Engineering (BS): Electrical Engineering Systems Concentration

The Electrical Engineering Systems concentration offers a solid foundation in electrical engineering principles, including electrical/electronic devices and circuits, computer hardware and software, electromagnetics, electrical power systems, control systems, communications and signal processing, and the design and analysis of digital/analog electronic systems. Electrical engineering courses are taught by nationally recognized faculty from the Raleigh campus.

On-site NC State faculty teach the systems engineering content, conduct all laboratory experiences, and direct students in the two-semester capstone design experience where they are partnered with an industry sponsor to design a solution to a real-world problem. Hands-on laboratory exercises and design-build projects each semester allow students to explore and experience theoretical concepts learned in their courses and practice important modern skills such as manual and computerized measurement techniques, data acquisition and analysis, troubleshooting, design of experiments, and technical communication.

Training in formal systems engineering prepares students to understand and work through the broad, complex issues involved with integrated systems. Training in electrical engineering equips students with the skills and confidence required to understand and solve detailed technical problems. Students with this unique combination of skills are well-prepared to meet both the technical and non-technical challenges of today's engineering workplace.

Plan Requirements

Code	Title	Hours
College Requirements		
E 101	Introduction to Engineering & Problem Solving	1
EC 205	Fundamentals of Economics	3
or EC 201	Principles of Microeconomics	
or ARE 201	Introduction to Agricultural & Resource Economics	
Math		
MA 141	Calculus I	12
& MA 241	and Calculus II	
& MA 242	and Calculus III	
MA 305	Introductory Linear Algebra and Matrices	3
Sciences		
CH 101	Chemistry - A Molecular Science	4
& CH 102	and General Chemistry Laboratory	
PY 205	Physics for Engineers and Scientists I	4
& PY 206	and Physics for Engineers and Scientists I Laboratory	
PY 208	Physics for Engineers and Scientists II	4
& PY 209	and Physics for Engineers and Scientists II Laboratory	
Major		
ECE 109	Introduction to Computer Systems	3
ECE 211	Electric Circuits	4
ECE 200	Introduction to Signals, Circuits and Systems	4
ECE 209	Computer Systems Programming	3
ECE 212	Fundamentals of Logic Design	3
ECE 220	Analytical Foundations of Electrical and Computer Engineering	3
ECE 301	Linear Systems	3
ECE 302	Microelectronics	4
ECE 303	Electromagnetic Fields	3
Select 2 ECE Foundation Electives (p. 1)		6
Select 2 ECE Electives (p. 2)		6
Select 1 of the following:		3
ECE Elective (p. 2)		
OR		
ECE Foundation Elective (p. 1)		
MES 200	Introduction to Engineering Systems	2
MES 201	Engineering Systems Lab 1	2
MES 300	Systems Engineering	3
MES 301	Engineering Systems Junior Design Lab	2
MES 304	Electrical Engineering Systems Lab 1	2
MES 401	MES Capstone Design I	3
MES 403	MES Capstone Design II	3
MES 404	Electrical Engineering Systems Lab 2	2
Other Major		
GC 120	Foundations of Graphics	3
ENG 331	Communication for Engineering and Technology	3
Engineering Ethics:		3
PHI 214	Issues in Business Ethics	
or PHI 221	Contemporary Moral Issues	
or PHI 375	Ethics	
GEP Courses		
ENG 101	Academic Writing and Research	4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		5
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)		
Total Hours		**124**

ECE Foundation Elective List

Code	Title	Hours
ECE 305	Principles of Electromechanical Energy Conversion	3
ECE 306	Introduction to Embedded Systems	3

ECE 308	Elements of Control Systems	3
ECE 310	Design of Complex Digital Systems	3

ECE Elective List

Code	Title	Hours
ECE 403	Electronics Engineering	3
ECE 407	Introduction to Computer Networking	3
ECE 434	Fundamentals of Power Electronics	3
ECE 436	Digital Control Systems	3

First Year		
Fall Semester		**Hours**
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory [2]	4
E 101	Introduction to Engineering & Problem Solving [1]	1
ENG 101	Academic Writing and Research [1]	4
MA 141	Calculus I [2]	4
GC 120	Foundations of Graphics	3
	Hours	**16**
Spring Semester		
MA 241	Calculus II [2]	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory [2]	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/) 1**		1
EC 205	Fundamentals of Economics	3
Select One of The Following		3
PHI 214	Issues in Business Ethics	
PHI 221	Contemporary Moral Issues	
PHI 375	Ethics	
	Hours	**16**
Second Year		
Fall Semester		
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
ECE 200	Introduction to Signals, Circuits and Systems [1]	4
MA 242	Calculus III	4
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4
MES 200	Introduction to Engineering Systems	2
	Hours	**17**
Spring Semester		
ECE 109	Introduction to Computer Systems [1]	3
ECE 211	Electric Circuits [1]	4

ECE 220	Analytical Foundations of Electrical and Computer Engineering [1]	3
MES 201	Engineering Systems Lab 1	2
MA 305	Introductory Linear Algebra and Matrices	3
	Hours	**15**
Third Year		
Fall Semester		
ECE 209	Computer Systems Programming	3
ECE 301	Linear Systems	3
ECE 302	Microelectronics	4
MES 301	Engineering Systems Junior Design Lab	2
ENG 331	Communication for Engineering and Technology	3
	Hours	**15**
Spring Semester		
MES 300	Systems Engineering	3
ECE 212	Fundamentals of Logic Design	3
ECE Foundation Elective (p. 1)		3
MES 304	Electrical Engineering Systems Lab 1	2
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
	Hours	**14**
Fourth Year		
Fall Semester		
MES 401	MES Capstone Design I	3
ECE 303	Electromagnetic Fields	3
ECE Elective (p. 2)		3
ECE Foundation Elective (p. 1)		3
MES 404	Electrical Engineering Systems Lab 2	2
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
	Hours	**17**
Spring Semester		
MES 403	MES Capstone Design II	3
ECE Elective (p. 2)		3
Select One of The Following		3
ECE Elective (p. 2)		
OR		
ECE Foundation Elective (p. 1)		
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		2-3
	Hours	**14**
	Total Hours	**124**

[1] A grade of C- or higher is required.
[2] A grade of C (2.0) or higher is required.

Career Opportunities

Career Titles

- Aeronautical & Aerospace Engineer
- Aerospace Engineering Technician
- Agricultural Engineer
- Airport Engineer
- Automotive Engineer
- Biomedical Engineer
- Ceramic Engineer
- Chemical Engineer
- Civil Engineer
- Civil Engineering Technician
- Clinical Data Managers
- Computer Network Architects
- Computer Systems Engineer
- Cost Analysis Engineer
- Cost Estimator
- Electronics Engineer
- Energy Engineer
- Engineering Professor
- Environmental Engineer
- Factory Layout Engineer
- Fire Prevention Engineer
- Human Factors Engineers and Ergonomists
- Industrial Engineer
- Industrial Engineering Technician
- Industrial Safety and Health Engineer
- Irrigation Engineer
- Logistics Engineers
- Marine Engineer
- Marine Surveyor
- Materials Engineer
- Mechanical Engineer
- Mechanical Engineering Technician
- Meteorologist
- Mining Engineer
- Model Maker
- Natural Sciences Managers
- Nuclear Engineer
- Nuclear Fuels Research Engineer
- Operating Engineer
- Petroleum Engineer
- Photogrammetrist
- Physicist
- Product Safety Engineer
- Quality Control Managers
- Radiation Protection Engineer
- Sanitary Engineer
- Ship Engineers
- Software Developers - Applications
- Soil Engineer
- Solar Energy Systems Designer
- Solar Energy Systems Engineers
- Sound Engineering Technicians
- Structural Engineer
- Surveying Technicians
- Surveyor
- Sustainability Specialists
- Tool and Machine Designer
- Transportation Engineer
- Urban and Regional Planner
- Wind Energy Engineer

Learn More About Careers

NCcareers.org (https://nccareers.org/)
Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (https://www.bls.gov/ooh/)
Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (https://www.careeronestop.org/)
View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (https://careers.dasa.ncsu.edu/explore-careers/career-assessments/) (NC State student email address required)
This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (https://careers.dasa.ncsu.edu/about/hours-appointments/) to discuss the results.

Focus 2 Apply Assessment (https://www.focus2career.com/Portal/Register.cfm?SID=1929) (Available to prospective students)
A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.