MAJOR IN ELECTRICAL ENGINEERING, AEROSPACE CONCENTRATION

Aerospace engineering is a broad and dynamic field that centers on the design, construction, and science behind aircraft and spacecraft. Intended for undergraduate electrical engineering majors, the aerospace concentration offers students an electrical engineering degree foundation and specialized training in the aerospace discipline. Coursework will focus on applications of key electrical engineering principles in the areas of deep-space communications, robotics, embedded systems, flight avionics, and more. These courses will enable and encourage students to solve complex engineering problems in aerospace such as improved satellite communications, electric propulsion technologies, and remote sensing methods. Electrical 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.

Learning Objectives

Upon successful completion, students will be able to:

1. Identify, formulate, and solve engineering problems in aerospace systems by applying principles of electrical engineering, science, and mathematics.
2. Apply the engineering design process to develop electrical engineering solutions for aerospace systems, balancing technical objectives with broader considerations including public health, 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 aerospace systems and make informed judgments, considering their impact in global, economic, environmental, and societal contexts.
5. Function effectively on teams, collaborating on tasks related to aerospace systems, to establish goals, task plans, and to meet task objectives.
6. Develop and conduct appropriate experimentation, analyze results, and use electrical engineering judgment to draw conclusions.
7. Acquire and apply new knowledge in advancing aerospace systems, leveraging appropriate electrical engineering 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 ECE 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. In addition, 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
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
Select one group from the following:[1]			3
Group A:			
CS 150B	Culture and Coding: Python (GT-AH3)	3B	
Group B or Group C:			
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
	Total Credits		**30**
Sophomore			
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 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5
Select one group from the following:[1]			4
Group A			
CS 164	CS1--Computational Thinking with Java		
Group B			
CS 152	Python for STEM		
CS 162	CS1--Introduction to Java Programming		
Group C			
CS 163	CS1---No Prior Programming Experience		
	Total Credits		**32**

Junior

ECE 311	Linear System Analysis I		3
ECE 312	Linear System Analysis II		3
ECE 331	Electronics Principles I		4
ECE 332	Electronics Principles II	4A	4
ECE 341	Electromagnetic Fields and Devices I		3
ECE 342	Electromagnetic Fields and Devices II		3
JTC 300 or CO 301B	Strategic Writing and Communication (GT-CO3) Writing in the Disciplines: Sciences (GT-CO3)	2	3
Science/Math/Engineering Electives (See list below)			7
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
	Total Credits		**33**

Senior

ECE 401	Senior Design Project I	4A,4B	3
ECE 402	Senior Design Project II	4C	3
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
Aerospace Technical Electives (See list below)			12
Electrical Engineering Technical Electives (See list below)			4
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		**31**
	Program Total Credits:		**126**

Science/Math/Engineering Electives

Code	Title	Credits
BC 351	Principles of Biochemistry	4
BIOM 200	Fundamentals of Biomedical Engineering	2
BIOM 350A	Study Abroad--Ecuador: Prosthetics	1-3
BIOM 350C	Study Abroad--Ireland: Biomedical Engineering and Healthcare	1
BMS 300	Principles of Human Physiology	4
BMS 301	Human Gross Anatomy	5
BMS 325	Cellular Neurobiology	3
BMS 345	Functional Neuroanatomy	4
BZ 310	Cell Biology	4
CBE 160	MATLAB for Chemical and Biological Eng	1
CHEM 245	Fundamentals of Organic Chemistry	4
CHEM 246	Fundamentals of Organic Chemistry Laboratory	1
CIVE 260	Engineering Mechanics-Statics	3
CIVE 371	Study Abroad--Peru: Grand Challenges in Engineering in Peru	3
CS 165	CS2--Data Structures	4
CS 214	Software Development	3
CS 220	Discrete Structures and the Applications	4
CS 310H/IDEA 310H	Design Thinking Toolbox: Mixed Reality Design	3
CT 301	C++ Fundamentals	2
or CS 253	Software Development with C++	
CT 307	High Performance Programming in Rust	2
DSCI 320/MATH 320	Optimization Methods in Data Science	3
ECE 395A	Independent Study [2]	1-6

ECE 395B	Independent Study: Open Option Project [2]	1
ECE 395C	Independent Study : Vertically Integrated Project [2]	1
ENGR 300	3D Printing Lab for Engineers	1
ENGR 422	Technology Entrepreneurship	3
ENGR 478	Applied Engineering Data Analytics	3
HES 307	Biomechanical Principles of Human Movement	3
IDEA 310L	Design Thinking Toolbox : Creating Things That Think	2
IDEA 310O	Design Thinking Toolbox: Digital Interaction and Game Design	3
LIFE 103	Biology of Organisms-Animals and Plants (GT-SC1)	4
MATH 151	Mathematical Algorithms in Matlab I	1
MATH 229	Matrices and Linear Equations	2
MATH 235	Introduction to Mathematical Reasoning	2
MATH 301	Introduction to Combinatorial Theory	3
MATH 317	Advanced Calculus of One Variable	3
MATH 331	Introduction to Mathematical Modeling	3
MATH 332	Partial Differential Equations	3
MATH 360	Mathematics of Information Security	3
MATH 366	Introduction to Abstract Algebra	3
MATH 369	Linear Algebra I (credit not allowed for both MATH 369 and DSCI 369)	3
or DSCI 369	Linear Algebra for Data Science	
MECH 200A	Introduction to Manufacturing Processes: Lecture	3
MECH 200B	Introduction to Manufacturing Processes : Laboratory	1
MECH 201	Engineering Design I	2
MECH 202	Engineering Design II	3
MIP 300	General Microbiology	3
PH 314	Introduction to Modern Physics	4
PH 341	Mechanics	4
PH 353	Optics and Waves	4
PSY 253	Human Factors and Engineering Psychology	3
STAT 158	Introduction to R Programming	1
SYSE 501	Foundations of Systems Engineering	3
A maximum of one course may be taken from the following:		3-4
MECH 237	Introduction to Thermal Sciences	
MECH 337	Thermodynamics	
MECH 339	Thermodynamics I for Mechanical Engineers	

Aerospace Technical Electives

Code	Title	Credits
ATS 550	Atmospheric Radiation and Remote Sensing	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 452	Computer Organization and Architecture	3
ECE 455	Introduction to Robot Programming/ Simulation	3
ECE 456	Computer Networks	4
ECE 461	Power Systems	4
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	4
ECE 529	Signal Processing & Artificial Intelligence	3
ECE 536	RF Integrated Circuit Design	3
ECE 539	Digital Communications	3
ECE 540	Computational Electromagnetics	3
ECE 541	Applied Electromagnetics	3
ECE 545	FPGA Signal Processing/Software-Defined Radio	3
ECE 548	Microwave Theory and Component Design	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 562	Power Electronics I	3
ECE 565/ENGR 565	Electrical Power Engineering	3
ECE 572	Semiconductor Transistors	1
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
MECH 518	Orbital Mechanics	3
MECH 519	Aerospace Vehicles Trajectory and Performance	3

Electrical Engineering Technical Electives

Code	Title	Credits
ATS 550	Atmospheric Radiation and Remote Sensing	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		4
CS 5XX Any CS course numbered 500-579		4
DSCI 475	Topological Data Analysis	2

ECE 4XX Any ECE course at the 400-level		Var.
ECE 495A	Independent Study [2]	1-6
ECE 495B	Independent Study: Open Option Project [2]	1
ECE 495C	Independent Study: Vertically Integrated Projects [2]	1
ECE 5XX Any ECE course at the 500-level		Var.
ENGR 430	Engineering With Drones	3
ENGR 570	Coupled Electromechanical Systems	3
MATH 417	Advanced Calculus I	3
MATH 418	Advanced Calculus II	3
MATH 419	Introduction to Complex Variables	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
MATH 466	Abstract Algebra I	3
MATH 469	Linear Algebra II	3
MATH 474	Introduction to Differential Geometry	3
MECH 403	Energy Engineering	3
MECH 518	Orbital Mechanics	3
MECH 519	Aerospace Vehicles Trajectory and Performance	3
MECH 564	Fundamentals of Robot Mechanics and Controls	3
PH 315	Modern Physics Laboratory	2
PH 425	Advanced Physics Laboratory	2
PH 451	Introductory Quantum Mechanics I	3
PH 452	Introductory Quantum Mechanics II	3
PH 462	Statistical Physics	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 degree requirements. This includes credit 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
Course(s) from Group A, B, or C (See options in Program Requirements Tab)				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
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
	Total Credits				**15**

Sophomore

Semester 3		**Critical**	**Recommended**	**AUCC**	**Credits**
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 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
Course(s) from Group A, B, or C (See options in Program Requirements Tab)		X			4
	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**
ECE 311	Linear System Analysis I	X			3
ECE 331	Electronics Principles I	X			4
ECE 341	Electromagnetic Fields and Devices I	X			3
JTC 300 or CO 301B	Strategic Writing and Communication (GT-CO3) Writing in the Disciplines: Sciences (GT-CO3)		X	2	3
Science/Math/Engineering Electives (See List on Program Requirements Tab)			X		3
	Total Credits				**16**
Semester 6		**Critical**	**Recommended**	**AUCC**	**Credits**
ECE 312	Linear System Analysis II	X			3
ECE 332	Electronics Principles II	X		4A	4
ECE 342	Electromagnetic Fields and Devices II	X			3
Science/Math/Engineering Electives (See List on Program Requirements Tab)			X		4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
	Total Credits				**17**
Senior					
Semester 7		**Critical**	**Recommended**	**AUCC**	**Credits**
ECE 401	Senior Design Project I	X		4A,4B	3
Aerospace Technical Electives (See List on Concentration Requirements Tab)		X			6
Electrical Engineering Technical Electives (See List on Concentration Requirements Tab)		X			2
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
	Total Credits				**17**
Semester 8		**Critical**	**Recommended**	**AUCC**	**Credits**
ECE 402	Senior Design Project II	X		4C	3
ECON 202	Principles of Microeconomics (GT-SS1)	X		3C	3
Aerospace Technical Electives (See List on Concentration Requirements Tab)		X			6
Electrical Engineering Technical Electives (See List on Concentration Requirements Tab)		X			2
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
	Total Credits				**14**
	Program Total Credits:				**126**