COMPUTER SCIENCE & ENGINEERING, BACHELOR OF SCIENCE

College of Engineering

The Computer Science Engineering major prepares students to do further work in hardware, software, theory, or electronics, either in industry or in postgraduate study.

The primary differences between the Computer Science Engineering and the Computer Science majors are the extent of course work covering hardware and the flexibility of the curriculum. The Computer Science Engineering major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The Computer Science major has some course work on hardware, at the digital-design level, on simulators. The Computer Science Engineering major has fewer free electives. The CS major’s more generous electives make it easier to complete a minor or double major.

A key theme of the Computer Science Engineering curriculum is the hardware/software interaction, a theme reflected in the courses required and the orientation of the courses themselves.

The Computer Science & Engineering major provides students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software courses that constitute the focus of the curriculum.

Computer Science & Engineering Undergraduate Program

The Computer Science & Engineering program is accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of ABET (http://www.abet.org).

Exclusive of General Education units, the minimum number of units for the Computer Science & Engineering major is 144.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 021A</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 021B</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 021C</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MAT 021D</td>
<td>Vector Analysis</td>
<td>4</td>
</tr>
<tr>
<td>Choose one:</td>
<td></td>
<td>3-4</td>
</tr>
<tr>
<td>MAT 022A</td>
<td>Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MAT 027A</td>
<td>Linear Algebra with Applications to Biology</td>
<td></td>
</tr>
<tr>
<td>MAT 067</td>
<td>Modern Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MAT 022B</td>
<td>Differential Equations</td>
<td>3-4</td>
</tr>
<tr>
<td>or MAT 027B</td>
<td>Differential Equations with Applications to Biology</td>
<td></td>
</tr>
</tbody>
</table>

Mathematics

Physics

COMMENTS

PHY 009A | Classical Physics                   | 5     |
PHY 009C | Classical Physics                   | 5     |
PHY 009D | Modern Physics                      | 4     |

Chemistry

CHE 002A | General Chemistry                   | 5     |

Computer Science Engineering

ECS 020  | Discrete Mathematics For Computer Science | 4     |
ECS 050  | Computer Organization & Machine-Dependent Programming | 4     |

Choose a series option (must complete one full series in entirety, mixing of courses between series is not allowed): 12-16

(a)

ECS 036A | Programming & Problem Solving      |       |
ECS 036B | Software Development & Object-Oriented Programming in C++ |       |
ECS 036C | Data Structures, Algorithms, & Programming |       |

(b)

ECS 032A | Introduction to Programming        |       |
ECS 032B | Introduction to Data Structures    |       |
ECS 032C | Implementation of Data Structures in C |       |
ECS 034  | Software Development in UNIX & C++ |       |

Engineering

ENG 017  | Circuits I                         | 4     |

Communications

CMN 001  | Introduction to Public Speaking   | 4     |

Choose one; a grade of C- or better is required: 4

ENL 003  | Introduction to Literature        |       |
UWP 001  | Introduction to Academic Literacies |       |
UWP 001V | Introduction to Academic Literacies: Online |       |
UWP 001Y | Introduction to Academic Literacies |       |
COM 001  | Major Works of the Ancient World  |       |
COM 002  | Major Works of the Medieval & Early Modern World |       |
COM 003  | Major Works of the Modern World   |       |
COM 004  | Major Works of the Contemporary World |       |
NAS 005  | Introduction to Native American Literature |       |

Lower Division Required Courses Subtotal 78-84

Upper Division Required Courses

Computer Science Engineering

ECS 132  | Probability & Statistical Modeling for Computer Science | 4     |
ECS 140A | Programming Languages               | 4     |
ECS 150  | Operating Systems & System Programming |       |
ECS 152A | Computer Networks                   | 4     |
ECS 154A | Computer Architecture               | 4     |
ECS 154B | Computer Architecture               | 4     |
ECS 160  | Software Engineering                | 4     |
ECS 188  | Ethics in an Age of Technology      | 4     |
ECS 193A | Senior Design Project               | 3     |
ECS 193B | Senior Design Project               | 3     |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS 120</td>
<td>Theory of Computation</td>
<td>4</td>
</tr>
<tr>
<td>or ECS 122A</td>
<td>Algorithm Design &amp; Analysis</td>
<td></td>
</tr>
<tr>
<td>EEC 100</td>
<td>Circuits II</td>
<td>5</td>
</tr>
<tr>
<td>EEC 172</td>
<td>Embedded Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

**Electrical & Computer Engineering**

**Computer Science Electives**

Choose a minimum of four courses and a minimum of 15 units $^1$ 15

**Upper Division Composition Requirement**

Choose one: 0-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWP 101</td>
<td>Advanced Composition (Grade of C- or better required.)</td>
</tr>
</tbody>
</table>

Passing the Upper Division Composition Exam administered by the College of Letters & Science.

Upper Division Required Courses Subtotal 66-70

| Total Units | 144-154 |

---

$^1$ Chosen from ECS courses numbered 120 to 189 inclusive; one approved course of 3-5 units from ECS 192 or 199; EEC 171, 180A, 180B; one course may be taken from the following restricted elective list: ECN 122; LIN 127, 177; MAT 135A, 135B; PSC 120; STA 131A, 131B. No course can count as both a required course and a computer science and engineering elective.