ELECTRICAL ENGINEERING, BS

Introduction
Please click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/electrical-engineering/) to see Electrical Engineering department information.

Program Objectives
The educational objectives of the electrical engineering undergraduate program are to produce graduates who, within a few years of graduation, will:

- Demonstrate professional advancement as productive practicing engineers who continuously develop their technical expertise, as demanded by the rapidly changing technologies.
- Attain enhanced and broadened knowledge via graduate education in either engineering or other fields such as science, mathematics, business, medicine, and law.

These objectives are consistent with the mission of the University of Colorado Denver, congruent with the goals of the College of Engineering, Design and Computing and reflective of the mission of the Department of Electrical Engineering.

Program Delivery
- This is an on-campus program.

Declaring This Major
- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/#policies) to go to information about declaring a major.

General Requirements
To earn a degree, students must satisfy all requirements in each of the areas below, in addition to their individual major requirements.

- CU Denver General Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation/)
- CU Denver Core Curriculum (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation-undergraduate-core-requirements/)
- College of Engineering, Design and Computing Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/#graduationrequirementstext)
- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/) for information about Academic Policies

Program Requirements
1. The particular curriculum to be satisfied by each student is the one published in the catalog current at the time of the student’s 30-hour senior checkout.

2. A graduation agreement should be requested by each student before completing registration for the student’s last semester.

3. All electrical engineering students must satisfactorily complete ELEC 4309 Senior Design Project I, which is a fall-only course and ELEC 4319 Senior Design Project II, which is a spring-only course and these courses must be in consecutive semesters.

4. Students must maintain a minimum 2.0 GPA in all courses applying to major requirements.

5. Students must maintain a minimum 2.0 GPA in all ELEC courses attempted.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGR 1200</td>
<td>Fundamentals of Engineering Design Innovation</td>
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</tr>
<tr>
<td>ELEC 1510</td>
<td>Digital Logic</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 1520</td>
<td>Programming for Electrical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 2132</td>
<td>Circuit Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 2142</td>
<td>Circuit Analysis II</td>
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<tr>
<td>ELEC 2520</td>
<td>Embedded Systems</td>
<td>3</td>
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<td>ELEC 2530</td>
<td>Logic Laboratory</td>
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<td>ELEC 2650</td>
<td>Signal Processing</td>
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<td>ELEC 3130</td>
<td>Electromagnetic Fields</td>
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<td>ELEC 3164</td>
<td>Energy Systems</td>
<td>3</td>
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<td>ELEC 3220</td>
<td>Electronics</td>
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<td>ELEC 3316</td>
<td>Signals and Systems</td>
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<tr>
<td>ELEC 3520</td>
<td>Intelligent Systems: IoT &amp; Cyber-Physical Systems</td>
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<tr>
<td>ELEC 3700</td>
<td>Machine Learning for Engineers (spring only)</td>
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<td>ELEC 3724</td>
<td>Energy Systems Laboratory</td>
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<td>ELEC 3817</td>
<td>Engineering Probability and Statistics (fall only)</td>
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<tr>
<td>ELEC 3900</td>
<td>Circuit Design and Fabrication (summer and fall)</td>
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<tr>
<td>ELEC 4309</td>
<td>Senior Design Project I (fall only)</td>
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<td>ELEC 4319</td>
<td>Senior Design Project II (spring only)</td>
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<tr>
<td>ENGR 3400</td>
<td>Technology and Culture</td>
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</table>

Professional Elective
Select one course 2

Other Courses
Select seventeen semester hours from the following lists. At least two laboratories with an associated lecture course must be completed.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ELEC 4840</td>
<td>Independent Study: ELEC</td>
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<tr>
<td>ELEC 4136</td>
<td>Control Systems Analysis</td>
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<td>ELEC 4276</td>
<td>Digital Control Systems</td>
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<td>ELEC 4406</td>
<td>Control Systems Laboratory</td>
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<tr>
<td>ELEC 5466</td>
<td>Adaptive Control System Design</td>
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<td>ELEC 4005</td>
<td>IC Design</td>
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<td>ELEC 4025</td>
<td>Device Electronics</td>
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<tr>
<td>ELEC 4225</td>
<td>Advanced Electronics</td>
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<td>ELEC 4435</td>
<td>Advanced Electronics Laboratory</td>
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<tr>
<td>ELEC 4555</td>
<td>VLSI Circuit Simulation</td>
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<td>ELEC 5005</td>
<td>IC Design</td>
<td></td>
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<tr>
<td>ELEC 5025</td>
<td>Device Electronics</td>
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</tbody>
</table>
Electrical Engineering, BS

**Communications**
- ELEC 5455 Computer Methods for Device Electronics
- ELEC 5555 VLSI Circuit Simulation
- ELEC 4247 Communication Theory
- ELEC 4248 Digital Communication Systems
- ELEC 4249 Wireless networking
- ELEC 4637 Digital Signal Processing
- ELEC 5220 Methods of Engineering Analysis
- ELEC 5248 Digital Communication Systems
- ELEC 5250 Information Inference and Learning Algorithms
- ELEC 5276 Digital Control Systems
- ELEC 5446 Introduction to Modern Control Theory
- ELEC 5466 Adaptive Control System Design
- ELEC 5476 Optimal Control Systems
- ELEC 5638 Digital Image Processing
- ELEC 5648 Blind Signal Processing

**Fields, Waves and Optics**
- ELEC 4133 Advanced Electromagnetic Fields
- ELEC 4134 Introduction to Microwave Circuit Design
- ELEC 4333 Introduction to Computational Electromagnetics
- ELEC 4373 Optical Engineering
- ELEC 4375 Engineering Neuroscience
- ELEC 4423 Radio Frequency Laboratory
- ELEC 5033 Advanced Electromagnetic Fields
- ELEC 5133 Electromagnetic Radiation and Antenna
- ELEC 5333 Introduction to Computational Electromagnetics
- ELEC 5334 Advanced Computational Electromagnetics
- ELEC 5373 Optical Engineering
- ELEC 5375 Engineering Neuroscience
- ELEC 5423 Radio Frequency Laboratory
- ELEC 5433 Fundamentals and Applications of Plasmas

**Computer Engineering and Embedded System Design**
- ELEC 4501 Microprocessor Based Design
- ELEC 4511 Hardware-Software Interface
- ELEC 4521 Microprocessor Laboratory
- ELEC 4561 Hardware-Software Lab
- ELEC 4678 Quantum Computing
- ELEC 4723 High Performance Computer Architecture
- ELEC 4727 Machine Vision Systems
- ELEC 4800 Special Topics
- ELEC 5501 Microprocessor-Based Design
- ELEC 5511 Hardware-Software Interface
- ELEC 5678 Quantum Computing
- ELEC 5723 High Performance Computer Architecture

**Energy and Power Systems**
- ELEC 4164 Electric Machines and Drives
- ELEC 4170 Electric Machines and Drives Laboratory
- ELEC 4174 Power Electronic Systems
- ELEC 4184 Power Systems Analysis
- ELEC 4444 Power Systems Laboratory
- ELEC 4474 Power Electronics Laboratory
- ELEC 5164 Electric Machines and Drives
- ELEC 5174 Power Electronic Systems
- ELEC 5710 Advanced Electric Drive Systems
- ELEC 5184 Power Systems Analysis
- ELEC 5444 Power System Laboratory
- ELEC 5755 Grid Integration of Renewable Energy

**Mathematics**
- MATH 1401 Calculus I 4
- MATH 2411 Calculus II 4
- MATH 2421 Calculus III 4
- MATH 3191 Applied Linear Algebra 4
- MATH 3200 and Elementary Differential Equations 6
- MATH 3195 Linear Algebra and Differential Equations 6

**Science**
- ENGR 1130 Chemistry for Engineers 5
- PHYS 2311 General Physics I: Calculus-Based 4
- PHYS 2321 Intro Experimental Phys Lab I 1
- PHYS 2331 General Physics II: Calculus-Based 4

**Total Hours** 107-109

1 Effective Spring 2020: Senior Design I will be offered only during fall semesters; Senior Design II will be offered only during spring semesters.
2 Professional electives may be selected from an approved list of upper-division or graduate-level courses or cooperative education. The electrical engineering advisor must be consulted prior to the selection of these electives.

To review the Degree Map for this program, please visit our website (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/electrical-engineering/electrical-engineering-bs/cedc_bs_electrical_engineering.pdf).