ELECTRICAL ENGINEERING, BS

Natural Sciences, Mathematics, and Engineering (nsme) (https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/)

Department of Computer and Electrical Engineering and Computer Science (https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/department-computer-electrical-engineering-computer-science/)

Department Chair: Saeed Jafarzadeh
Office: Science Building III, 317
Phone: (661) 654-3082
Email: ceecs@cs.csubak.edu

www.cs.csubak.edu (http://www.cs.csubak.edu)

Program Maps for Natural Sciences, Mathematics, and Engineering (https://programmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/)

Program Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>General Education Requirements</td>
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<tr>
<td>First-Year Seminar (FYS) 4</td>
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<tr>
<td>Lower Division Area A: Foundational Skills 4</td>
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<td>Lower Division Area B: Natural Sciences 4</td>
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<td>Lower Division Area D: Social and Behavioral Sciences 4</td>
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<td>Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) 5</td>
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<td>Lower Division Area F: Ethnic Studies</td>
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<td>Junior Year Diversity &amp; Reflection (JYDR)</td>
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<td>Graduation Writing Assessment Requirement (GWAR) 4</td>
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<td>Upper Division Thematic Area C and D 4</td>
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<td>General Education Capstone 4</td>
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<td>Major Requirements</td>
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<td>Lower Division</td>
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<tr>
<td>ECE/ENGR 1618 Introduction to Engineering I</td>
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<td>ECE/ENGR 1628 Introduction to Engineering II</td>
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<td>CMPS 2010 Programming I: Programming Fundamentals</td>
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<td>ECE 3040 Signals and Systems</td>
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<td>ECE 3070 Analog Circuits</td>
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<td>ECE 3200 Digital Circuits</td>
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<td>ECE 3230 Digital Communications</td>
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<td>ECE 3320 Fields and Waves</td>
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ECE 3370 Power Systems Fundamentals 4
ECE 3340 Control Systems 4
ECE 4910 Senior Project I 2
ECE 4928 Senior Project II 2

Upper Division Elective courses OR Emphasis courses

Students with a declared emphasis must complete the upper division elective courses required for the emphasis (14 units see below).

Students without a declared emphasis (Traditional students) must select 12 units of upper division elective courses.

Select 12 or 14 units of the following: 12-14

Digital Design and Embedded Systems:
- ECE 3220 Digital Design with VHDL
- ECE 3250 Embedded Systems
- ECE 4240 Microprocessor System Design

Digital Communication and Digital Signal Processing:
- ECE 3280 Instrumentation, Control, and Data Acquisition
- ECE 4570 Robotics
- CMPS/ECE 4550 Applied Machine Learning

Power Systems and Power Electronics:
- ECE 4370 Power Systems Analysis
- ECE 4380 Power System Operation with Renewable Energy
- ECE 4381 Resources and Power System Operation with Renewable Energy Resources Laboratory 2

Image Processing and Computer Vision:
- ECE 4460 Image Processing
- ECE 4470 Computer Vision

Special Topics and Independent Study: 3
- ECE 3770 Special Topics in Engineering
- ECE 3771 Special Topics Laboratory
- ECE 4770 Special Topics in Engineering
- ECE 4771 Special Topics Laboratory
- ECE 4800 Undergraduate Research
- ECE 4860 Internship
- ECE 4870 Cooperative Education
- ECE 4890 Experiential Prior Learning

Required Cognate Courses

MATH 2510 Single Variable Calculus I 4
or MATH 2310 Single Variable Calculus I for Engineers 4

MATH 2520 Single Variable Calculus II 4
or MATH 2320 Single Variable Calculus II for Engineers 4

Select one of the following:
- MATH 2530
- MATH 2533 Multivariable and Vector Calculus 4
- MATH 2330 Multivariable and Vector Calculus for Engineers
- MATH 2531 Multivariable Calculus & MATH 2532 and Vector Calculus
- MATH 2610 Linear Algebra I 4
- MATH 3200 Probability Theory 4
- CHEM 1000 Foundations of Chemistry 3
- PHYS 2210 Physics for Scientists and Engineers I 4
- PHYS 2220 Physics for Scientists and Engineers II 4
PHIL 3318 Professional Ethics 3

Major Subtotal 86-88

Additional Units Needed Towards Graduation 2-6

Total Units 112-118

1 At least one course must be at the 4000-level.

2 Students must take both ECE 4380 Power System Operation with Renewable Energy Resources and ECE 4381 Power System Operation with Renewable Energy Resources Laboratory to receive elective credit for the Electrical Engineering degree.

3 Only a combined total of 4 units of ECE 377x, 477x, 48xx may be used for elective credit.

4 Some of the courses required for the Electrical Engineering major also satisfy General Education requirements. Students who complete each of these courses with the appropriate grade will also satisfy the GE requirement, even if they were to change majors:
   - ECE 1618 Introduction to Engineering I/ENGR 1618 Introduction to Engineering I and ECE 1628 Introduction to Engineering II/ENGR 1628 Introduction to Engineering II satisfy the First-Year Seminar requirement.
   - ECE 4928 Senior Project II satisfies the Capstone requirement.
   - PHIL 3318 Professional Ethics satisfies UD Thematic Area C and the Electrical Engineering Ethics requirement.
   - PHYS 2210 Physics for Scientists and Engineers I satisfies LD Area B1.
   - MATH 2510 Single Variable Calculus I or MATH 2310 Single Variable Calculus I for Engineers with a grade of C- or better satisfies Foundational Skills B4.
   - PHIL 3318 Professional Ethics satisfies GWAR.

Electrical Engineering majors have the following General Education Modifications (GEMs), which means they do not have to take courses to satisfy these GE requirements. These GEMs are specific to the three engineering majors (Computer Engineering, Electrical Engineering and Engineering Sciences). Students who change to another major will not keep the modifications:
   - Foundational Skill A3 is embedded in PHYS 2210 Physics for Scientists and Engineers I, PHYS 2220 Physics for Scientists and Engineers II[B1] and ECE 2070 Electric Circuits/ENGR 2070 Electric Circuits/PHYS 2070 Electric Circuits[A3].
   - LD Area B2 is embedded throughout the curriculum.
   - 3 units of LD Area D is met through EAC/ABET outcomes 2 and 4.
   - UD Thematic Area D is met through EAC/ABET outcomes 2 and 4.

5 The SELF requirement can be met by selecting another General Education course with a SELF overlay or by taking a stand-alone course. The GWAR may be satisfied by taking the GWAR exam, by taking another General Education course with a GWAR overlay, or by taking a stand-alone course. If a student opts to take a stand-alone course for either or both of these requirements, the course(s) will add additional units to that student’s general education pathway.

6 Additional Units are required to meet the 120-unit requirement for graduation. Any accepted university units may be used to meet this requirement, including stand-alone courses for SELF.

Note: One (1) semester unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week.