BS IN ELECTRICAL AND ELECTRONIC ENGINEERING

Units required for Major: 92
Total units required for BS: 123

Program Description

The field of Electrical and Electronic Engineering continues to expand in scope, driven by advances in technology and new challenges faced by society. To prepare our graduates for careers in this demanding field, we equip them with a strong background in the fundamental principles of the discipline, and subsequent advanced courses in specific areas. Our curriculum provides practical, hands-on experience through laboratory courses.

The Electrical and Electronic Engineering program provides breadth (core courses), depth (elective sequence), and a culminating design project to apply the knowledge gained through the curriculum. The curriculum allows flexibility by offering a number of elective courses providing our graduates with depth in their respective areas of interest. The electives offered provide depth in one or more of the following areas: Analog Digital Electronics, Control Systems, Communication Engineering, and Power Engineering. Students select a senior project either in power engineering or in the general area of electronics. Each of these options includes a sequence of two courses for the completion of the project, and has its own pre-requisite requirements.

Note: Students graduating with a BS in Electrical and Electronic Engineering will not be subject to the University's Foreign Language Graduation Requirement. Students who change major may be subject to the University's Foreign Language Graduation Requirement.

Minimum Grade Requirement

A grade of 'C-' or better is required in all courses applied to an Electrical and Electronic Engineering major.

Program Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Lower Division Courses (38 Units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 1E</td>
<td>General Chemistry for Engineering ¹</td>
<td>4</td>
</tr>
<tr>
<td>CPE/EEE 64</td>
<td>Introduction to Logic Design ¹,²</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 1</td>
<td>Introduction to Engineering ¹</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 17</td>
<td>Introductory Circuit Analysis ²</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 50</td>
<td>Computational Methods and Applications</td>
<td>3</td>
</tr>
<tr>
<td>MATH 30</td>
<td>Calculus I</td>
<td>1</td>
</tr>
<tr>
<td>MATH 31</td>
<td>Calculus II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 32</td>
<td>Calculus III</td>
<td>1</td>
</tr>
<tr>
<td>MATH 45</td>
<td>Differential Equations for Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1A</td>
<td>General Physics: Mechanics ¹</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 11C</td>
<td>General Physics: Electricity and Magnetism ¹</td>
<td>4</td>
</tr>
<tr>
<td>Required Upper Division Courses (33 Units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEE 108</td>
<td>Electronics I</td>
<td>3</td>
</tr>
<tr>
<td>EEE 108L</td>
<td>Electronics I Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>EEE 117</td>
<td>Network Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EEE 117L</td>
<td>Networks Analysis Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

EEE 130 Electromechanical Conversion 3
EEE 161 Applied Electromagnetics 4
EEE 174 Introduction to Microprocessors 4
EEE 180 Signals & Systems 3
EEE 184 Introduction to Feedback Systems 3
EEE 185 Modern Communication Systems 3
ENGR 120 Probability and Random Signals 3
ENGR 140 Engineering Economics ² 2

Required Design Project Series

Select one of the following two series:

Electrical Power Design Project Series (11 units)
EEE 141 Power System Analysis I
EEE 142 Power System Analysis II
EEE 143 Power System Laboratory
EEE 192A Electrical Power Design Project I ³
EEE 192B Electrical Power Design Project II ³

Product Design Project Series (8 units)
EEE 109 Electronics II
EEE 193A Product Design Project I ³
EEE 193B Product Design Project II ³

Elective Requirements for Power Design Project Series (10 Units)
Select 6 units of lecture and 1 unit of laboratory from one of the four areas listed below. 7
Select 3 additional units from any on the list of the electives. 3

Elective Requirements for Product Design Project Series (13 Units)
Select 6 units of lecture and 1 unit of laboratory from one of the four areas listed below. 7
Select 6 additional units from any on the list of the electives. 6

Total Units 94

¹ Course also satisfies General Education (GE)/Graduation Requirement. The designation ‘General Education course’ denotes a course which meets GE requirements other than those which also serve as prerequisites to courses in the major. Students are expected to satisfy the University’s GE requirements. Consult the Department Chair for specific GE requirements. Students should take ENGL 5 as early as possible since it is required for admission to the upper division.

² CPE 64W, EEE 64W or ENGR 17W may be available to augment understanding of material; however, these courses cannot be used to satisfy graduation requirements.

³ It is imperative that students take the University’s Writing Placement for Juniors (WPJ) during the first semester of the junior year, as it is a prerequisite to some laboratory courses after EEE 117L.

Depth Requirement Areas and List of Electives

Depth Requirement (Power Design Project Series):

- Select 6 units of lecture and 1 unit of laboratory from one of the four areas listed below.
- Select 3 additional units from any on the list of the electives.

Depth Requirement (Product Design Project Series):

- Select 6 units of lecture and 1 unit of laboratory from one of the four areas listed below.
- Select 6 additional units from any on the list of the electives.
• Select 6 units of lecture and 1 unit of laboratory from one of the four areas listed below.
• Select 6 additional units from any on the list of electives.

### Code | Title | Units
--- | --- | ---
**Analog/Digital Electronics (33 Units)**
CPE/CSC 138 | Computer Networking Fundamentals | 3
CPE 151 | CMOS and Digital VLSI Design | 3
CPE 153 | Vlsi Design | 3
CPE 166 | Advanced Logic Design | 4
CPE 186 | Computer Hardware System Design | 3
CPE 187 | Embedded Systems Design | 2
EEE 109 | Electronics II | 4
EEE 110 | Advanced Analog Integrated Circuits | 3
EEE 111 | Advanced Analog Integrated Circuits Laboratory | 1
EEE 120 | Electronic Instrumentation | 4
EEE 166 | Physical Electronics | 3

### Control Systems (11 Units)
EEE 178 | Introduction to Machine Vision | 3
EEE 187 | Robotics | 4
EEE 188 | Digital Control System | 3
EEE 189 | Controls Laboratory | 1

### Communication Engineering (19 Units)
EEE 122 | Applied Digital Signal Processing | 3
EEE 162 | Applied Wave Propagation | 3
EEE 163 | Traveling Waves Laboratory | 1
EEE 165 | Introduction To Optical Engineering | 3
EEE 167 | Electro-Optical Engineering Lab | 1
EEE 181 | Introduction to Digital Signal Processing | 3
EEE 182 | Digital Signal Processing Lab | 1
EEE 183 | Digital and Wireless Communication System Design | 3
EEE 186 | Communication Systems Laboratory | 1

### Power Engineering (29 Units)
EEE 131 | Electromechanics Laboratory | 1
EEE 135 | Renewable Electrical Energy Sources and Grid Integration | 3
EEE 136 | Smart Electric Power Grid | 3
EEE 137 | Applications of Power Electronics in Power Systems | 3
EEE 141 | Power System Analysis I | 3
EEE 142 | Power System Analysis II | 3
EEE 143 | Power System Laboratory | 1
EEE 144 | Electric Power Distribution | 3
EEE 145 | Power System Relay Protection and Laboratory | 4
EEE 146 | Power Electronics Controlled Drives | 3
EEE 147 | Power System Operation and Control Laboratory | 1
EEE 148 | Power Electronics Laboratory | 1

### General Education Requirements ¹

1. **Area A: Basic Subjects (9 Units)**
   - A1 - Oral Communication | 3
   - A2 - Written Communication | 3
   - A3 - Critical Thinking | 3

2. **Area B: Physical Universe and Its Life Forms (3 Units)**
   - B1 - Physical Science ² | 0
   - B2 - Life Forms | 3
   - B3 - Lab (Note: Lab experience to be taken with one of the following: B1, B2 or B5 ²) | 0
   - B4 - Math Concepts ² | 0
   - B5 - Additional Course (Any B to reach 12 units) - Take upper-division course to complete Area & upper division requirements. ² | 0

3. **Area C: Arts and Humanities (12 Units)**
   - C1 - Arts | 3
   - C2 - Humanities | 3
   - C1/C2 - Area Course C | 3
   - C1/C2 - Area C Course - Take upper-division course to complete Area & upper division requirements. | 3

4. **Area D: The Individual and Society (9 Units)**
   - Area D Course | 3
   - Area D Course | 3
   - Area D Course | 3
   - Area D Course - Take upper-division course to complete Area & upper division requirements. ² | 0

5. **Area E: Understanding Personal Development**
   - Area E Course ² | 0

To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (http://catalog.csus.edu/colleges/academic-affairs/general-education/).

Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (http://www.csus.edu/acad/), by phone (916) 278-1000, or email (advising@csus.edu).

² Required in Major; also satisfies GE.

### Graduation Requirements ¹

1. **Graduation Requirements (required by CSU) (9 Units)**
   - American Institutions: U.S. History | 3
   - American Institutions: U.S. Constitution & CA Government | 3

¹ Students planning to complete EEE 193A/EEE 193B series may **not** use EEE 109 to meet depth/elective requirement.

² Students planning to complete EEE 192A/EEE 192B series may **not** use EEE 141, EEE 142, and EEE 143 to meet depth/elective requirement.
Writing Intensive (WI) 3

Graduation Requirements (required by Sacramento State) (6 Units)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>Race and Ethnicity in American Society (RE)</td>
<td>3</td>
</tr>
<tr>
<td>Foreign Language Proficiency Requirement §</td>
<td>0</td>
</tr>
</tbody>
</table>

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Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (http://www.csus.edu/acad/), by phone (916) 278-1000, or email (advising@csus.edu).

2 If not satisfied before entering Sacramento State, it may be satisfied in General Education Area C2 (Humanities). ‘C- or better required.’

The alternative methods for satisfying the Foreign Language Proficiency Requirement are described here: https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html

Note: Students with a declared major of BS in Electrical and Electronic Engineering are exempt from the Foreign Language Graduation Requirement.