Computer Engineering

Nature of Program

Computer engineers design, develop, test, and oversee the manufacture and maintenance of embedded computer hardware and software. As such, computer engineering combines portions of the knowledge of electrical engineers and computer scientists. Embedded computer systems include applications in the automotive, communications, radio and television, consumer electronics, aircraft, robotics, and health-care industries. In addition, computer engineers design, develop, test, manufacture, and maintain complex systems including digital communications systems such as cell phone networks, secure computer networks, and system-level software such as operating systems and applications software. The computer engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, http://www.abet.org.

Program Educational Objectives

The Program Educational Objectives (PEO) of the Computer Engineering (CpE) program at West Virginia University is to produce graduates who will apply their knowledge and skills to achieve success in their careers in industry, research, government service or graduate study. It is expected that in the first five years after graduation our graduates will achieve success and proficiency in their profession, be recognized as leaders, and contribute to the well-being of society.

Student Outcomes

Upon graduation, all Bachelor of Science students in Computer Engineering will have the:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design and conduct experiments, as well as to analyze and interpret data
- 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
- An ability to function on multidisciplinary teams
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility
- An ability to communicate effectively
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- A recognition of the need for, and an ability to engage in life-long learning
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Fundamental courses in the computer engineering areas of hardware and software are taken during the second year with general fundamental engineering courses included. The third and fourth years in the curriculum concentrate on areas of computer engineering in both software and hardware with technical electives provided to allow the student to acquire more depth in a preferred area of expertise.

The computer engineering technical electives must be taken from 400-level CPE regular courses. The other technical electives should be selected from upper division regular courses in biometric systems, computer engineering, computer science, or electrical engineering. However, students with special career objectives can petition the department through their advisors for prior written permission to select technical electives from upper-division courses in mathematics, the sciences, or other areas of engineering.

A total of five humanities and social science electives (GEF electives) must be selected. The humanities and social science electives must be chosen so as to meet the University General Education Foundations requirements and Accreditation Board for Engineering and Technology accreditation guidelines.

Click here to view the Suggested Plan of Study (p. 3)

Curriculum in Computer Engineering

GENERAL EDUCATION FOUNDATIONS

Please use this link to view a list of courses that meet each GEF requirement. (http://registrar.wvu.edu/gef)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

General Education Foundations

F1 - Composition & Rhetoric
Computer Engineering

ENGL 101 & ENGL 102
or ENGL 103

Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing

F2A/F2B - Science & Technology 4-6
F3 - Math & Quantitative Skills 3-4
F4 - Society & Connections 3
F5 - Human Inquiry & the Past 3
F6 - The Arts & Creativity 3
F7 - Global Studies & Diversity 3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree) 9

Total Hours 31-37

Curriculum Requirements

To receive a bachelor of science in computer engineering, a student must meet the University's undergraduate degree requirements, take all the courses indicated below, and attain a grade point average of 2.0 or better for all Lane Department of Computer Science and Electrical Engineering courses. If a Lane Department of Computer Science and Electrical Engineering is repeated, only the last grade received is used to compute the major grade point average, and the course credit hours are counted only once. This requirement assures that the student has demonstrated overall competence in the major.

Freshman Engineering Requirements

ENGR 101 Engineering Problem Solving 1 2
Engineering Problem Solving:
CHE 102 Introduction to Chemical Engineering 3
ENGR 102 Engineering Problem-Solving 2
ENGR 103 Introduction to Nanotechnology Design
MAE 102 Introduction to Mechanical and Aerospace Engineering Design
ENGR 199 Orientation to Engineering 1

Non-Computer Engineering Core

CHEM 115 Fundamentals of Chemistry (GEF 2B) 4
ECON 201 Principles of Microeconomics (GEF 4) 3
ECON 202 Principles of Macroeconomics 3

Calculus I (GEF 3):
MATH 155 Calculus 1 (Minimum grade of C- is required) 4
MATH 153 Calculus 1a with Precalculus
& MATH 154 Calculus 1b with Precalculus (Minimum grade of C- is required) 4
MATH 156 Calculus 2 (GEF 8 - Minimum grade of C- is required) 4
MATH 251 Multivariable Calculus (Minimum grade of C- is required) 4
MATH 261 Elementary Differential Equations 4
MATH 375 Applied Modern Algebra 3
PHYS 111 General Physics (GEF 8) 4
PHYS 112 General Physics (GEF 8) 4
STAT 215 Introduction to Probability and Statistics 3

Engineering Science Elective (Choose one) 3
CHE 201 Material and Energy Balances 1
CHE 366 Materials Science
IENG 377 Engineering Economy
MAE 241 Statics
MAE 320 Thermodynamics

Computer Engineering Core Requirements (Minimum GPA of 2.0 required in BIOM, CPE, CS, and EE courses)

CPE 271 Introduction to Digital Logic Design 3
CPE 272 Digital Logic Laboratory 1
CPE 310 Microprocessor Systems 3
CPE 311 Microprocessor Laboratory 1
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CPE 312</td>
<td>Microcomputer Structures and Interfacing</td>
<td>3</td>
</tr>
<tr>
<td>CPE 313</td>
<td>Microcomputer Structures and Interfacing Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CPE 480</td>
<td>Senior Design Seminar (Fulfills Writing and Communications Skills Requirement)</td>
<td>2</td>
</tr>
<tr>
<td>CPE 481</td>
<td>Senior Design Project</td>
<td>3</td>
</tr>
<tr>
<td>CS 110</td>
<td>Introduction to Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>CS 111</td>
<td>Introduction to Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CS 230</td>
<td>Introduction to Software Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CS 350</td>
<td>Computer System Concepts</td>
<td>3</td>
</tr>
<tr>
<td>CS 450</td>
<td>Operating Systems Structure</td>
<td>3</td>
</tr>
<tr>
<td>EE 221</td>
<td>Introduction to Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EE 222</td>
<td>Introduction to Electrical Engineering Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>EE 223</td>
<td>Electrical Circuits</td>
<td>3</td>
</tr>
<tr>
<td>EE 224</td>
<td>Electrical Circuits Laboratory</td>
<td>1</td>
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<tr>
<td>EE 225</td>
<td>Digital Electronics</td>
<td>3</td>
</tr>
<tr>
<td>EE 227</td>
<td>Signals and Systems 1</td>
<td>3</td>
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<tr>
<td>EE 355</td>
<td>Analog Electronics</td>
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<tr>
<td>EE 356</td>
<td>Analog Electronics Laboratory</td>
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<tr>
<td>CPE Technical Elective (400-level course in Computer Engineering)</td>
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<tr>
<td>Technical Electives (300 level or higher course in Biometric Systems, Computer Engineering, Computer Science, or Electrical Engineering)</td>
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<tr>
<td>Free Elective</td>
<td>3</td>
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<tr>
<td>GEF Electives 1, 5, 6, 7</td>
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<td><strong>Total Hours</strong></td>
<td>130</td>
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</table>

**Suggested Plan of Study**

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.Cp.E. degree program that completes degree requirements in four years is as follows.

**First Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Hours</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MATH 155 (GEF 3)</td>
<td>4</td>
<td>MATH 156 (GEF 8)</td>
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<td>ENGR 101</td>
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<td>ENGR 102</td>
<td>3</td>
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<td>ENGR 199</td>
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<td>PHYS 111 (GEF 8)</td>
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<td>CHEM 115 (GEF 2)</td>
<td>4 GEF 6</td>
<td>ENGL 101 (GEF 1)</td>
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<tr>
<td>ENGL 101 (GEF 1)</td>
<td>3 GEF 7</td>
<td>GEF 5</td>
<td>3</td>
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**Second Year**

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<tr>
<td>CPE 271</td>
<td>3</td>
<td>CS 110</td>
<td>4</td>
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<tr>
<td>CPE 272</td>
<td>1</td>
<td>EE 223</td>
<td>3</td>
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<td>EE 221</td>
<td>3</td>
<td>EE 224</td>
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<tr>
<td>EE 222</td>
<td>1</td>
<td>EE 251</td>
<td>3</td>
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<tr>
<td>MATH 251</td>
<td>4</td>
<td>EE 252</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 112 (GEF 8)</td>
<td>4 ENGL 102 (GEF 1)</td>
<td>MATH 261</td>
<td>3</td>
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<td>19</td>
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</table>

**Third Year**

<table>
<thead>
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<th>Course Code</th>
<th>Hours</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CPE 310</td>
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<td>CPE 312</td>
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<tr>
<td>CPE 311</td>
<td>1</td>
<td>CPE 313</td>
<td>1</td>
</tr>
<tr>
<td>CS 111</td>
<td>4</td>
<td>CS 230</td>
<td>4</td>
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</tbody>
</table>
EE 327 3 CS 350 3
EE 355 3 ECON 201 (GEF 4) 3
EE 356 1 STAT 215 3
MATH 375 3

18
17

Fourth Year

Fall Hours Spring Hours
CPE 480 2 CPE 481 3
CS 450 3 Engr. Science Elective 3
ECON 202 3 CPE Tech. Elective 3
Free Elective 3 Tech. Elective 3
Tech. Elective 3

14
12

Total credit hours: 130

* Offered once per year in the semester shown.

Major Learning Goals

COMPUTER ENGINEERING

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