ELECTRICAL ENGINEERING (BS)

Program Description

The BS in Electrical Engineering program provides students with a strong foundation to design and analyze electrical and electronics systems, including in the areas of power, energy, biomedical devices, and signal processing.

The BS in Electrical Engineering degree is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org/).

Entering and Completing the Major

In order to earn a degree, you must complete at least one academic major. SPU encourages students to explore various academic paths, so if you change your mind about a major, or want to include an additional program, you are able to do so, as outlined below.

Note that the University encourages you to enter your chosen major(s) as soon as you have determined it and are eligible to join it, especially by the start of your junior year. Students who transfer as juniors and seniors should enter a major within their first two quarters at SPU.

- If this is your first quarter at SPU and you identified a major in this department as your first choice on your application for admission to the University, you have gained entry to the major. To change or add a major, follow these instructions (https://spu.atlassian.net/l/cp/a3th1keb).
- If you are an SPU student with an SPU cumulative GPA of 2.0 or better, follow these instructions (https://spu.atlassian.net/l/cp/a3th1keb) to enter a major in this department.
- The University requires a grade of C- or better in all classes that apply to a major; however, programs may require higher minimum grades in specific courses. You may repeat an SPU course only once for a higher grade.
- To advance in this program, meet with your faculty advisor regularly to discuss your grades, course progression, and other indicators of satisfactory academic progress. If your grades or other factors indicate that you may not be able to successfully complete the major or minor, your faculty advisor can work with you to explore options, which may include choosing a different major.
- You must complete the major requirements that are in effect in the SPU Undergraduate Catalog for the year you enter the major.

Electrical Engineering (BS)

123 Credits Minimum, Including 54 Upper Division (UD)

Code	Title	Credits
Mathematics		
EGR 2200	Engineering Probability and Statistics	3
or MAT 2200	Engineering Probability and Statistics	
MAT 1234	Calculus I	5
MAT 1235	Calculus II	5
MAT 1236	Calculus III	5
MAT 2401	Linear Algebra	3
MAT 3237	Differential Equations	3
MAT 3238	Vector Calculus	3
Section Credits Required		27
Science		
EE 3315	Electricity and Magnetism I	3
or PHY 3315	Electricity and Magnetism I	
PHY 1121	Physics for Science and Engineering	5
PHY 1122	Physics for Science and Engineering	5
PHY 1123	Physics for Science and Engineering	5
Section Credits Required		18
Engineering: Computer Science		
CSC 1250	Introductory Problem Solving and Programming	5
CSC 1260	Structured Programming	5
CSC 2430	Object Oriented Programming	5
Section Credits Required		15
Engineering		
EE 4211	Electrical Engineering Senior Design I	3
EGR 3810	General Engineering Design	5
or EE 3730	Engineering Design	
EGR 4812	Engineering Senior Design II	3
or EE 4212	Electrical Engineering Senior Design II	
EGR 4899	Engineering Capstone and Senior Design	3
or EE 4899	Electrical Engineering Capstone and Senior Design	
EGR 4941	Engineering Professional Experience [1]	1
GS 3001	Internship and Job Search Strategies	1
Section Credits Required		16
Electrical Engineering		
EE 1210	Introduction to Logic System Design	5
EE 1502	Electrical and Computer Engineering Fundamentals	1
EE 2726	Electric Circuits I	5
EE 2728	Electric Circuits II - Expanded	5
EE 3280	Microcontroller System Design	5
EE 3410	Signal and System Analysis	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab	6
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab	6
EE 3760	Computer Organization and Assembly Language	5
Section Credits Required		43
Technical Electives		
Select 5 credits of the following:		5
EE 3500	Power Systems Fundamentals	
EE 4450	Control System Design	
or EGR 4450	Control Systems Design	
EE 4950	Topics in Electrical Engineering	
EGR 3250	Introduction to Robotics	
EGR 4950	Special Topics: General Engineering	
Section Credits Required		5
Total Credits		**124**

[1] An approved tech internship or professional experience must be completed before passing EGR 4941.

Additional Requirements and Information

- **Chemistry Proficiency Requirement:** You must score 75 percent or higher on SPU's Chemistry Placement Test or complete CHM 1310 Survey of General Chemistry or CHM 1211 General Chemistry.

Suggested Course Sequences

Four Year Plan Starting with Calculus

Course	Title	Credits
Freshman		
Variable		
TCOR 1000	The Christian Faith	5
WRI 1000	Academic Inquiry and Writing Seminar	5
Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		0-5
	Credits	**10-15**
Autumn		
FYS 1000	First Year Seminar [1]	3
MAT 1234	Calculus I	5
PHY 1121	Physics for Science and Engineering	5
	Credits	**13**
Winter		
EE 1502	Electrical and Computer Engineering Fundamentals	1
MAT 1235	Calculus II	5
PHY 1122	Physics for Science and Engineering	5
	Credits	**11**
Spring		
MAT 1236	Calculus III	5
PHY 1123	Physics for Science and Engineering	5
	Credits	**10**
Sophomore		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		0-5
GS 3001 [2]		1
	Credits	**1-6**
Autumn		
CHM 1310	Survey of General Chemistry (if needed) [3]	5
EE 2726	Electric Circuits I	5
MAT 3237	Differential Equations	3
	Credits	**13**
Winter		
CSC 1250	Introductory Problem Solving and Programming	5
EE 2728	Electric Circuits II - Expanded	5
MAT 3238	Vector Calculus	3
PHY 3315	Electricity and Magnetism I [4]	3
	Credits	**16**
Spring		
CSC 1260	Structured Programming [5]	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab [6]	6
MAT 2401	Linear Algebra	3
	Credits	**14**
Junior		
Variable		
Technical Electives [7]		0-5
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and/or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		5-25
EE 3410	Signal and System Analysis [4]	5
PHY 3315	Electricity and Magnetism I [8]	3
	Credits	**13-38**
Autumn		
CSC 2430	Object Oriented Programming [5]	5
EE 1210	Introduction to Logic System Design	5
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab [9]	6
GS 3001	Internship and Job Search Strategies [10]	1
	Credits	**17**
Winter		
EE 3760	Computer Organization and Assembly Language	5
	Credits	**5**
Spring		
EE 3280	Microcontroller System Design	5
EE 3730	Engineering Design	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab [10]	6
	Credits	**16**
Senior		
Variable		
Technical Electives [7]		0-5
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and/or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		5-25
EE 3410	Signal and System Analysis [8]	5
PHY 3315	Electricity and Magnetism I [8]	3
	Credits	**13-38**
Autumn		
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab [10]	6
EE 4211	Electrical Engineering Senior Design I	3
EGR 4941	Engineering Professional Experience [11]	1
	Credits	**10**
Winter		
EE 4212	Electrical Engineering Senior Design II	3
	Credits	**3**
Spring		
EE 4899	Electrical Engineering Capstone and Senior Design	3
MAT 2200	Engineering Probability and Statistics [10]	3
	Credits	**6**
	Total Credits	**171-231**

1. FYS 1000 First Year Seminar should be asection taught by an engineering faculty member, if available.
2. May be taken Fall of junior year.
3. If you score at least 75 percent or higher on SPU's Chemistry Placement Test or complete CHM 1211 General Chemistry, then CHM 1310 is not needed.
4. Offered alt years.
5. At least a C+ must have been earned in the pre-requisite programming class.
6. May be taken Spring of junior year.
7. Can be taken junior or senior year. See link at the bottom of this page for the list.
8. If not already completed. Offered alt years.
9. May be taken senior year.
10. If not already completed.
11. Must be taken AFTER completing or WHILE pursuing an approved internship or an approved certification.

Four Year Plan Starting with Algebra or Trigonometry

Course	Title	Credits
Freshman		
Variable		
TCOR 1000	The Christian Faith	5
WRI 1000	Academic Inquiry and Writing Seminar	5
Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		0-10
	Credits	**10-20**
Autumn		
CHM 1310	Survey of General Chemistry (if needed) [2]	5
FYS 1000	First Year Seminar [1]	3
MAT 1141	Precalculus I (if needed)	5
	Credits	**13**
Winter		
CSC 1250	Introductory Problem Solving and Programming	5
EE 1502	Electrical and Computer Engineering Fundamentals	1
MAT 1142	Precalculus II	5
	Credits	**11**
Spring		
CSC 1260	Structured Programming [3]	5
MAT 1234	Calculus I	5
	Credits	**10**
Sophomore		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/) or CHM 1310 (if needed)		0-15
GS 3001	Internship and Job Search Strategies [4]	1
	Credits	**1-16**
Autumn		
CSC 2430	Object Oriented Programming [3]	5
MAT 1235	Calculus II	5
PHY 1121	Physics for Science and Engineering	5
	Credits	**15**
Winter		
MAT 1236	Calculus III	5
PHY 1122	Physics for Science and Engineering	5
	Credits	**10**
Spring		
MAT 2401	Linear Algebra	3
PHY 1123	Physics for Science and Engineering	5
	Credits	**8**
Junior		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and/or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		5-20
Technical Electives [5]		0-5
EE 3410	Signal and System Analysis [6]	5
PHY 3315	Electricity and Magnetism I [6]	3
	Credits	**13-33**
Autumn		
EE 1210	Introduction to Logic System Design	5
EE 2726	Electric Circuits I	5
GS 3001	Internship and Job Search Strategies [7]	1
MAT 3237	Differential Equations	3
	Credits	**14**
Winter		
EE 2728	Electric Circuits II - Expanded	5
EE 3760	Computer Organization and Assembly Language	5
MAT 3238	Vector Calculus	3
	Credits	**13**
Spring		
EE 3280	Microcontroller System Design	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab	6
EE 3730	Engineering Design	5
	Credits	**16**
Senior		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and/or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		5-30
Technical Electives [5]		0-5
EE 3315	Electricity and Magnetism I [8]	3
EE 3410	Signal and System Analysis [8]	5
	Credits	**13-43**
Autumn		
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab	6
EE 4211	Electrical Engineering Senior Design I	3
EGR 4941	Engineering Professional Experience [9]	1
	Credits	**10**
Winter		
EE 4212	Electrical Engineering Senior Design II	3
	Credits	**3**
Spring		
EE 4899	Electrical Engineering Capstone and Senior Design	3
MAT 2200	Engineering Probability and Statistics	3
	Credits	**6**
	Total Credits	**166-241**

1. FYS 1000 First Year Seminar should be a section taught by an engineering faculty member, if available.
2. If you score at least 75 percent or higher on SPU's Chemistry Placement Test or complete CHM 1211 General Chemistry, then CHM 1310 is not needed.
3. At least a C+ must have been earned in the pre-requisite programming class.
4. May be taken Fall of junior year.
5. Can be taken junior or senior year. See link at the bottom of this page for the list. Be sure to verify that pre-requisites have been met.
6. If pre-requisites are complete and if the course is offered that year since offered alt years.
7. If not already completed.
8. If not already completed. Offered alt years.
9. Must be taken AFTER completing or WHILE pursuing an approved internship or an approved certification.

Two Year Plan for a Transfer Student with or without a DTA

See below for the pre-requisite courses required to complete the degree in two years, plus potentially an additional quarter. It is fine to transfer to SPU without having completed those courses, but it will likely result in requiring more than two years at SPU.

Note also that without a DTA, it will depend on how many of the General Education Courses (Common Curriculum (https://catalog.spu.edu/

undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/), Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/), etc (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/graduation-requirements-policies/).) are completed before transferring as to whether or not the degree can be completed in two years.

Check the quarter, day and time in the current schedule as course offerings may change. Pay close attention to the pre-requisites of the courses.

Course	Title	Credits
First Year		
Variable		
EE 3410	Signal and System Analysis [1]	5
PHY 3315	Electricity and Magnetism I [1]	3
Technical Electives [2, 3]		0-5
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/) as needed [3]		
	Credits	**8-13**
Autumn		
CSC 2330	Data Structures & Programming	5
EE 1210	Introduction to Logic System Design	5
EE 2502 or EE 2726	Selected Circuits Topics for Transfer Students or Electric Circuits I	2
GS 3001	Internship and Job Search Strategies	1
	Credits	**13**
Winter		
EE 2728	Electric Circuits II - Expanded	5
EE 3760	Computer Organization and Assembly Language	5
	Credits	**10**
Spring		
EE 3280	Microcontroller System Design	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab	6
EE 3730	Engineering Design	5
MAT 2200	Engineering Probability and Statistics [3]	3
	Credits	**19**
Second Year		
Variable		
Technical Electives [2, 3]		0-5
EE 3410	Signal and System Analysis [4]	5
PHY 3315	Electricity and Magnetism I [4]	3
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/) as needed [3]		
	Credits	**8-13**
Autumn		
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab	6
EE 4211	Electrical Engineering Senior Design I	3
EGR 4941	Engineering Professional Experience [5]	1
	Credits	**10**
Winter		
EE 4212	Electrical Engineering Senior Design II	3
	Credits	**3**
Spring		
EE 4899	Electrical Engineering Capstone and Senior Design	3
MAT 2200	Engineering Probability and Statistics [3]	3
	Credits	**6**
	Total Credits	**77-87**

1. Offered alt years.
2. Pay attention to pre-reqs. See link at the bottom of this page for the list.
3. May be taken the first or second year.
4. If not already completed. Offered alt years.
5. Must be taken AFTER completing or WHILE pursuing an approved internship or an approved certification.

Prerequisites for the Two Year Plan

The following courses must be completed before coming to SPU in order to finish at SPU in two years, plus potentially an additional quarter. It is ok to transfer to SPU before completing all of the courses, but it will likely take longer than two years at SPU.

Code	Title	Credits
Calculus Equivalent to SPU's		
MAT 1234	Calculus I	
MAT 1235	Calculus II	
MAT 1236	Calculus III	
Two Quarters of Programming in Same Language [1]		
Prog. I		
Prog II Data Structures		
A Circuits I Class with Lab [2]		
Additional Math Equivalents to SPU's		
MAT 2401	Linear Algebra	
MAT 3237	Differential Equations	
MAT 3238	Vector Calculus	
Physics Equivalent to SPU's		
PHY 1121	Physics for Science and Engineering	
PHY 1122	Physics for Science and Engineering	
PHY 1123	Physics for Science and Engineering	
Chemistry Equivalent to SPU's		
CHM 1310	Survey of General Chemistry (or a similar class)	

1. The second must include data structures concepts.
2. Or, instead, take EE 2502 Selected Circuits Topics for Transfer Students or EE 2726 Electric Circuits I at SPU in the Fall.

Four Year Plan including Junior Fall Study Abroad

Course	Title	Credits
Freshman		
Variable		
Select one of the following each quarter.		
TCOR 1000	The Christian Faith	5
WRI 1000	Academic Inquiry and Writing Seminar	5
	Credits	**10**
Autumn		
FYS 1000	First Year Seminar [1]	3
MAT 1234	Calculus I	5
PHY 1121	Physics for Science and Engineering	5
	Credits	**13**
Winter		
EE 1502	Electrical and Computer Engineering Fundamentals	1
MAT 1235	Calculus II	5

PHY 1122	Physics for Science and Engineering	5
	Credits	**11**
Spring		
MAT 1236	Calculus III	5
PHY 1123	Physics for Science and Engineering	5
	Credits	**10**
Sophomore		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		0-5
	Credits	**0-5**
Autumn		
CSC 1250	Introductory Problem Solving and Programming	5
EE 1210	Introduction to Logic System Design	5
EE 2726	Electric Circuits I	5
	Credits	**15**
Autumn or Winter		
MAT 3237	Differential Equations	3
MAT 3238	Vector Calculus	3
	Credits	**6**
Winter		
CHM 1310	Survey of General Chemistry (if needed)	5
CSC 1260	Structured Programming [2]	5
EE 2728	Electric Circuits II - Expanded	5
	Credits	**15**
Spring		
CSC 2430	Object Oriented Programming [2]	5
EE 3721 & 3721L	Electronics I - Analog Devices and Circuits and Electronics I - Analog Devices and Circuits Lab	6
GS 3001	Internship and Job Search Strategies	1
MAT 2401	Linear Algebra	3
	Credits	**15**
Junior		
Variable		
EE 3410	Signal and System Analysis [3]	5
PHY 3315	Electricity and Magnetism I [3]	3
tech electives [4]		0-5
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) and/or Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/)		5-20
	Credits	**13-33**
Autumn		
Study Abroad Quarter: Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) , Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/) , and/or Cultural Understanding and Engagement (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wetext)		15
	Credits	**15**
Winter		
EE 3760	Computer Organization and Assembly Language	5
	Credits	**5**
Spring		
EE 3280	Microcontroller System Design	5
EE 3730	Engineering Design	5
MAT 2200	Engineering Probability and Statistics [5]	3
	Credits	**13**
Senior		
Variable		
Common Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/common-curriculum/) , Exploratory Curriculum (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/) , and/or Cultural Understanding and Engagement (https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wetext)		5-20
Technical Electives [4]		0-5
EE 3315	Electricity and Magnetism I [6]	3
EE 3410	Signal and System Analysis [6]	5
	Credits	**13-33**
Autumn		
EE 3722 & 3722L	Electronics II Analog Electronics and Electronics II Analog Electronics Lab	6
EE 4211	Electrical Engineering Senior Design I	3
EGR 4941	Engineering Professional Experience [7]	1
	Credits	**10**
Winter		
EE 4212	Electrical Engineering Senior Design II	3
	Credits	**3**
Spring		
EE 4899	Electrical Engineering Capstone and Senior Design	3
MAT 2200	Engineering Probability and Statistics [5]	3
	Credits	**6**
	Total Credits	**173-218**

1. FYS 1000 First Year Seminar should be a section taught by an engineering faculty member, if available.
2. At least a C+ must have been earned in the pre-requisite programming class.
3. Offered alt years. May be taken in the senior year if not offered in the junior year.
4. Spread between junior and senior years. See the link at the bottom of the page for this list.
5. May be taken junior or senior year.
6. If not already completed. Offered alt years.
7. Must be taken AFTER completing or WHILE pursuing an approved internship or an approved certification.

Technical Electives List

See the Requirements (p. 1) tab for a complete list of technical electives.