



## Required Courses

- 15 units of required mathematics, 12 units of physics, 3 units of chemistry
- 19 units of required lower division engineering courses and 39 units of required upper division courses,
- 6 units of elective courses, and 33 units of General Education courses (for Engineering Track)
- Course prerequisites are strictly enforced. Students not meeting the prerequisites are subject to being administratively dropped.
- All required lower division courses must be passed before upper division courses can be taken.

## Required Lower Division Math and Science Courses

Course Number	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
CHEM 180	Chemistry for the Energy and the Environment	3				550 or above on Entry Level Math (ELM) exam or approved exemption, or MATH 70© and satisfactory score on chemistry placement exam.
MATH 226	Calculus I	4				Successful completion of ELM requirement; MATH 199© or equivalent.
MATH 227	Calculus II	4				MATH 226©
MATH 228	Calculus III	4				MATH 227©
MATH 245	Elementary Differential Equations & Linear Algebra	3				MATH 228©
PHYS 220/222	General Physics with Calculus I & Lab	4				MATH 226©; PHYS 222♥; (MATH 227♥ recommended)
PHYS 230/232	General Physics with Calculus II & Lab	4				PHYS 220© and MATH 227©; PHYS 232♥ (MATH 228♥ recommended)
PHYS 240/242	General Physics with Calculus III & Lab	4				PHYS 220© and MATH 227©; PHYS 242♥ (MATH 228♥ recommended)

## Required Lower Division Electrical Engineering Courses

ENGR	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
100	Introduction to Engineering	3				High school algebra and trigonometry
205	Electric Circuits	3				PHYS 230; MATH 245♥
206	Circuits and Instrumentation Lab	1				ENGR 205♥
212	Introduction to Unix/Linux for Engineers	2				
213	Introduction to C Programming for Engineers	3				MATH 226©; ENGR 212©
214	Programming Laboratory	1				ENGR 213♥
221	Data Structures and Algorithms with Python	4				ENGR 213©
281	Probability and Statistics with Matlab	2				MATH 226©

## Required Upper Division Electrical Engineering Courses

ENGR	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
301	Microelectronics Laboratory	1				ENGR 206©; ENGR 353♥
305	Linear Systems Analysis	3				ENGR 205©; MATH 245©
306	Electromechanical Systems	3				ENGR 205©
315	Linear System Analysis Laboratory	1				ENGR 305♥
350	Intro. Engineering Electromagnetics	3				MATH 245© & PHYS 240©
353	Microelectronics	3				ENGR 205©, 206©; ENGR 301♥
356	Digital Design	3				ENGR 205©
357	Digital Design Laboratory	1				ENGR 356♥
442	Op. Amplifier System Design	3				ENGR 305©
446	Control Systems Laboratory	1				ENGR 447♥
447	Control Systems	3				ENGR 305©
449	Communication Systems	3				ENGR 305©
451	Digital Signal Processing	4				ENGR 305©; ENGR 213©
478	Design with Microprocessors	4				ENGR 213©
696	Engineering Design Project I	1				ENGR 478©; Complete 15 upper division EE units
697	Engineering Design Project II	2				ENGR 696

© = Engineering Course must be passed with a grade of C- or better    © = MATH or PHYS Course must be passed with a grade of C or better  
 ♥ = Course must either be completed or taken concurrently

## Elective Courses

- A minimum of six upper division engineering elective units is required.
- Upper division courses must have been taken within five years of graduation.
- Students with GPA of 3.0 or better may take graduate courses from this list with approval from advisor or Program Head.

### Elective Upper Division Courses for Electrical Engineering

ENGR	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
378	Digital Systems Design	3				ENGR 356©
410	Process Instrumentation and Control	3				ENGR 300, 305
411	Instrumentation and Process Control Laboratory	1				ENGR 410♥
415	Mechatronics	3				ENGR 201 or 204; 305
416	Mechatronics Laboratory	1				ENGR 415♥
445	Analog Integrated Circuit Design	4				ENGR 301©, 353©
448	Electrical Power Systems	3				ENGR 306©
453	Digital Integrated Circuit Design	4				ENGR 301© or ENGR 354©;356©
454	ASIC Design	4				ENGR 356©
455	Renewable Electric Power Systems and Smart Grids	4				ENGR 301©, 305©, 306©, 353©
456	Computer Systems	3				ENGR 356©; 213©
458	Industrial and Commercial Power Systems	3				ENGR 306©
459	Power Engineering Laboratory	1				ENGR 306©
476	Computer Communication Networks	3				ENGR 356©; ENGR 213©
492	Hardware for Machine Learning	3				ENGR 213© & ENGR 353© & ENGR 356©
498	Advanced Microcontroller	4				ENGR 478©
610	Engineering Cost Analysis	3				ENGR 103 or ENGR 213© and Math 227©
844	Embedded Systems	3				Graduate Standing or consent of instructor
845	Neural-Machine Interfaces: Design and Applications	3				Graduate Standing or consent of instructor
848	Digital VLSI Design	3				Graduate Standing or consent of instructor
849	Advance Analog IC Design	3				Graduate Standing or consent of instructor
850	Digital Design Verification	3				Graduate Standing or consent of instructor
851	Advance Microprocessor Architecture	3				Graduate Standing & ENGR 456 or instructor consent
852	Advance Digital Design	3				Graduate Standing or consent of instructor
853	Advance Topics in Computer Communication and Network	3				Graduate Standing or consent of instructor
854	Wireless Data Communication Standards	3				Graduate Standing or consent of instructor
855	Advance Wireless Communication Technologies	3				Graduate Standing & ENGR449 & ENGR 451 or consent of instructor
856	Nanoscale Circuits and Systems	3				Graduate Standing or consent of instructor
858	Hardware Security and Trust	3				Graduate Standing & ENGR 356 or consent of instructor
859	On-Device Machine Learning	3				See SFSU Bulletin
868	Advance Control Systems	3				Graduate Standing or consent of instructor
869	Robotics	3				Graduate Standing or consent of instructor
870	Robot Control	3				Graduate Standing or consent of instructor
871	Advance Electrical Power Systems	3				Graduate Standing & MATH 245 or consent of instructor
890	RF Devices & Transceiver Principles of Design	3				Graduate Standing & ENGR 350 or consent of instructor

Units Completed

**Minimum Required**

**6**

© = Engineering course must have been passed with a grade of C- or better

♥ = Listed course should be taken concurrently