MAJOR IN COMPUTER SCIENCE, COMPUTER SCIENCE EDUCATION CONCENTRATION

Computer science is the study of algorithms and software systems: their theory, analysis, design, efficiency, implementation, maintenance, and application. Computers Science Educators seek to advance the fundamental quality of computer science education by having a deeper understanding on how students learn combined with the complexities of the computational mindset that is developed through computer science.

Computer Science Education students will engage in coursework related to both computer science and education, and their intersection, the growing field of computer science education. Through course work, service learning, and student teaching, this degree will prepare students to enter the field as a K-12 teachers. Furthermore, this degree will serve as preparation for admission into advanced degree programs and college level teaching and research in the field of computer science education.

Course work includes the same core foundation expected of all computer science concentrations, and course work specific to computer science education and teaching standards including web development, software engineering, and networking.

Learning Objectives

Upon successfully completing this program, students will be able to:

1. Demonstrate proficiency in the areas of software design and development, computing systems, and algorithmic analysis. Students will have a thorough grounding in the key principles and practices of computing, and in the mathematical and scientific principles of computation.
2. Work effectively in groups to develop computational solutions to complex problems.
3. Communicate ideas effectively, both generally and specifically, with regard to technology and computing.
4. Demonstrate strong pedagogical practices related to education and computational thinking.
5. Develop lesson plans related to computer science with artifact generation and statistical analysis of artifacts and student performance.
6. Demonstrate the variety of fields in which computer science is applied, with direct knowledge in fields relating to the CO Standards for CS Education (algorithms, data structures, web development, networking and security).

Potential Occupations

Upon completing this program, students can either attend graduate school in computer science, find professional computer-related employment, or directly enter employment as K-12 computer science / technology education teachers.

Students interested in pursuing a teaching license through CSU may refer to Educator Preparation (http://www.cep.chhs.colostate.edu/)and the School of Education (https://catalog.colostate.edu/general-catalog/colleges/health-human-sciences/education/)for general information.

Requirements Effective Fall 2025

A minimum grade of C (2.000) is required in CO 150 and in all CS, DSCI, MATH, and STAT courses which are required for graduation.

Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
CS 201/PHIL 201	Ethical Computing Systems (GT-AH3)	3B	3
MATH 156 or 160[1]	Mathematics for Computational Science I (GT-MA1) Calculus for Physical Scientists I (GT-MA1)	1B	4
Select one group from the following:[2]			5-9
Group A:			
CS 150A or 150B	Culture and Coding: Java (GT-AH3) Culture and Coding: Python (GT-AH3)	3B	
CS 162 or 164	CS1--Introduction to Java Programming CS1--Computational Thinking with Java		
Group B:			
CS 152	Python for STEM		
CS 162 or 164	CS1--Introduction to Java Programming CS1--Computational Thinking with Java		
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)		3B	
Group C:			
CS 163	CS1---No Prior Programming Experience		
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)		3B	

Select at least two courses totaling a minimum of 7 credits from the following (one course must be or include the sequenced laboratory):			7
AA 100 & AA 101	Introduction to Astronomy (GT-SC2)	3A	
ANTH 120 & ANTH 121	Human Origins and Variation (GT-SC2)	3A	
BZ 110 & BZ 111	Principles of Animal Biology (GT-SC2)	3A	
BZ 120	Principles of Plant Biology (GT-SC1)	3A	
CHEM 107 & CHEM 108	Fundamentals of Chemistry (GT-SC2)	3A	
CHEM 111 & CHEM 112	General Chemistry I (GT-SC2)	3A	
GEOL 120 & GEOL 121	Geology and Society (GT-SC2)	3A	
GEOL 122 & GEOL 121	Geoscience--Climate and Environmental Change (GT-SC2)	3A	
GEOL 124 & GEOL 121	Earth Resources and Sustainability (GT-SC2)	3A	
GEOL 150	Dynamic Earth (GT-SC2)	3A	
HONR 292A	Honors Seminar: Knowing in the Sciences	3A	
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	
LIFE 103	Biology of Organisms-Animals and Plants (GT-SC1)	3A	
LIFE 201A	Introductory Genetics: Applied/Population/Conservation/Ecological (GT-SC2)	3A	
LIFE 201B	Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2)	3A	
LIFE 220/LAND 220	Fundamentals of Ecology (GT-SC2)	3A	
NR 150	Oceanography (GT-SC2)	3A	
PH 121	General Physics I (GT-SC1)	3A	
PH 122	General Physics II (GT-SC1)	3A	
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Electives[3]			1-5
	Total Credits		**30**

Sophomore

CS 165	CS2--Data Structures		4
CS 220	Discrete Structures and the Applications		4
EDUC 275	Schools, Society, and Self (GT-SS3)	3C	3
EDUC 340	Literacy and the Learner		3
Select one group from the following:			4-5
Group A			
CS 214	Software Development		
CT 301	C++ Fundamentals		
Group B			
CS 253	Software Development with C++		
Select one course from the following:			4
CS 250	Computer Systems Foundations		
CS 270	Computer Organization		
Select one course from the following:			3-4
DSCI 369	Linear Algebra for Data Science		
MATH 369	Linear Algebra I		
Select one course from the following:			1-3

STAT 301	Introduction to Applied Statistical Methods		
STAT 302A	Statistics Supplement: General Applications		
STAT 307	Introduction to Biostatistics		
STAT 315	Intro to Theory and Practice of Statistics		
Electives			0-4
	Total Credits		**30**
Junior			
CS 314	Software Engineering	4A,4B	3
CS 320	Algorithms--Theory and Practice		3
CS 370	Operating Systems		3
EDUC 331	Educational Technology and Assessment		2
EDUC 350	Instruction I-Individualization/Management		3
EDUC 386	Practicum-Instruction I		1
Two CS courses numbered 300- or above, excluding 380-399 and 480-499			6-8
One CS course numbered 400- or above, excluding 480-499			4
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)		2	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
	Total Credits		**31-33**
Senior			
EDCT 465	Methods and Materials in Technology Education		3
EDCT 485	Student Teaching	4A,4B,4C	11
EDUC 450	Instruction II-Standards and Assessment		4
EDUC 486E	Practicum: Instruction II		1
EDUC 493A	Seminar: Professional Relations		1
CS Education Standards: Select 2 courses from the following			7-8
CS 312	Modern Web Applications		
CS 414	Object-Oriented Design		
CS 430	Database Systems		
CS 457	Computer Networks and the Internet		
Elective[4]			0-1
	Total Credits		**27-29**
	Program Total Credits:		**120**

1 MATH 156 recommended for computer science majors who do not already have MATH 160 credit.

2 Recommended sequence for most incoming students is Group A: CS 150B to CS 164.

3 CS 192 or other seminar course is a recommended elective for incoming, first semester, students.

4 Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

Major Completion Map

Distinctive Requirements for Degree Program:

To prepare for first semester: The curriculum for the Computer Science major assumes students enter college prepared to take calculus. Entering students who are not prepared to take calculus will need to fulfill pre-calculus requirements in the first semester. All students must maintain a C (2.000) or better in CO 150 and in all CS, DSCI, MATH, and STAT courses which are required for graduation.4

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CO 150	College Composition (GT-CO2)	X		1A	3
First course in Group A, B, or C (See options on Concentration Requirements Tab)		X		3B	3

Department Approved Science (See list on Concentration Requirements Tab)		X		3A	4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		X		1C	3
Elective			X		1
MATH 124 and MATH 126 may be necessary for some students to fulfill pre-calculus requirements.		X			
	Total Credits				**14**
Semester 2		**Critical**	**Recommended**	**AUCC**	**Credits**
CS 201/PHIL 201	Ethical Computing Systems (GT-AH3)	X		3B	3
MATH 156 or 160	Mathematics for Computational Science I (GT-MA1) Calculus for Physical Scientists I (GT-MA1)	X		1B	4
Remaining course(s) from Group A, B, or C (See options on Concentration Requirements Tab)		X			2-6
Department Approved Science with Lab (See list on Concentration Requirements Tab)		X		3A	3
Electives			X		0-4
CO 150 must be completed by the end of Semester 2 with a grade of C or better.		X			
	Total Credits				**16**
Sophomore					
Semester 3		**Critical**	**Recommended**	**AUCC**	**Credits**
CS 165	CS2--Data Structures	X			4
CS 220	Discrete Structures and the Applications	X			4
EDUC 275	Schools, Society, and Self (GT-SS3)	X		3C	3
Select one course from the following:		X			1-3
STAT 301	Introduction to Applied Statistical Methods				
STAT 302A	Statistics Supplement: General Applications				
STAT 307	Introduction to Biostatistics				
STAT 315	Intro to Theory and Practice of Statistics				
Electives			X		0-2
	Total Credits				**14**
Semester 4		**Critical**	**Recommended**	**AUCC**	**Credits**
EDUC 340	Literacy and the Learner	X			3
Select one group from the following:		X			4-5
Group A					
CS 214	Software Development				
CT 301	C++ Fundamentals				
Group B					
CS 253	Software Development with C++				
Select one course from the following:		X			4
CS 250	Computer Systems Foundations				
CS 270	Computer Organization				
Select one course from the following:		X			3-4
DSCI 369	Linear Algebra for Data Science				
MATH 369	Linear Algebra I				
Elective					0-2
CS 165 and CS 220 and (CS 250 or CS 270) must be completed by the end of Semester 4.		X			
MATH 156 or MATH 160 and MATH 369 or DSCI 369 must be completed by the end of Semester 4.		X			
	Total Credits				**16**

Junior

Semester 5		Critical	Recommended	AUCC	Credits
CS 314	Software Engineering	X		4A,4B	3
CS 370	Operating Systems	X			3
EDUC 331	Educational Technology and Assessment	X			2
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)			X	2	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
CS 253 must be completed by the end of Semester 5.		X			
	Total Credits				**14**

Semester 6		Critical	Recommended	AUCC	Credits
CS 320	Algorithms--Theory and Practice	X			3
EDUC 350	Instruction I-Individualization/Management	X			3
EDUC 386	Practicum-Instruction I	X			1
Two CS courses numbered 300- or above, excluding 380-399 and 480-499		X			6-8
One CS course numbered 400- or above, excluding 480-499		X			4
CS 314 and CS 320 and CS 370 must be completed by the end of Semester 6.		X			
	Total Credits				**17-19**

Senior

Semester 7		Critical	Recommended	AUCC	Credits
EDCT 465	Methods and Materials in Technology Education	X			3
EDUC 450	Instruction II-Standards and Assessment	X			4
EDUC 486E	Practicum: Instruction II	X			1
Two CS Education Standards Courses (See CS Education Standards Course List on Concentration Requirements tab)		X			7-8
	Total Credits				**15-16**

Semester 8		Critical	Recommended	AUCC	Credits
EDCT 485	Student Teaching	X		4A,4B,4C	11
EDUC 493A	Seminar: Professional Relations	X			1
Elective			X		0-1
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
	Total Credits				**12-13**
	Program Total Credits:				**120**