

MAJOR IN COMPUTER ENGINEERING, AEROSPACE SYSTEMS CONCENTRATION

Aerospace engineering is a broad and dynamic field that centers on the design, construction, and science behind aircraft and spacecraft. Intended for undergraduate computer engineering majors, the aerospace concentration offers students a computer engineering degree foundation and specialized training in the aerospace discipline. Course work will focus on applications of key computer engineering principles in the areas of computer systems, programming, deep-space communications, robotics, flight avionics, and more. These courses will enable and encourage students to solve complex engineering problems in aerospace such as improved safety-critical hardware design, real-time software programming, satellite communications, and remote sensing methods.

Computer engineering students concentrating in aerospace will experience first-hand the necessity of their major in innovating new solutions to support humanity's ascent to the stars.

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
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			32

Junior

CS 214	Software Development		3
CS 220	Discrete Structures and the Applications		4
CT 301	C++ Fundamentals		2
ECE 311	Linear System Analysis I		3
ECE 312	Linear System Analysis II		3
ECE 450	Digital System Design Laboratory		1
ECE 451	Digital System Design		3
ECE 452	Computer Organization and Architecture		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		
Total Credits			31

Senior

ECE 401	Senior Design Project I	4A,4B	3
ECE 402	Senior Design Project II	4C	3
Select one course from the following:			4
ECE 456	Computer Networks		
ECE 528/CS 528	Embedded Systems and Machine Learning		
Computer Engineering Electives (see list below) and Technical Electives (see list below)			15
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			34
Program Total Credits:			126

Computer Engineering Electives 0-3 credits

Code	Title	Credits
ECE 395A	Independent Study ²	1-3
ECE 395B	Independent Study: Open Option Project ²	1
ECE 395C	Independent Study : Vertically Integrated Project ²	1
IDEA 310L	Design Thinking Toolbox : Creating Things That Think	2

Technical Electives 12-15 credits

Code	Title	Credits
ATS 550	Atmospheric Radiation and Remote Sensing	3
CS 314	Software Engineering	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 CS457 and CS470		4
CS 545	Machine Learning	4
CS 553	Algorithmic Language Compilers	4
CS 559	Quantitative Security	4
CS 575	Parallel Processing	4
CT 307	High Performance Programming in Rust	2
ECE 340	Electromagnetics for Computer Engineering	3
ECE 404	Experiments in Optical Electronics	2
ECE 411	Control Systems	3
ECE 412	Digital Control and Digital Filters	3
ECE 415	Semiconductor Physics and Junctions	2
ECE 421	Telecommunications I	3
ECE 441	Optical Electronics	3
ECE 444	Antennas and Radiation	3
ECE 455	Introduction to Robot Programming/ Simulation	3
ECE 456	Computer Networks ³	4
ECE 495A	Independent Study ²	1-3

ECE 495B	Independent Study: Open Option Project ²	1
ECE 495C	Independent Study: Vertically Integrated Projects ²	1
ECE 512	Digital Signal Processing	3
ECE 514	Applications of Random Processes	3
ECE 516	Information Theory	3
ECE 520	Optimization Methods—Control and Comm.	3
ECE 521	Satellite Communication	3
ECE 528/CS 528	Embedded Systems and Machine Learning ³	4
ECE 529	Signal Processing & Artificial Intelligence	3
ECE 540	Computational Electromagnetics	3
ECE 541	Applied Electromagnetics	3
ECE 544	Silicon Photonics for Computing Systems	3
ECE 545	FPGA Signal Processing/Software-Defined Radio	3
ECE 549	Radar Systems and Design	3
ECE 553	Adaptive Systems and Machine Learning	3
ECE 554	Computer Architecture	3
ECE 556	AI for Radar and Remote Sensing	3
ECE 561/CS 561	Hardware/Software Design of Embedded Systems	4
ECE 564	Semiconductor Memory	3
ECE 571	VLSI System Design	4
ECE 578	Satellite Data Analysis	3
ECE 579	Global Navigation Satellite Systems	3
ENGR 430	Engineering With Drones	3
ENGR 570	Coupled Electromechanical Systems	3
MATH 450	Introduction to Numerical Analysis I	3

MATH 451	Introduction to Numerical Analysis II	3
MECH 518	Orbital Mechanics	3
MECH 519	Aerospace Vehicles Trajectory and Performance	3
STAT 421	Introduction to Stochastic Processes	3

¹ Recommended sequence for most incoming students is Group A: CS 150B to CS 164.

² 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.

³ Course may count as a Technical Elective ONLY when not taken as part of the major requirements. The course cannot count as credit toward both major and technical elective requirements.

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; 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		X	3A	4
CHEM 112		X	3A	1
ENGR 111	X			3
MATH 160	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		X	1A	3
ENGR 114	X			3
MATH 161	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	X			4
ECE 205	X			2
ECE 252	X			3
MATH 261	X			4
PH 141	X		3A	5

Total Credits

18

Semester 4		Critical	Recommended	AUCC	Credits
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					14
Junior					
Semester 5		Critical	Recommended	AUCC	Credits
CS 214	Software Development	X			3
CS 220	Discrete Structures and the Applications	X			4
ECE 311	Linear System Analysis I	X			3
ECE 450	Digital System Design Laboratory	X			1
ECE 451	Digital System Design	X			3
JTC 300 or CO 301B	Strategic Writing and Communication (GT-CO3) Writing in the Disciplines: Sciences (GT-CO3)		X	2	3
Total Credits					17
Semester 6		Critical	Recommended	AUCC	Credits
CT 301	C++ Fundamentals				2
ECE 312	Linear System Analysis II	X			3
ECE 452	Computer Organization and Architecture	X			3
ECON 202	Principles of Microeconomics (GT-SS1)		X	3C	3
Select a minimum of three credits from the following:			X		3
DSCI 369	Linear Algebra for Data Science				
MATH 369	Linear Algebra I				
Total Credits					14
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
ECE 401	Senior Design Project I	X		4A,4B	3
Select one course from the following:		X			4
ECE 456	Computer Networks				
ECE 528/ CS 528	Embedded Systems and Machine Learning				
Computer Engineering Electives and Technical Electives (See Lists on Program Requirements Tab)		X			4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
Total Credits					17
Semester 8		Critical	Recommended	AUCC	Credits
ECE 402	Senior Design Project II	X		4C	3
Computer Engineering Electives and Technical Electives (See Lists on Program Requirements Tab)		X			11
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		X		3B	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