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 (http://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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>ME 128</td>
<td>Introduction to Mechanical Engineering I</td>
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<tr>
<td>ME 129</td>
<td>Introduction to Mechanical Engineering II</td>
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<tr>
<td>ME 130</td>
<td>Introduction to Mechanical Engineering III</td>
<td>1</td>
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<tr>
<td>ME 163</td>
<td>Freshmen Orientation to Mechanical Engineering</td>
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<td>ME 211</td>
<td>Engineering Statics</td>
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<td>ME 212</td>
<td>Engineering Dynamics</td>
<td>3</td>
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<td>ME 234</td>
<td>Philosophy of Design</td>
<td>3</td>
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<tr>
<td>ME 236</td>
<td>Measurement and Engineering Data Analysis</td>
<td>3</td>
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<tr>
<td>ME 251</td>
<td>Introduction to Detailed Design with Solid Modeling</td>
<td>2</td>
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<tr>
<td>ME 302</td>
<td>Thermodynamics I</td>
<td>3</td>
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<tr>
<td>ME 303</td>
<td>Thermodynamics II</td>
<td>3</td>
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<tr>
<td>ME 318</td>
<td>Mechanical Vibrations</td>
<td>4</td>
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</table>
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 347 Fluid Mechanics II 4
ME 350 Heat Transfer 4
ME 420 Thermal System Design 4

Concentration 25-27

SUPPORT COURSES
BIO 213 & BMED 213 Life Science for Engineers and Bioengineering Fundamentals (B2) 2 4
CE 204 Mechanics of Materials I 3 3
CE 207 Mechanics of Materials II 3 2
CHEM 124 General Chemistry for Physical Science and Engineering I (B3/B4) 2 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 1

EE 201 Electric Circuit Theory 3
EE 251 Electric Circuits Laboratory 1
EE 321 Electronics 3
EE 361 Electronics Laboratory 1

ENGL 149 Technical Writing for Engineers (A3) 2 4

IME 142 Manufacturing Processes: Materials Joining 2

IME 145 Subtractive Manufacturing Processes for Mechanical Designs I 1

IME 146 Subtractive Manufacturing Processes for Mechanical Designs II 1

MATE 210 Materials Engineering 4
& MATE 215 and Materials Laboratory I
MATH 141 Calculus I (B1) 2 4
MATH 142 Calculus II (B1) 2 4
MATH 143 Calculus III (Add’l Area B) 2 4
MATH 241 Calculus IV 4
MATH 244 Linear Analysis I 4
MATH 344 Linear Analysis II (B6) 2 4

PHYS 132 General Physics II 4

PHYS 133 General Physics III 4

PHYS 141 General Physics IA (Add’l Area B) 2 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

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 transfer students.
2 Required in Support; also satisfies GE.
3 May take CE 208 in place of CE 204 and CE 207.

Concentrations (select one)
• General (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/generalconcentration)
• Energy Resources (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/energyresourcesconcentration)
• Heating, Ventilating, Air-Conditioning and Refrigerating (HVAC&R) (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/hvacrconcentration)
• Mechatronics (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/mechatronicsconcentration)
• Manufacturing (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering/bsmechanicalengineering/manufacturingconcentration)

General Education (GE) Requirements
• 72 units required, 32 of which are specified in Major and/or Support.
• See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
• Minimum of 8 units required at the 300 level.

Area A Communication
A1 Expository Writing 4
A2 Oral Communication 4
A3 Reasoning, Argumentation and Writing (4 units in Support) 1

Area B Math, Science, and Quantitative Reasoning
B1 Mathematics/Statistics (8 units in Support) 1 0
B2 Life Science (4 units in Support) 1 0
B3 Physical Science (4 units in Support) 1 0
B4 One lab taken with either a B2 or B3 course
B6 Upper-division Area B (4 units in Support) 1 0

Additional Area B units (8 units in Support) 1 0

Area C Arts and Humanities
C1 Literature 4
C2 Philosophy 4
C3 Fine/Performing Arts 4
C4 Upper-division elective 4

Area D Society and the Individual
<table>
<thead>
<tr>
<th></th>
<th>Course Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>D1</td>
<td>The American Experience (Title 5, Section 40404 requirement) (40404)</td>
<td>4</td>
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<tr>
<td>D2</td>
<td>Political Economy</td>
<td>4</td>
</tr>
<tr>
<td>D3</td>
<td>Comparative Social Institutions</td>
<td>4</td>
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<tr>
<td>Area E</td>
<td>Lifelong Learning and Self-Development</td>
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<tr>
<td>E</td>
<td>Lower-division elective</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>Total units</strong></td>
<td><strong>40</strong></td>
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1 Required in Support; also satisfies GE