

MAJOR IN ELECTRICAL ENGINEERING, LASERS AND OPTICAL ENGINEERING CONCENTRATION

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.

Requirements Effective Fall 2023

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering

Freshman

| | | AUCC | Credits |
|---|---|------|-----------|
| CO 150 | College Composition (GT-CO2) | 1A | 3 |
| ECE 102 | Digital Circuit Logic | | 4 |
| ECE 103 | DC Circuit Analysis | | 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 | | | 7 |
| Group A: | | | |
| CS 150B | Culture and Coding: Python (GT-AH3) | 3B | |
| CS 164 | CS1—Computational Thinking with Java | | |
| Group B: | | | |
| CS 152 | Python for STEM | | |
| CS 162 | CS1—Introduction to Java Programming | | |
| Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities) | | 3B | |
| Group C: | | | |
| CS 163 | CS1—No Prior Programming Experience | | |
| Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities) | | 3B | |
| Total Credits | | | 30 |

Sophomore

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|--|--|----|-----------|
| CHEM 111 | General Chemistry I (GT-SC2) | 3A | 4 |
| ECE 202 | Circuit Theory Applications | | 4 |
| ECE 232 | Introduction to Project Practices | | 1 |
| 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 |
| PH 314 | Introduction to Modern Physics | | 4 |
| Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion) | | 1C | 3 |
| Total Credits | | | 32 |

Junior

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|---------|--------------------------|--|---|
| ECE 311 | Linear System Analysis I | | 3 |
| ECE 331 | Electronics Principles I | | 4 |

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|---|---|----|---|
| ECE 332 | Electronics Principles II | 4A | 4 |
| ECE 341 | Electromagnetic Fields and Devices I | | 3 |
| ECE 342 | Electromagnetic Fields and Devices II | | 3 |
| ECON 202 | Principles of Microeconomics (GT-SS1) | 3C | 3 |
| PH 353 | Optics and Waves | | 4 |
| Select one course from the following: | | | 3 |
| CO 301B | Writing in the Disciplines: Sciences (GT-CO3) | 2 | |
| JTC 300 | Strategic Writing and Communication (GT-CO3) | 2 | |
| Science/Engineering Elective (see list below) | | | 2 |
| Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities) | | | 3 |

Total Credits **32**

Senior

| | | | |
|---|------------------------------------|-------|----|
| ECE 401 ² | Senior Design Project I | 4A,4B | 3 |
| ECE 402 | Senior Design Project II | 4C | 3 |
| ECE 404 | Experiments in Optical Electronics | | 2 |
| ECE 441 | Optical Electronics | | 3 |
| ECE 457 | Fourier Optics | | 3 |
| PH 451 | Introductory Quantum Mechanics I | | 3 |
| Technical Electives (see list below) | | | 12 |
| Historical Perspectives (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives) | | | 3 |

Total Credits **32**

Program Total Credits: **126**

Science/Math/Engineering Electives

| Code | Title | Credits |
|----------|---|---------|
| BC 351 | Principles of Biochemistry | 4 |
| BIOM 100 | Overview of Biomedical Engineering | 1 |
| BIOM 200 | Fundamentals of Biomedical Engineering | 2 |
| 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 101 | Introduction to Chemical and Biological Engr | 3 |
| CBE 101A | Introduction to Chemical and Biological Engr. Lecture | 2 |
| CBE 101B | Introduction to Chemical and Biological Engr. Laboratory | 1 |
| CHEM 112 | General Chemistry Lab I (GT-SC1) | 1 |
| CHEM 245 | Fundamentals of Organic Chemistry | 4 |
| CHEM 246 | Fundamentals of Organic Chemistry Laboratory | 1 |
| CIVE 102 | Introduction to Civil and Environmental Engr | 3 |
| 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 220 | Discrete Structures and their Applications | 4 |

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|--|---|------|
| CS 253 | Software Development with C++ | 4 |
| CS 310H/IDEA 310H | Design Thinking Toolbox: Mixed Reality Design | 3 |
| DSCI 320 | Optimization Methods in Data Science | 3 |
| ECE 101 | Foundations in ECE | 1 |
| May select any course from the following: ³ | | Var. |
| ECE 395A | Independent Study | |
| ECE 395B | Independent Study: Open Option Project | |
| ECE 395C | Independent Study : Vertically Integrated Project | |
| ENGR 300 | 3D Printing Lab for Engineers | 1 |
| ENGR 478 | Applied Engineering Data Analytics | 3 |
| HES 307 | Biomechanical Principles of Human Movement | 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 317 | Advanced Calculus of One Variable | 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 | 3 |
| or DSCI 369 | Linear Algebra for Data Science | |
| MECH 103 | Introduction to Mechanical Engineering | 3 |

| | | |
|-------------------------|---|-----|
| MECH 104A | Study Abroad--Germany: Introduction to Mechanical Engineering | 3 |
| MECH 200 | Introduction to Manufacturing Processes | 3 |
| MECH 201 | Engineering Design I | 2 |
| MECH 237 or MECH 337 | Introduction to Thermal Sciences Thermodynamics | 3-4 |
| MIP 300 | General Microbiology | 3 |
| PH 341 | Mechanics | 4 |
| PSY 253 | Human Factors and Engineering Psychology | 3 |
| STAT 158 | Introduction to R Programming | 1 |

Technical Electives

| Code | Title | Credits |
|--|--|---------|
| ECE 312 | Linear System Analysis II | 3 |
| ECE 415 | Semiconductor Physics and Junctions | 2 |
| ECE 430/MATH 430 | Fourier and Wavelet Analysis with Apps | 3 |
| May select any course from the following: ³ | | Var. |
| ECE 495A | Independent Study | |
| ECE 495B | Independent Study: Open Option Project | |
| ECE 495C | Independent Study: Vertically Integrated Projects | |
| ECE 503 | Ultrafast Optics | 3 |
| ECE 504 | Physical Optics | 3 |
| ECE 505 | Nanostructures: Fundamentals and Applications | 3 |
| ECE 506 | Optical Interferometry and Laser Metrology | 3 |
| ECE 507 | Plasma Physics and Applications | 3 |
| ECE 517/BIOM 517 | Advanced Optical Imaging | 3 |
| ECE 518/BIOM 518 | Biophotonics | 3 |
| ECE 526/BIOM 526 | Biological Physics | 3 |
| ECE 527B/ BIOM 527B | Biosensing: Signal and Noise in Biosensors | 1 |
| ECE 527F/ BIOM 527F | Biosensing: Biophotonic Sensors Using Refractive Index | 1 |
| ECE 546 | Laser Fundamentals and Devices | 3 |
| ECE 572 | Semiconductor Transistors | 1 |
| ECE 573 | Semiconductor Optoelectronics Laboratory | 3 |
| ECE 574 | Optical Properties in Solids | 3 |
| MATH 419 | Introduction to Complex Variables | 3 |
| PH 315 | Modern Physics Laboratory | 2 |
| PH 425 | Advanced Physics Laboratory | 2 |
| PH 452 | Introductory Quantum Mechanics II | 3 |
| PH 462 | Statistical Physics | 3 |

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

² Project must be a laser and optical engineering topic.

³ A total of 3 credits of Independent Study may apply toward the total degree requirements. This includes credit awarded for ECE 395A, ECE 395B, ECE 395C and ECE 495A, ECE 495B, ECE 495C combined.