# Bachelor of Science in Mechanical Engineering Roadmap

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
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<tr>
<td>CHEM 180 or CHEM 115</td>
<td>Chemistry for the Energy and the Environment or General Chemistry I: Essential Concepts of Chemistry</td>
<td>3-5</td>
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<tr>
<td>ENGR 100</td>
<td>Introduction to Engineering</td>
<td>1</td>
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<tr>
<td>ENGR 101</td>
<td>Engineering Graphics</td>
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<tr>
<td>MATH 226</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>GE Area A: Written English Communication (A2)</td>
<td></td>
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</tr>
<tr>
<td>GE Area D: U.S. History (D2) or U.S. and California Government (D3)</td>
<td></td>
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<tr>
<td></td>
<td>Units</td>
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<tr>
<td><strong>Second Semester</strong></td>
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</tr>
<tr>
<td>ENGR 103</td>
<td>Introduction to Computers</td>
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<tr>
<td>MATH 227</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>PHYS 220 &amp; PHYS 222</td>
<td>General Physics with Calculus I and General Physics with Calculus I Laboratory</td>
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<tr>
<td>GE Area A: Oral Communication (A1)</td>
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<tr>
<td>GE Area B: Life Science (B2)</td>
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<tr>
<td><strong>Third Semester</strong></td>
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<tr>
<td>ENGR 102</td>
<td>Statics</td>
<td>3</td>
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<tr>
<td>ENGR 200</td>
<td>Materials of Engineering</td>
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<tr>
<td>MATH 228</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>PHYS 230 &amp; PHYS 232</td>
<td>General Physics with Calculus II and General Physics with Calculus II Laboratory</td>
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<tr>
<td>GE Area A: Written English Communication II (A4)</td>
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<td></td>
<td>Units</td>
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<tr>
<td><strong>Fourth Semester</strong></td>
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<tr>
<td>ENGR 201</td>
<td>Dynamics</td>
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<tr>
<td>ENGR 205 &amp; ENGR 206</td>
<td>Electric Circuits and Circuits and Instrumentation Laboratory</td>
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<tr>
<td>ENGR 290</td>
<td>Modular Elective</td>
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<tr>
<td>MATH 245</td>
<td>Elementary Differential Equations and Linear Algebra</td>
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<tr>
<td>PHYS 240 &amp; PHYS 242</td>
<td>General Physics with Calculus III and General Physics with Calculus III Laboratory</td>
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<td>Units</td>
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<td>ENGR 290</td>
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<tr>
<td>ENGR 300</td>
<td>Engineering Experimentation</td>
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<tr>
<td>ENGR 303</td>
<td>Engineering Thermodynamics</td>
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<tr>
<td>ENGR 305</td>
<td>Linear Systems Analysis</td>
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<tr>
<td>ENGR 309</td>
<td>Mechanics of Solids</td>
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<td>GE Area D: U.S. History (D2) or U.S. and California Government (D3)</td>
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<td><strong>Sixth Semester</strong></td>
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<td>ENGR 290</td>
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<tr>
<td>ENGR 302</td>
<td>Experimental Analysis</td>
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<td>ENGR 304</td>
<td>Mechanics of Fluids</td>
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<tr>
<td>ENGR 364</td>
<td>Materials and Manufacturing Processes</td>
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<tr>
<td>Major Upper Division Electives</td>
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<tr>
<td>GE Area C: Arts (C1) or Humanities (C2)</td>
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<td>GE Area C: Humanities: Literature (C3)</td>
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<tr>
<td><strong>Units</strong></td>
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<td><strong>Seventh Semester</strong></td>
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<tr>
<td>ENGR 446</td>
<td>Control Systems Laboratory</td>
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<tr>
<td>ENGR 410</td>
<td>or Process Instrumentation and Control</td>
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</tr>
<tr>
<td>ENGR 411</td>
<td>and Instrumentation and Process Control</td>
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<tr>
<td>ENGR 464</td>
<td>Laboratory</td>
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<tr>
<td>ENGR 467</td>
<td>Mechanical Design</td>
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<tr>
<td>ENGR 696</td>
<td>Heat Transfer</td>
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<tr>
<td>GE Area C: Arts (C1)</td>
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<tr>
<td>GE Area C: Social Sciences (D1)</td>
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<tr>
<td><strong>Units</strong></td>
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<tr>
<td><strong>Eighth Semester</strong></td>
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<tr>
<td>ENGR 463</td>
<td>Thermal Power Systems</td>
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<tr>
<td>ENGR 697GW</td>
<td>Engineering Design Project II-GWAR</td>
<td>2</td>
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<tr>
<td>Major Upper Division Electives – Take Two</td>
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<tr>
<td>GE Area UD–C: Upper Division Arts and/or Humanities (Consider SF State Studies Course)</td>
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<tr>
<td>GE Area UD–D: Upper Division Social Sciences (Consider SF State Studies Course)</td>
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<td><strong>Units</strong></td>
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<td>17</td>
</tr>
<tr>
<td><strong>Total Units</strong></td>
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<td>129-131</td>
</tr>
</tbody>
</table>

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. To avoid taking additional units, it is recommended that you meet LLD and SF State Studies requirements (AERM, GP, ES, SJ) within your GE or major.

3. GE Area A: Critical Thinking (A3) is satisfied upon completion of ENGR 205 and ENGR 201 or ENGR 213.

4. Students must complete 21 units of upper-division engineering units before registering for ENGR 696.
Upper Division Major Electives (9 units)
ENGR 306 Electromechanical Systems (3 units)
ENGR 410 Process Instrumentation and Control (3 units)
ENGR 411 Instrumentation and Process Control Laboratory (1 units)
ENGR 415 Mechatronics (3 units)
ENGR 416 Mechatronics Lab (1 units)
ENGR 432 Finite Element Methods in Structural and Continuum Mechanics (3 units)
ENGR 441 Fundamentals of Composite Materials (3 units)
ENGR 446 Control Systems Laboratory (1 units)
ENGR 447 Control Systems (3 units)
ENGR 461 Mechanical and Structural Vibrations (3 units)
ENGR 465 Principles of HVAC (3 units)
ENGR 466 Gas Dynamics and Boundary Layer Flow (3 units)
ENGR 468 Applied Fluid Mechanics and Hydraulics (3 units)
ENGR 469 Alternative and Renewable Energy Systems (3 units)
ENGR 610 Engineering Cost Analysis (3 units)
ENGR 699 Independent Study (1-3 units)
ENGR 820 Energy Resources and Sustainability (3 units)
ENGR 863 Advanced Thermal-fluids (3 units)
ENGR 865 Energy-Efficient Buildings (3 units)
ENGR 866 Air Quality Engineering (3 units)
ENGR 867 Energy Auditing and Measurement and Verification (3 units)
ENGR 871 Advanced Electrical Power Systems (3 units)