BS COMPUTER ENGINEERING

Program Learning Outcomes
In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to function on multidisciplinary teams.
5. An ability to identify, formulate, and solve engineering problems.
6. An understanding of professional and ethical responsibility.
7. An ability to communicate effectively.
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. A recognition of the need for, and an ability to engage in life-long learning.
10. A knowledge of contemporary issues.
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

- Knowledge of probability and statistics, including applications appropriate to CPE program objectives.
- Knowledge of mathematics through differential and integral calculus, basic sciences, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to CPE program objectives.
- Knowledge of advanced mathematics, typically including differential equations, linear algebra, complex variables, and discrete mathematics.

Degree Requirements and Curriculum
In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No major or support courses may be selected as credit/no credit.

MAJOR COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE 100</td>
<td>Computer Engineering Orientation</td>
<td>1</td>
</tr>
<tr>
<td>CPE/CSC 101</td>
<td>Fundamentals of Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>CPE/CSC 123</td>
<td>Introduction to Computing</td>
<td>4</td>
</tr>
<tr>
<td>CPE/EE 133</td>
<td>Digital Design</td>
<td>4</td>
</tr>
<tr>
<td>CPE/CSC 202</td>
<td>Data Structures</td>
<td>4</td>
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<tr>
<td>CPE/CSC 203</td>
<td>Project-Based Object-Oriented Programming and Design</td>
<td>4</td>
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<tr>
<td>CPE/EE 233</td>
<td>Computer Design and Assembly Language Programming</td>
<td>4</td>
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<tr>
<td>CPE 315</td>
<td>Computer Architecture</td>
<td>4</td>
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<tr>
<td>CPE/EE 329</td>
<td>Programmable Logic and Microprocessor-Based Systems Design</td>
<td>4</td>
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<tr>
<td>CPE/CSC 357</td>
<td>Systems Programming</td>
<td>4</td>
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<tr>
<td>CPE 350</td>
<td>Capstone I</td>
<td>4</td>
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<tr>
<td>CPE 450</td>
<td>Capstone II</td>
<td>3</td>
</tr>
<tr>
<td>CPE/CSC 453</td>
<td>Introduction to Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>CPE 461 &amp; CPE 462</td>
<td>Senior Project I and Senior Project II</td>
<td>5</td>
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<tr>
<td>CPE 464</td>
<td>Introduction to Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td>CSC 348</td>
<td>Discrete Structures</td>
<td>4</td>
</tr>
<tr>
<td>EE 112</td>
<td>Electric Circuit Analysis I</td>
<td>2</td>
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<tr>
<td>EE 211 &amp; EE 241</td>
<td>Electric Circuit Analysis II and Electric Circuit Analysis Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>EE 212 &amp; EE 242</td>
<td>Electric Circuit Analysis III and Electric Circuit Analysis Laboratory III</td>
<td>4</td>
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<tr>
<td>EE 228</td>
<td>Continuous-Time Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>EE 306 &amp; EE 346</td>
<td>Semiconductor Device Electronics and Semiconductor Device Electronics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>EE 307 &amp; EE 347</td>
<td>Digital Electronics and Integrated Circuits and Digital Electronics and Integrated Circuits Laboratory</td>
<td>4</td>
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</tbody>
</table>

Technical Electives

Select from the following: 12

- Any 300-500 level CPE Course
- Any 300-500 level CSC or EE Course
- CPE 400 Special Problems for Undergraduates (up to 4 units)
- Up to four units from the following:
  - BMED 432 Micro/Nano System Design
  - BMED 434/EE 423/MATE 430 Micro/Nano Fabrication
  - BMED/MATE 435 Microfabrication Laboratory
  - CHEM 312 Survey of Organic Chemistry
  - CSC 300 Professional Responsibilities
  - CPE 488/IME 458/MATE 458 Microelectronics and Electronics Packaging
  - DATA 301 Introduction to Data Science
  - ENGR 551 Advanced Topics in Bioengineering
  - IME 301 Operations Research I
  - IME 303 Project Organization and Management
### Support Courses

- **CHEM 124**: General Chemistry for Physical Science and Engineering I (B3/B4) 5  
- **CHEM 125**: General Chemistry for Physical Science and Engineering II
- **CPE/EE 328**: Discrete Time Signals and Systems
- **CSC 349**: Design and Analysis of Algorithms
- **MATE 210 & MATE 215**: Materials Engineering and Materials Laboratory I (both needed)
- **ME 211**: Engineering Statics
- **ENGL 149**: Technical Writing for Engineers (A3) 5  
- **IME 156**: Basic Electronics Manufacturing 2-4
- **IME 157**: Electronics Manufacturing
- **IME 458**: Microelectronics and Electronics Packaging
- **MATH 141**: Calculus I 8
- **MATH 142**: and Calculus II (B1) 5
- **MATH 143**: Calculus III (Add'l Area B) 5  
- **MATH 241**: Calculus IV 4
- **MATH 244**: Linear Analysis I 4
- **PHYS 141**: General Physics IA (Add'l Area B) 5  
- **PHYS 132**: General Physics II 8
- **& PHYS 133**: and General Physics III
- **PHYS 211**: Modern Physics I 4
- **STAT 350**: Probability and Random Processes for Engineers (B6) 5  

### General Education (GE) Requirements

- **Area A**: Communication
  - A1: Expository Writing 4
  - A2: Oral Communication 4
  - A3: Reasoning, Argumentation and Writing (4 units in Support)  
- **Area B**: Science and Mathematics
  - B1: Mathematics/Statistics (8 units in Support)  
  - B2: Life Science 4
  - B3: Physical Science (4 units in Support)  
  - B4: One lab taken with either a B2 or B3 course
  - B6: Upper-division Area B (4 units in Support)  
- **Area C**: Arts and Humanities
  - C1: Literature 4
  - C2: Philosophy 4
  - C3: Fine/Performing Arts 4
  - C4: Upper-division elective 4
- **Area D/E**: Society and the Individual
  - D1: The American Experience (Title 5, Section 40404 requirement) (40404)  
  - D2: Political Economy 4
  - D3: Comparative Social Institutions 4
  - D4: Self Development (CSU Area E) 4

Total units: 44

1. Required in Major/Support; also satisfies GE