BS MECHANICAL ENGINEERING

Program Learning Outcomes

In order to prepare our alumni for their career accomplishments expressed by the Program Educational Objectives, the students in the program will be proficient in the following skills upon graduation:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.
   a. The student will be able to apply basic math and science principles and associated analysis techniques.
   b. The student will be able to evaluate components, systems, and processes and be able to develop appropriate models of engineering systems.
   c. The student will be able to analyze their models, interpret their results, and formulate appropriate action.

2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
   a. The student will be able to recognize a need, identify constraints, and develop appropriate design specifications.
   b. Using the above specifications, the student will be able to synthesize conceptual solutions for a component, system, or process.
   c. The student will be able to use analysis techniques to refine and select the design of a component, system, or process.
   d. The student will be able to build a functional prototype and assess if it meets design specifications.

3. An ability to communicate effectively with a range of audiences.
   a. The student will be able to write an effective memorandum, letter, abstract, and project report for a wide range of audiences.
   b. The student will be able to give a coherent and effective oral presentation for a wide range of audiences.
   c. The student will be able to critique writing samples and oral presentations and identify both strong points and weak points in grammar, clarity, and organization.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
   a. The student will be able to interpret engineering professional codes of ethics and to identify situations with ethical concerns.
   b. The student will be able to identify and mitigate health and safety concerns associated with their design.
   c. The student will be able to assess the environmental, societal, and economic impact of their engineering solutions.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
   a. The student will be able to manage a team project by establishing goals, planning tasks, and meeting objectives.
   b. The student will be able to collaborate effectively on a team and contribute to an inclusive teamwork environment.
   c. The student will be able to identify when problems occur due to poor interactions among team members and identify ways to improve team dynamics.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
   a. The student will be able to select and operate appropriate instrumentation used in engineering measurement.
   b. The student will be able to design and conduct an experiment and compare the results to those predicted by an analytical model.
   c. The student will be able to interpret and draw conclusions from the results.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
   a. The student will be able to recognize the limitations of their knowledge and to acquire new knowledge using appropriate learning strategies.
   b. The student will be able to find and use appropriate technical resources.
   c. The student will be able to identify their need for additional learning.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (https://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext) section of this catalog, including:

- 60 units upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

ME 128	Introduction to Mechanical Engineering I [1]	1
ME 129	Introduction to Mechanical Engineering II [1]	1
ME 130	Introduction to Mechanical Engineering III [1]	1
ME 163	Freshmen Orientation to Mechanical Engineering [1]	1
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
ME 234	Philosophy of Design	3
ME 236	Measurement and Engineering Data Analysis	3
ME 251	Introduction to Detailed Design with Solid Modeling	2
ME 302	Thermodynamics I	3
ME 303	Thermodynamics II	3
ME 318	Mechanical Vibrations	4

ME 322	Introduction to System Dynamics	4
ME 328	Design for Strength and Stiffness	4
ME 329	Mechanical Systems Design	4
ME 341	Fluid Mechanics I	3
ME 343	Heat Transfer	4
ME 347	Fluid Mechanics II	4
ME 448	Thermal System Design	4
Concentration or General Curriculum in Mechanical Engineering		
(See list of Concentrations and General Curriculum in Mechanical Engineering below)		25-27
SUPPORT COURSES		
CE 204	Mechanics of Materials I [2]	3
CE 207	Mechanics of Materials II [2]	2
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) [3]	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
CSC 231	Programming for Engineering Students	2-3
or CSC 234	C and Unix	
EE 201	Electric Circuit Theory	3
EE 251	Electric Circuits Laboratory	1
EE 321	Electronics	3
EE 361	Electronics Laboratory	1
IME 142	Manufacturing Processes: Materials Joining	2
Select from the following: [4]		2
IME 145 & IME 146	Subtractive Manufacturing Processes for Mechanical Designs I and Subtractive Manufacturing Processes for Mechanical Designs II	
or IME 143	Manufacturing Processes: Material Removal	
MATE 210 & MATE 215	Materials Engineering and Materials Laboratory I	4
MATH 141	Calculus I (B4) [3]	4
MATH 142	Calculus II (B4) [3]	4
MATH 143	Calculus III (Area B Electives) [3]	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
MATH 344	Linear Analysis II (Upper-Division B) [3]	4
PHYS 141	General Physics I (Area B Electives) [3]	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
Manufacturing Processes Elective		
Select from the following:		1-4
IME 141	Manufacturing Processes: Net Shape	
ITP 341	Packaging Polymers and Processing	
ME 161	Introduction to Composite Materials Manufacturing	
GENERAL EDUCATION		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		0
Total units		**196-202**

1. ME 228 , ME 263 and ME 264 are required in lieu of ME 128, ME 129, ME 130, and ME 163 for change of major and transfer students.
2. May take CE 208 in place of CE 204 and CE 207.
3. Required in Major or Support; also satisfies General Education (GE) requirement.
4. IME 143 is required in lieu of IME 145 and IME 146 for change of major and transfer students.

General Curriculum in Mechanical Engineering or Concentrations (select one)

- General Curriculum in Mechanical Engineering (https://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/general-curriculum/)
- Energy Resources (https://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/energyresourcesconcentration/)
- Heating, Ventilating, Air-Conditioning and Refrigerating (HVAC&R) (https://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/hvacrconcentration/)
- Mechatronics (https://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/mechatronicsconcentration/)
- Manufacturing (https://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/manufacturingconcentration/)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (https://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	**English Language Communication and Critical Thinking**	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	**Scientific Inquiry and Quantitative Reasoning**	
B1	Physical Science (4 units in Support) [1]	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	

B4	Mathematics/Quantitative Reasoning (8 units in Support) [1]	0
Upper-Division B (4 units in Support) [1]		0
Area B Electives (8 units in Support) [1]		0
Area C	**Arts and Humanities**	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	**Social Sciences**	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	**Lifelong Learning and Self-Development**	
Lower-Division E		4
Area F	**Ethnic Studies**	
F	Ethnic Studies	4
Total units		**48**

[1] Required in Major or Support; also satisfies General Education (GE) requirement.