

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING - QUANTITATIVE REASONING CATEGORY III/IV AND STRETCH ENGLISH

129 Total Units Required
Minimum Number of Units in Major: 95

Course	Title	Units
First Semester		
ENG 104	Writing the First Year: Finding Your Voice Stretch I ¹	3
ENGR 100	Introduction to Engineering (Major Core)	1
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) ^{2,3}	3
GE Area A: Oral Communication (A1) ^{4,5}		3
GE Area D		3
	Units	13
Second Semester		
Select One (Major Core):		3-5
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	
CHEM 180	Chemistry for the Energy and the Environment (B1, B3, ES)	
ENG 105	Writing the First Year: Finding Your Voice Stretch II (A2) ¹	3
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) ^{2,3}	3
GE Area B: Life Science (B2)		3
GE Area C		3
	Units	15-17
Third Semester		
MATH 226	Calculus I (Major Core, B4) ^{2,3}	4
GE Area C		3
GE Area D - Take Two		6
GE Area E		3
	Units	16

Fourth Semester

ENGR 213	Introduction to C Programming for Engineers (Major Core) ⁵	3
ENGR 290	Modular Elective (Major Core)	1
MATH 227	Calculus II (Major Core)	4
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (Major Core, B1, B3)	4
GE Area C		3
	Units	15

Fifth Semester

MATH 228	Calculus III (Major Core)	4
PHYS 230 & PHYS 232	General Physics with Calculus II and General Physics with Calculus II Laboratory (Major Core)	4
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3
	Units	14

Sixth Semester

ENGR 205	Electric Circuits (Major Core) ⁵	3
ENGR 206	Circuits and Instrumentation Laboratory (Major Core)	1
MATH 245	Elementary Differential Equations and Linear Algebra (Major Core)	3
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory (Major Core)	4
	Units	11

Seventh Semester

ENGR 300	Engineering Experimentation (Major Core) ⁶	3
ENGR 305	Linear Systems Analysis (Major Core)	3

ENGR 306	Electromechanical Systems (Major Core)	3
ENGR 315	Systems Analysis Lab (Major Core)	1
ENGR 353	Microelectronics (Major Core)	3
ENGR 356	Digital Design (Major Core)	3
ENGR 357	Digital Design Laboratory (Major Core)	1
Units		17

Eighth Semester

ENGR 301	Microelectronics Laboratory (Major Core) ⁶	1
ENGR 350	Introduction to Engineering Electromagnetics (Major Core)	3
ENGR 442	Operational Amplifier Systems Design (Major Core)	3
ENGR 451	Digital Signal Processing (Major Core)	4
ENGR 478	Design with Microprocessors (Major Core)	4
Units		15

Ninth Semester

ENGR 446	Control Systems Laboratory (Major Core)	1
ENGR 447	Control Systems (Major Core)	3
ENGR 449	Communication Systems (Major Core)	3
ENGR 696	Engineering Design Project I (Major Core)	1
Upper-Division Engineering Electives (9 units) - Take One ⁸		3
Mechanical Engineering Elective - Select One:		3
ENGR 201	Dynamics	
ENGR 203	Materials of Electrical and Electronic Engineering	
ENGR 204	Engineering Mechanics	
ENGR 303	Engineering Thermodynamics	
Units		14

Tenth Semester

ENGR 697GW	Engineering Design Project II - GVAR (Major Core)	2
Upper-Division Engineering Electives (9 units) - Take Two ⁸		6
Units		8
Total Units		138-140

- ¹ ENG 114 can only be taken if you complete Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.
- ² Depending on courses completed through Early Start, students in Pathway/Category III or IV may be required to enroll in a support course to complement their Quantitative Reasoning/B4 requirement. There are multiple course options for this pathway. Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center (<http://cms.sfsu.edu/content/student-center>). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (<http://developmentalstudies.sfsu.edu>).
- ³ QR Category III students with a grade of B or higher in high school pre-calculus in the past year may be able to enroll in MATH 226. Please see a department advisor.
- ⁴ To avoid taking additional units, it is recommended that you meet **SF State Studies** requirements (AERM, GP, ES, SJ) within your GE or major.
- ⁵ GE Area A: Critical Thinking (A3) is satisfied upon completion of ENGR 205 and ENGR 201 or ENGR 213.
- ⁶ Upper-Division General Education, Physical and Life Sciences (UD-B) is satisfied upon completion of ENGR 300 and either ENGR 301 or ENGR 302.
- ⁷ Students must complete 21 units of upper-division Engineering units before registering for ENGR 696.

⁸ **Major Upper-Division Electives**

- ENGR 378 Digital Systems Design (3 units)
- ENGR 410 Process Instrumentation and Control (3 units) (Hidden Prerequisite for ENGR 411)
- ENGR 411 Instrumentation and Process Control Laboratory (1 units)
- ENGR 415 Mechatronics (3 units) (Hidden Prerequisite for ENGR 416)
- ENGR 416 Mechatronics Lab (1 units)
- ENGR 445 Analog Integrated Circuit Design (4 units)
- ENGR 448 Electrical Power Systems (3 units)
- ENGR 453 Digital Integrated Circuit Design (4 units)
- ENGR 454 Application Specific Integrated Circuit Design (4 units)
- ENGR 455 Power Electronics (4 units)
- ENGR 456 Computer Systems (3 units)
- ENGR 458 Renewable Electrical Power Systems and Smart Grid (3 units)
- ENGR 476 Computer Communications Networks (3 units)
- ENGR 610 Engineering Cost Analysis (3 units)
- ENGR 699 Independent Study (1-3 units)
- ENGR 844 Embedded Systems (3 units)
- ENGR 848 Digital VLSI Design (3 units)
- ENGR 849 Advanced Analog IC Design (3 units)
- ENGR 851 Advanced Microprocessor Architectures (3 units)
- ENGR 852 Advanced Digital Design (3 units)
- ENGR 853 Advanced Topics in Computer Communication and Networks (3 units)
- ENGR 854 Wireless Data Communication Standards (3 units)
- ENGR 856 Nanoscale Circuits and Systems (3 units)
- ENGR 868 Advanced Control Systems (3 units)
- ENGR 869 Robotics (3 units)