schools (grades 8-12), the requirements are: CS 1308, 1428, 2308, 2315, 2318, 2420, 3358, 3398, 4354, and Math 2358.

Bachelor of Arts (BA) Major in Computer Science Minimum required: 120 semester hours							
General Requirements:							
1. A minimum of 120 hours is required for graduation. Of those hours, 9 hours must be writing intensive and 36 hours must be advanced. Advanced courses are numbered 3000-4000 level.							
2. A minimum of 42 hours must be completed in the general education core. Refer to the Academic Services section of this catalog for additional information about general education core curriculum requirements.							
3. In addition to satisfying the University graduation requirements, students must earn a grade of C or higher in all computer science and mathematics courses used to satisfy the requirements of the computer science major.							
4. Computer Science majors must take eight hours (2 courses) from: BIO 1330/1130 & 1331/1131; PHYS 1315/1115 & 1325/1125 [or 1430 & 2425]; CHEM 1341/1141, and 1342/1142; or GEOL 1410 & 1420. The eight hours (2 courses) must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.							
5. MATH 2417 or 2471 may substitute for the MATH 1317, 1319, 1329, or 2321 requirement.							
6. Students pursuing the BA degree are required to complete 6 hours of modern language (2310 and 2320) in the same modern language. Most students will have to complete 1410 and 1420 as prerequisites before attempting 2310.							
7. Students pursuing the BS degree are required to complete an additional 3 hours of English beyond the core curriculum. A grade of C or higher is required in these additional hours to satisfy the graduation requirements of the CS major. Students may select from ENG 2310, 2320, 2330, 2340, 2359, 2360, ENG 3303 (Technical Writing), or ENG 3311 (Writing for the Computer Industry) to fulfill this requirement. ENG 3303 or 3311 is recommended.							
8. Computer Science majors must complete a CS project course from: CS 3468, 4326, or 4398.							
9. A minor is required, and it is recommended that it be chosen in consultation with the academic advisor.							
10. The number of free electives a student will complete varies, depending on the number of hours needed to satisfy the 120 and/or the 36 advanced or 9 hours writing intensive requirements. Students should consult with the academic advisor before enrolling in any free elective courses to ensure that electives are needed.							
Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 1428	4	CS 2308	3	CS 2315	3	CS 3358	3
MATH 1317, 1319, 1329, or 2321 (see gen. req. 4)	3	MATH 2358	3	CS 2420	4	CS 2318	3
US 1100	1	Natural Science (see gen. req. 3)	4	MATH 3398	3	Modern Language 1420	4
ENG 1310	3	ENG 1320	3	Modern Language 1410 (see gen. req. 5)	4	Natural Science (see gen. req. 3)	4
COMM 1310	3	PHIL 1305 or 1320	3	ENG Lit 2310, 2320, 2330, 2340, 2359, 2360	3		
Total	14	Total	16	Total	17	Total	14

Junior Year - 1st Semester		Junior Year - 2nd Semester		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 3398	3	CS Advanced Elective	3	CS 4354	3	CS Advanced Elective	3
Second ENG Lit 2310, 2320, 2330, 2340, 2359, 2360 or 3303 or 3311 (see gen. req. 6)	3	Modern Language 2320	3	CS Project (CS 3468, 4326, or 4398)	3	CS Advanced Elective	3
Modern Language 2310	3	Minor (see gen. req. 8)	3	Minor (see gen. req. 8)	3	Minor (see gen. req. 8)	5
Minor (see gen. req. 8)	3	ART, DAN, MU, or TH 2313	3	Social Science ANTH 1312,		POSI 2320	3
HIST 1310	3	HIST 1320	3	ECO 2301, ECO 2314, GEO 1310,	3		
				SOCI 1310, PSY 1300	3		
				POSI 2310	3		
Total	15	Total	15	Total	15	Total	14

Bachelor of Arts (BA)
Major in Computer Science
(Teacher Certification in Computer Science, Grades 8-12)
Minimum required: 127 semester hours

General Requirements:

1. A minimum of 127 hours will be completed for students pursuing teacher certification. Of those hours, 9 hours must be writing intensive, and 36 hours must be advanced. Advanced courses are 3000-4000 level courses.
2. A minimum of 42 hours must be completed in the general education core. Refer to the Academic Services section of this catalog for additional information about general education core curriculum requirements.
3. In addition to satisfying the University graduation requirements, students must earn a grade of C or higher in all computer science and mathematics courses used to satisfy the requirements of the computer science major.
4. Computer Science majors must take eight hours (2 courses) from: BIO 1330/1130 & 1331/1131; PHYS 1315/1115 & 1325/1125 (or 1430 & 2425); CHEM 1341/1141, and 1342/1142; or GEOL 1410 & 1420. The eight hours (2 courses) must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
5. MATH 2417 or 2471 may substitute for the MATH 1317, 1319, 1329, or 2321 requirement.
6. Students pursuing the BA degree are required to complete 6 hours of language (2310 and 2320) in the same modern language. Most students will have to complete 1410 and 1420 as prerequisites before attempting 2310.
7. Students pursuing the BA degree are required to complete an additional 3 hours of English beyond the core curriculum. A grade of C or higher is required in these additional hours to satisfy the graduation requirements of the CS major. Students may select from ENG 2310, 2320, 2330, 2340, 2359, 2360, ENG 3303 (Technical Writing), or ENG 3311 (Writing for the Computer Industry) to fulfill this requirement. ENG 3303 or 3311 is recommended.
8. Computer Science majors must complete a CS project course from: CS 3468, 4326, or 4398.
9. A minor is required. Students seeking teacher certification will automatically satisfy a minor in Secondary Education when they successfully complete the 21 hours of Professional Education sequence of courses under the College of Education (CI 3325, 4332, 4370, 4343, RDG 3323, and EDST 4681--Student Teaching).

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 1428	4	CS 2308	3	CS 2315	3	CS 3358	3
MATH 1317, 1319, 1329, or 2321 (see gen. req. 4)	3	MATH 2358	3	CS 2420	4	CS 2318	3
US 1100	1	Natural Science (see gen. req. 3)	4	MATH 3398	3	Modern Language 1420	4
ENG 1310	3	ENG 1320	3	Modern Language 1410 (see gen. req. 5)	4	Natural Science (see gen. req. 3)	4
COMM 1310	3	PHIL 1305 or 1320	3				
Total	14	Total	16	Total	14	Total	14

Sophomore Year - Summer I		Sophomore Year - Summer II		Junior Year - 1st Semester		Junior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
ENG Lit 2310, 2320, 2330, 2340, 2359, 2360	3	ART, DAN, MU, or TH 2313	3	CS 3398	3	CS Advanced Elective	3
HIST 1310	3	HIST 1320	3	Second ENG Lit 2310, 2320, 2330, 2340, 2359, 2360	3	CS Advanced Elective	3
				CS 4354	3	CS Project Course CS 3468, 4326, 4398	3-4
				Modern Language 2310	3	Modern Language 2320	3
				CI 3325	3	CI 4332	3
Total	6	Total	6	Total	15	Total	15

Junior Year - Summer I		Junior Year - Summer II		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
POSI 2310	3	POSI 2320	3	CS Advanced Elective	3	EDST 4681 (Student Teaching)	6
Social Science ANTH 1312, ECO 2301, ECO 2314, GEO 1310, SOCI 1310, PSY 1300	3			CI 4370	3		
				CI 4343	3		
				RDG 3323	3		
Total	6	Total	3	Total	12	Total	6

**Bachelor of Science (BS)
Major in Computer Science
Minimum required: 120 semester hours**

General Requirements:

1. A minimum of 120 hours is required for graduation. Of those, 9 hours must be writing intensive and 36 hours must be advanced. Advanced courses are 3000-4000 level courses.
2. A minimum of 42 hours must be completed in the general education core. Refer to the Academic Services section of this catalog for additional information about general education core curriculum requirements.
3. In addition to satisfying the University graduation requirements, students must earn a grade of C or higher in all computer science and mathematics courses used to satisfy the requirements of the computer science major.
4. Computer Science majors must take sixteen hours (4 courses) from: BIO 1330/1130 & 1331/1131; PHYS 1315/1115 & 1325/1125 (or 1430 & 2425); CHEM 1341/1141 and 1342/1142; or GEOL 1410 & 1420. Eight hours (2 courses) must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
5. A minor is required, and it is recommended that it be chosen in consultation with the academic advisor.
6. Students pursuing the BS are required to complete a total of 17 hours in mathematics. Therefore, a Mathematics minor is recommended.
7. 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 language taken in high school, then two semesters of the same modern language must be taken at the college level.
8. Students pursuing the BS degree are required to complete an additional 3 hours of English beyond the core curriculum. A grade of C or higher is required in these additional hours to satisfy the graduation requirements of the CS major. Students may select from ENG 2310, 2320, 2330, 2340, 2359, 2360, ENG 3303 (Technical Writing), or ENG 3311 (Writing for the Computer Industry) to fulfill this requirement. ENG 3303 or 3311 is recommended.
9. Computer Science majors must complete one CS project course from: CS 3468, 4326, or 4398.

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 1428	4	CS 2308	3	CS 3358	3	CS 2318	3
MATH 2471	4	MATH 2472	4	CS 2420	4	CS 2315	3
US 1100	1	ENG 1320	3	MATH 3398	3	Natural Science (see gen. req. 3)	4
ENG 1310	3	PHIL 1305 or 1320	3	Natural Science (see gen. req. 3)	4	Social Science ANTH 1312, ECO 2301, ECO 2314, GEO 1310, SOCI 1310, PSY 1300	3
COMM 1310	3	MATH 2358	3			ENG Lit 2310, 2320, 2330, 2340, 2359, 2360	3
Total	15	Total	16	Total	14	Total	16

Junior Year - 1st Semester		Junior Year - 2nd Semester		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 3398	3	CS 3339	3	CS 4354	3	CS Advanced Elective	3
CS Advanced Elective	3	CS Advanced Elective	3	CS Project Course CS 3468, 4326, 4398 (see gen. req. 8)	3-4	CS Advanced Elective	3
Second ENG Lit 2310, 2320, 2330, 2340, 2359, 2360 (see gen. req. 7)	3	MATH 3305	3	POSI 2310	3	Minor (see gen. req. 4)	6
Natural Science (see gen. req. 3)	4	Natural Science (see gen. req. 3)	4	ART, DAN, MU, or TH 2313	3	POSI 2320	3
HIST 1310	3	HIST 1320	3				
Total	16	Total	16	Total	12-13	Total	15

**Bachelor of Science (BS)
Major in Computer Science
(Concentration in Computer Engineering)
Minimum required: 120 semester hours**

General Requirements:

1. A minimum of 120 hours is required for graduation. Of those, 9 hours must be writing intensive and 36 hours must be advanced. Advanced courses are 3000-4000 level courses.
2. A minimum of 42 hours must be completed in the general education core. Refer to the Academic Services section of this catalog for additional information about general education core curriculum requirements.
3. In addition to satisfying the University graduation requirements, students must earn a grade of C or higher in all computer science and mathematics courses used to satisfy the requirements of the computer science major.
4. Computer Science majors must take sixteen hours (4 courses) from: BIO 1330/1130 & 1331/1131; PHYS 1315/1115 & 1325/1125 [or 1430 & 2425]; CHEM 1341/1141 & 1342/1142; or GEOL1410 & 1420. Eight hours (2 courses) must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
5. A minor is required, and it is recommended that it be chosen in consultation with the academic advisor.
6. Students pursuing the BS are required to complete a total of 17 hours in mathematics from 2471, 2472, 3305, 2358, 3398. Therefore, a Mathematics minor is recommended.
7. 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 language taken in high school, then two semesters of the same modern language must be taken at the college level.
8. Students pursuing the BS degree are required to complete an additional 3 hours of English beyond the core curriculum. A grade of C or higher is required in these additional hours to satisfy the graduation requirements of the CS major. Students may select from ENG 2310, 2320, 2330, 2340, 2359, 2360, ENG 3303 (Technical Writing), or ENG 3311 (Writing for the Computer Industry) to fulfill this requirement. ENG 3303 or 3311 is recommended.
9. Computer Science majors must complete one CS project course from: 4326 or 4398.
10. The concentration in computer engineering consists of EE 2400, CS 3468, and two courses chosen from CS 4310, CS 4318, CS 4328, or CS 4388.

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 1428	4	CS 2308	3	CS 3358	3	CS 2318	3
MATH 2471	4	MATH 2472	4	CS 2420	4	CS 2315	3
US 1100	1	ENG 1320	3	MATH 3398	3	Social Science ANTH 1312, ECO	
ENG 1310	3	PHIL 1305 or 1320	3	Natural Science (see gen. req. 3)	4	2301, ECO 2314, GEO 1310, SOCI	
COMM 1310	3	MATH 2358	3	ENG Lit 2310, 2320, 2330, 2340, 2359, 2360	3	1310, PSY 1300	3
						Natural Science (see gen. req. 5)	4
Total	15	Total	16	Total	17	Total	13

Junior Year - 1st Semester		Junior Year - 2nd Semester		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 3468	4	CS 3339	3	CS 4354	3	CS Project Course CS 4326 or	
CS 3398	3	MATH 3305	3	CS 4310, 4318, 4328, or 4388	6	4398 (see gen. req. 8)	3
EE 2400	4	Natural Science (see gen. req. 3)		HIST 1320	3	Minor (see gen. req. 4)	4
Second ENG Lit 2310, 2320, 2330, 2340, 2359, 2360, 3303, or 3311 (see gen. req. 7)	3	HIST 1310	4	ART, DAN, MU, or TH 2313	3	POSI 2320	3
Natural Science (see gen. req. 3)	4	POSI 2310	3				
			3				
Total	18	Total	16	Total	15	Total	10

Bachelor of Science (BS)
Major in Computer Science
(Teacher Certification in Computer Science, Grades 8-12)
Minimum required: 132 semester hours

General Requirements:

1. A minimum of 132 hours is required for graduation. Of those hours, 9 hours must be writing intensive hours, and 36 must be advanced. Advanced courses are 3000-4000 level courses.
2. A minimum of 42 hours must be completed in the general education core. Refer to the Academic Services section of this catalog for general education core curriculum requirements.
3. In addition to satisfying the University graduation requirements, students must earn a grade of C or higher in all computer science and mathematics courses used to satisfy the requirements of the computer science major.
4. Computer Science majors must take sixteen hours (4 courses) from: BIO 1330/1130 & 1331/1131; PHYS 1315/1115 & 1325/1125 (or 1430 & 2425); CHEM 1341/1141 & 1342/1142; or GEOL1410 & 1420. Eight hours (2 courses) must be from the same science (BIO, CHEM, GEOL, or PHYS) as listed above.
5. A minor is required. Students seeking teacher certification automatically satisfy a minor in Secondary Education when they successfully complete the 21 hours of Professional Education sequence of courses under the College of Education (CI 3325, CI 4332, CI 4343, RDG 3323, and EDST 4681—Student Teaching).
6. Students pursuing the BS are required to complete a total of 17 hours in mathematics from 2471, 2472, 3305, 2358, 3398.
7. 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 language taken in high school, then two semesters of the same modern language (1410 and 1420) must be taken at the college level.
8. Students pursuing the BS degree are required to complete an additional 3 hours of English beyond the core curriculum. A grade of C or higher is required in these additional hours to satisfy the graduation requirements of the CS major. Students may select from ENG 2310, 2320, 2330, 2340, 2359, 2360, ENG 3303 (Technical Writing), or ENG 3311 (Writing for the Computer Industry) to fulfill this requirement. ENG 3303 or 3311 is recommended.
9. Computer Science majors must complete one CS project course from: CS 3468, 4326, or 4398.

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS 1428	4	CS 2308	3	CS 3358	3	CS 2318	3
MATH 2471	4	MATH 2472	4	CS 2420	4	CS 2315	3
US 1100	1	ENG 1320	3	MATH 3398	3	Natural Science (see gen. req. 3)	4
ENG 1310	3	PHIL 1305 or 1320	3	Natural Science (see gen. req. 3)	4	Social Science ANTH 1312, ECO 2301, ECO 2314, GEO 1310, SOCI 1310, or PSY 1300	3
COMM 1310	3	MATH 2358	3	ENG Lit ENG 2310, 2320, 2330, 2340, 2359, or 2360	3		
Total	15	Total	16	Total	17	Total	13

Sophomore Year - Summer I		Sophomore Year - Summer II		Junior Year - 1st Semester		Junior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
HIST 1310	3	HIST 1320	3	CS 3398	3	CS 3339	3
POSI 2310	3	POSI 2320	3	CS 4354	3	CS Advanced Elective	3
				CI 4332	3	CS Project Course (see gen. req. 5)	3
				Second ENG Lit (see gen. req. 7) or 3303 or 3311 Science (see gen. req. 3)	3	CI 3325	3
					4	Science (see gen. req. 4)	4
Total	6	Total	6	Total	16	Total	16

Junior Year - Summer I		Junior Year - Summer II		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
CS Advanced Elective	3	ART, DAN, MU, or TH 2313	3	CI 4370	3	EDST 4681 (Student Teaching)	6
CS Advanced Elective	3			CI 4343	3		
				RDG 3323	3		
				MATH 3305	3		
Total	6	Total	3	Total	12	Total	6

Minor in Computer Science

A minor in Computer Science consists of CS 1428, 2308, 2318, 3358, at least six advanced CS hours, plus MATH 2358.

Courses in Computer Science (CS)

- 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 (COSC 1315) 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 1420) 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 2315) 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: CS 1428 with a grade of "C" or higher.
- 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 1428, ENG 1310, COMM 1310, and PHIL 1305 with grades of C or higher. (WI)
- 2318 (COSC 2325) Assembly Language. (3-0) 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. Prerequisite: MATH 2358 and CS 2308 with grades of C or higher.
- 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.
- 2420 Digital Logic. (3-2) 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.
- 3320 Internet Software Development. (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 software development. Prerequisite: CS 2308 with a grade of "C" or higher or consent of instructor.
- 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 2420 or EE 2420), (CS 2315 or EE 2400), and (CS 2318 or EE 3420) with grades 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 and MATH 2358 with grades 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.
- 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. Prerequisites: (CS 2315 or EE 2400) and CS 3358 with grades 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 and CS 2420 with grades 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. May be repeated once but not for credit and requires approval of the department chair. Prerequisite: CS majors and minors only.
- 4298 Undergraduate Research I. (1-2) 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.
- 4299 Undergraduate Research II. (1-2) Supervised individual research projects in a mentor-student relationship with a computer science faculty member. Prerequisites: CS 4298 and departmental approval.
- 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.
- 4315 Introduction to Data Mining. (3-0) 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.
- 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.
- 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. (WI)

- 4328 Operating Systems. (3-0) 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.
- 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.
- 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 with a grade of C or higher.
- 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.
- 4378A Introduction to Digital Forensics. (3-0) 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 with a grade of C or higher or consent of instructor.
- 4378P Introduction to Digital Multimedia. (3-0) 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.
- 4378T Parallel Programming. (3-0) 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 C or higher or instructor consent.
- 4378V Introduction to Machine Learning. (3-0) 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 with a grade of C or higher.
- 4378W Introduction to Human Computer Interaction (HCI). (3-0) 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 a grade of C or higher.
- 4378Z Practical Game Development. (3-0) 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. Prerequisite: CS 3398 with a grade of C or higher.
- 4379 Topics in Computer Science. (3-0) Selected topics in computer science. May be repeated with different emphasis for additional credit. Prerequisite: Consent of instructor.
- 4379A Software Testing. (3-0) 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.
- 4379B Introduction to Graphical User Interfaces. (3-0) 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.
- 4379Q Introduction to Recommender Systems. (3-0) 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.
- 4379Y Introduction to Green Computing. (3-0) 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.

- 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. Course is not repeatable for credit.
- 4398 Software Engineering Project. (3-0) 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.

Ingram School of Engineering

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DEGREE PROGRAMS OFFERED

- Bachelor of Science (BS), major in Electrical Engineering (Computer Engineering Specialization)
- Bachelor of Science (BS), major in Electrical Engineering (Micro and Nano Devices and Systems Specialization)
- Bachelor of Science (BS), major in Electrical Engineering (Networks and Communication Systems Specialization)
- Bachelor of Science (BS), major in Industrial Engineering
- Bachelor of Science (BS), major in Manufacturing Engineering (General Manufacturing Concentration)
- Bachelor of Science (BS), major in Manufacturing Engineering (Mechanical Systems Concentration)
- Bachelor of Science (BS), major in Manufacturing Engineering (Semiconductor Manufacturing Concentration)

The BS with a major in Electrical Engineering provides students the background that is essential for the conception, design, development, and manufacture of electrical, electronic and information technology products and systems. Students may specialize in the areas of networks and communication systems, micro and nano devices and systems, or computer engineering. Proficiency in mathematics is especially important in Electrical Engineering. In order to be admitted to the EE program, a student needs to be qualified to take MATH 2417 or higher. The BS with a major in Electrical Engineering is accredited by ABET (www.abet.org).

The BS with a major in Industrial Engineering provides students the background that is essential for improving the productivity, quality, safety, and cost effectiveness of all types of systems and processes. Industrial engineers are typically engaged in the areas of quality assurance, ergonomics, production and operations management, facilities design, work design, system optimization, information technology, and industrial safety.

The BS with a major in Manufacturing Engineering is designed to provide students with the mathematics, science, management, engineering, and applications skills needed to become manufacturing engineers. These engineers are typically responsible for promoting manufacturability, process planning, tool design, cost estimation, factory layout, work methods, quality assurance, automation, and systems integration. The degree has a concentration in general manufacturing, mechanical systems or semiconductor/high technology manufacturing. The BS with a major in Manufacturing Engineering is accredited by ABET (www.abet.org).

The Ingram School of Engineering Mission Statement

1. To provide students with an exceptional education in various disciplines of engineering,
2. To establish, through dedicated faculty, a nationally recognized research program, preparing interested students to achieve excellence in graduate studies and research, and
3. To serve the State of Texas and the nation by creating highly skilled, diverse, and motivated professionals capable of technological innovation and dedicated to the improvement of society.

The Ingram School of Engineering Vision Statement

The Ingram School of Engineering will be a nationally recognized institution of higher education, serving students and employers with a complete set of accredited engineering programs supported by a faculty which maintains high standards of teaching, research, and service. To accomplish this vision, we will:

1. Engage undergraduate and graduate students with innovative, multidisciplinary, and nationally recognized funded research programs,
2. Emphasize quality undergraduate and graduate education using a practical, interactive, and contemporary learning environment,
3. Produce first-generation professional college graduates as part of an HSI-designated university; be recognized for exceptional community service; and create tight bonds with alumni who will serve as professional mentors, sponsors, and advisors.
4. Promote a student-centered culture based on collegiality, scholarship, enthusiasm, integrity, and mutual respect among diverse faculty, staff, and students.

The Electrical Engineering Mission Statement & Objectives

Our mission is:

To lead students to be innovative, ethical engineering professionals through solid education at the undergraduate level, by providing opportunities to participate in research, and by responding to the needs of the Central Texas region, the state of Texas, and the nation. We achieve this mission by:

- * Engaging colleagues and students in new and more effective ways to transmit knowledge to the next generation of electrical engineers.
- * Engaging colleagues and students in pioneering, scholarly, multidisciplinary research efforts.
- * Creating an inclusive environment which emphasizes ethics