



## Required Courses

\*subject to change

- 15 units of required mathematics, 12 units of physics, and 3 units of chemistry,
- 16 units of required lower division engineering courses and 35 units of required upper division courses
- 3 units of modular electives, 9 units of engineering elective courses and 36 units of General Education courses
- Course prerequisites are strictly enforced. Students not meeting the prerequisites are subject to being administratively dropped.

## Required Math and Science Lower Division Courses

Course Number	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
CHEM 180	Chemistry for the Energy and the Environment	3				Category I or II placement for QR/Math or Cat. III or IV need MATH 197© (see bulletin for full details)
MATH 226	Calculus I	4				MATH 198© or 199© or equivalent or etc, (see bulletin for full details)
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				High school physics or equivalent; MATH 226© & PHYS 222♥ & MATH 227♥
PHYS 230/232	General Physics with Calculus II & Lab	4				PHYS 220© & MATH 227© & PHYS 232♥ (MATH 228♥ recommended)
PHYS 240/242	General Physics with Calculus III & Lab	4				PHYS 220© & MATH 227©; PHYS 242♥ (MATH 228♥ recommended)

## Required Lower Division Courses for Mechanical Engineering

ENGR	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
100	Introduction to Engineering	1				High school algebra and trigonometry
101	Engineering Graphics	1				ENGR 100♥
102	Statics	3				MATH 227 & PHYS 220
103	Introduction to Computers	1				MATH 226©
200	Materials of Engineering	3				CHEM 115 or CHEM 180
201	Dynamics	3				ENGR 102
205	Electric Circuits	3				PHYS 230 & MATH 245♥
206	Circuits and Instrumentation Lab	1				ENGR 205♥

## Required Upper Division Courses for Mechanical Engineering

ENGR	Course Name	Units	Grade	SFSU or Transfer	Term Yr	Prerequisite
300	Engineering Experimentation	3				ENGR 200©- or ENGR 206©- & ENGR 205©-
302	Experimental Analysis	1				ENGR 300 & ENGR 304♥ & ENGR 309
303+	Engineering Thermodynamics	3				PHYS 240
304+	Mechanics of Fluids	3				ENGR 201 & PHYS 240
305	Linear Systems Analysis	3				ENGR 205©- & MATH 245
309	Mechanics of Solids	3				ENGR 102 & ENGR 200♥
364	Material & Manufacturing processes	3				ENGR 201©- & ENGR 309©-
4xx*	Controls	3				Refer to the Table for Elective Courses
4xx*	Controls Laboratory	1				Refer to the Table for Elective Courses
463	Thermal Power Systems	3				ENGR 467©- & ENGR 302©-
464	Mechanical Design	3				ENGR 364©-
467	Heat Transfer	3				ENGR 303©- & ENGR 304©-
696	Engineering Design Project I	1				Senior standing with 21 upper-division units in engineering & ENGR 300 or ENGR 301 (see SFSU Bulletin for GEAR information)
697	Engineering Design Project II	2				ENGR 696©

© = Grade C or better

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

\* = Either ENGR 410/411 (recommended for Thermal-Fluids focus area) or ENGR 447/446 (recommend for Machine Design/Robotics and Control focus area)

♥ = Course must either be completed or taken concurrently.

## Elective Courses

- 9 units of the upper division engineering elective units are required.
- 3 units of modular electives are required. Select a total of 3 units below that are offered in one unit modules.

## Modular Electives (Refer to School of Engineering website for offerings each semester)

ENGR	Course Name	Units	Grade	SFSU or transfer	Term	Year	Prerequisite
271	Intro to MATLAB	1					MATH 226©
272	Engineering Project Management	1					Engineering students in sophomore year or later.
291	Intro to Creo Parametric (ProE)	1					
292	Intro to SolidWorks	1					
294	Intro to MicroController	1					
295	Design Methodology	1					

## Elective Upper Division Courses for Mechanical Engineering

ENGR	Course Name	Units			Grade	SFSU or Transfer	Year	Prerequisite
		Total	ES	ED				
306	Electromechanical Systems	3	2	1				ENGR 205©-
410	Process Instrumentation and Control	3	2	1				ENGR 300 & ENGR 305
411	Instrument. and Process Control Lab.	1	0	1				ENGR 410♥
415	Mechatronics	4	2	1				ENGR 305©-
432	Finite Element Methods	3	2	1				ENGR 309
441	Fundamentals of Composite Materials	3	1	2				ENGR 309 & Math 245
446	Control Systems Laboratory	1	0	1				ENGR 447♥
447	Automatic Control Systems	3	2	1				ENGR 305©-
465	Principles of HVAC	3	2	1				ENGR 303©-
466	Gas Dynamics and B.L. Flow	3	2	1				ENGR 303, ENGR 304
468	Applied Fluid Mech. and Hydraulics	3	2	1				ENGR 304
469	Renewable Energy Systems	3	2	1				ENGR 303
470	Biomechanics	3	2	1				ENGR 200 ©-
610	Engineering Cost Analysis	3	-	-				ENGR 103 OR ENGR 213♥ & Math 227♥
820	Energy Resources & Sustainability ♦	3	2	1				ENGR 303
863	Advanced Thermal Fluids ♦	3	2	1				ENGR 303 & ENGR 304
865	Energy-Efficient Buildings ♦	3	2	1				ENGR 467
867	Energy Auditing, Measurement, and Verification ♦	3	2	1				ENGR 205 & ENGR 467
868	Advanced Control Systems ♦	3	2	1				ENGR 447
869	Robotics	3	2	1				ENGR 201, 305, 447 (B or better)

Units Completed

Minimum Required

9	n/a	n/a	

♦ = GPA of 3 or better and consent of instructor are required to take graduate courses (in addition to prerequisites listed)

♥ = Course must be completed or taken concurrently

▪ = Course can only be used as UD elective if not also being used for controls requirement (cannot be double-counted)

## Program Planning

Fall 202\_\_

Spring 202\_\_

Fall 202\_\_

Spring 202\_\_

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Fall 202\_\_

Spring 202\_\_

Fall 202\_\_

Spring 202\_\_

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