MAJOR IN COMPUTER ENGINEERING

From self-driving cars to smart cities, we live in a hyper-connected world. As the smart thinkers behind today's smart devices and systems, computer engineers hold the key to understanding, advancing, and protecting the security of next generation technologies.

A degree in computer engineering from CSU will help you make an impact beyond your computer screen. Affording a big picture view of how technology works, computer engineers look at the interplay between hardware and software to create solutions that benefit society. Have an interest in robotics, artificial intelligence, machine learning, neural networks, or data science? With coursework designed to help you understand, advance, and protect the security of next generation technologies, our professors will arm you with knowledge to drive innovation, whether creating an elegant device that fits in the palm of your hand or optimizing a colossal system to manage and move data.

While our undergraduate program gives you the option to keep your studies broad, you may also specialize in one of the following concentrations:

- Aerospace Systems Concentration (https://catalog.colostate.edu/general-catalog/colleges/engineering/electrical-computer/computer-engineering-major-aerospace-systems-concentration/)
- Embedded and IoT Systems Concentration (https://catalog.colostate.edu/general-catalog/colleges/engineering/electrical-computer/computer-engineering-major-embedded-iot-systems-concentration/)
- Networks and Data Concentration (https://catalog.colostate.edu/general-catalog/colleges/engineering/electrical-computer/computer-engineering-major-networks-data-concentration/)

Career Opportunities

A field of endless possibilities, career paths for computer engineers are largely dependent on personal interests. Computer Engineering alumni hold positions such as software engineer for a tech giant, designer for a start-up company, and program manager for NASA. In addition to being one of the most lucrative college majors, Computer Engineering currently ranks among the top 10 majors in demand for bachelor's, master's, and doctoral degrees according to the National Association of Colleges and Employers. Almost every industry recruits computer engineering graduates, including aerospace, biomedical and healthcare, clean energy, robotics, climate science, manufacturing, agriculture, and transportation.

Learning Objectives

The Computer Engineering program educational objectives are designed and implemented around the following three principal attributes: mastery, innovation, and leadership.

Graduates of the Computer Engineering program will be able to:

1. Identify, formulate, and solve engineering problems in hardware, software, and integrated systems by applying principles of computer engineering, science, and mathematics
2. Apply the engineering design process to develop computer engineering solutions, balancing technical objectives with broader considerations including public health and safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. Communicate effectively with a range of audiences
4. Recognize ethical and professional responsibilities in computer engineering and make informed judgments, considering their impact in global, economic, environmental, and societal contexts
5. Function effectively on teams, collaborating on tasks related to computer engineering, to establish goals, task plans, and to meet task objectives
6. Develop and conduct appropriate experimentation, analyze results, and use principles of computer engineering to draw conclusions
7. Acquire and apply new knowledge in computer engineering, leveraging appropriate learning strategies

Requirements Effective Fall 2025

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in Electrical Engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with their advisor to correct grade point deficiencies. ECE courses required for the major at the 100, 200, and 300 level must be passed with a minimum grade of C (2.000); grades below a C will require the student to retake the course. ECE courses designated as an elective are exempt from the C or higher minimum grade requirement.

Freshman

		AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
CO 150	College Composition (GT-CO2)	1A	3
ENGR 111	Fundamentals of Engineering		3
ENGR 114	Engineering for Grand Challenges		3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
Select one group from the following:[1]			7
Group A			
CS 150B	Culture and Coding: Python (GT-AH3)	3B	
CS 164	CS1--Computational Thinking with Java		

Group B			
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
CS 152	Python for STEM		
CS 162	CS1--Introduction to Java Programming		
Group C			
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
CS 163	CS1-–No Prior Programming Experience		
	Total Credits		**29**

Sophomore

CS 165	CS2--Data Structures		4
CT 301	C++ Fundamentals		2
ECE 205	Analog Circuits I		2
ECE 206	Analog Circuits II		3
ECE 232	Introduction to Project Practices		1
ECE 252	Introduction to Digital Circuits		3
ECE 253	Microcontrollers and C for Internet-of-Things		3
ECE 303/STAT 303	Introduction to Communications Principles		3
MATH 261	Calculus for Physical Scientists III		4
MATH 340	Intro to Ordinary Differential Equations		4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
	Total Credits		**34**

Junior

CS 214	Software Development		3
CS 220	Discrete Structures and the Applications		4
ECE 311	Linear System Analysis I		3
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
JTC 300 or CO 301B	Strategic Writing and Communication (GT-CO3) Writing in the Disciplines: Sciences (GT-CO3)	2	3
Select a minimum of three credits from the following:			3
DSCI 369	Linear Algebra for Data Science		
MATH 369	Linear Algebra I		
Computer Engineering Electives - Group 1 (see list below)			11
	Total Credits		**30**

Senior

ECE 401	Senior Design Project I	4A,4B	3
ECE 402	Senior Design Project II	4C	3
Computer Engineering Electives - Group 2 and Group 3 and/or Technical Electives (see lists below)[2]			18
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
	Total Credits		**33**
	Program Total Credits:		**126**

Computer Engineering Electives - Group 1

Code	Title	Credits
Choose a minimum of 11 credits from the courses below:		
ECE 450	Digital System Design Laboratory	1
ECE 451	Digital System Design	3
ECE 452	Computer Organization and Architecture	3
ECE 456	Computer Networks	4
ECE 528/CS 528	Embedded Systems and Machine Learning	4

Computer Engineering Electives - Group 2 and Group 3

Code	Title	Credits
Group 2 - Choose 0-11 credits from the list below: [2]		0-11
DSCI 320/ MATH 320	Optimization Methods in Data Science	
ECE 312	Linear System Analysis II	
ECE 331	Electronics Principles I	
ECE 332	Electronics Principles II	
Group 3 - Choose 0-3 credits from the list below: [2]		0-3
ECE 395A	Independent Study [3]	
ECE 395B	Independent Study: Open Option Project [3]	
ECE 395C	Independent Study : Vertically Integrated Project [3]	
IDEA 310L	Design Thinking Toolbox : Creating Things That Think	
IDEA 310O	Design Thinking Toolbox: Digital Interaction and Game Design	

Technical Electives 4-18 credits

Code	Title	Credits
CS 310H/IDEA 310H	Design Thinking Toolbox: Mixed Reality Design	3
CS 314	Software Engineering	3
CS 320	Algorithms--Theory and Practice	3
CS 345	Machine Learning Foundations and Practice	3
CS 356	Systems Security	3
CS 370	Operating Systems	3
CS 4XX Any CS course numbered 400-479, excluding CS 457 and CS 470		
CS 5XX Any CS course numbered 500-579		
CT 307	High Performance Programming in Rust	2
DSCI 475	Topological Data Analysis	2
ECE 340	Electromagnetics for Computer Engineering	3
ECE 4XX Any ECE course at the 400-level		
ECE 495A	Independent Study [3]	1-6
ECE 495B	Independent Study: Open Option Project [3]	1
ECE 495C	Independent Study: Vertically Integrated Projects [3]	1
ECE 5XX Any ECE course at the 500-level, excluding ECE 532/ SYSE 532		
ENGR 430	Engineering With Drones	3
ENGR 478	Applied Engineering Data Analytics	3
MATH 360	Mathematics of Information Security	3
MATH 450	Introduction to Numerical Analysis I	3
MATH 451	Introduction to Numerical Analysis II	3
MATH 460	Information and Coding Theory	3
MATH 463	Post-Quantum Cryptography	3
MECH 564	Fundamentals of Robot Mechanics and Controls	3
STAT 421	Introduction to Stochastic Processes	3

1. Recommended sequence for most incoming students is Group A: CS 150B to CS 164.
2. Students will use 0-11 credits of Group 2 and 0-3 of Group 3 Computer Engineering Electives and 4-18 credits of Technical Electives to reach the required total of 126 program credits.
3. A total of 6 credits of Independent Study may apply toward total degree requirements. This includes credit awarded for ECE 395A, ECE 395B, ECE 395C, ECE 495A, ECE 495B, and ECE 495C combined.

Major Completion Map

Distinctive Requirements for Degree Program:

TO PREPARE FOR FIRST SEMESTER: The curriculum for this major assumes students enter college prepared to take calculus.

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in Electrical Engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with their advisor to correct grade point deficiencies. ECE courses required for the major at the 100, 200, and 300 level must be passed with a minimum grade of C (2.000); grades below a C will require the student to retake the course. ECE courses designated as an elective are exempt from the C or higher minimum grade requirement.

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)		X	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)		X	3A	1
ENGR 111	Fundamentals of Engineering	X			3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4

First course from Group A, B, or C (See options in Program Requirements Tab)		X		3B	3
	Total Credits				**15**
Semester 2		**Critical**	**Recommended**	**AUCC**	**Credits**
CO 150	College Composition (GT-CO2)		X	1A	3
ENGR 114	Engineering for Grand Challenges	X			3
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
Remaining course(s) from Group A, B, or C (See options in Program Requirements Tab)		X			4
	Total Credits				**14**
Sophomore					
Semester 3		**Critical**	**Recommended**	**AUCC**	**Credits**
CS 165	CS2--Data Structures	X			4
ECE 205	Analog Circuits I	X			2
ECE 252	Introduction to Digital Circuits	X			3
MATH 261	Calculus for Physical Scientists III	X			4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
	Total Credits				**18**
Semester 4		**Critical**	**Recommended**	**AUCC**	**Credits**
CT 301	C++ Fundamentals		X		2
ECE 206	Analog Circuits II	X			3
ECE 232	Introduction to Project Practices	X			1
ECE 253	Microcontrollers and C for Internet-of-Things	X			3
ECE 303/ STAT 303	Introduction to Communications Principles	X			3
MATH 340	Intro to Ordinary Differential Equations	X			4
	Total Credits				**16**
Junior					
Semester 5		**Critical**	**Recommended**	**AUCC**	**Credits**
CS 214	Software Development	X			3
ECE 311	Linear System Analysis I	X			3
JTC 300 or CO 301B	Strategic Writing and Communication (GT-CO3) Writing in the Disciplines: Sciences (GT-CO3)		X	2	3
Computer Engineering Electives - Group 1 (See List on Program Requirements Tab)		X			4-8
	Total Credits				**13-17**
Semester 6		**Critical**	**Recommended**	**AUCC**	**Credits**
CS 220	Discrete Structures and the Applications	X			4
ECON 202	Principles of Microeconomics (GT-SS1)		X	3C	3
Select one course from the following:			X		3
DSCI 369	Linear Algebra for Data Science				
MATH 369	Linear Algebra I				
Computer Engineering Electives - Group1 (See List on Program Requirements Tab)		X			3-7
	Total Credits				**13-17**
Senior					
Semester 7		**Critical**	**Recommended**	**AUCC**	**Credits**
ECE 401	Senior Design Project I	X		4A,4B	3
Computer Engineering Electives (Group 2/Group 3) and Technical Electives (See Lists on Program Requirements Tab)		X			10
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
	Total Credits				**16**

Semester 8		Critical	Recommended	AUCC	Credits
ECE 402	Senior Design Project II	X		4C	3
Computer Engineering Electives (Group 2/Group 3) and Technical Electives (See Lists on Program Requirements Tab)		X			8
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		X		3B	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		X		3D	3
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
	Total Credits				**17**
	Program Total Credits:				**126**