# MANUFACTURING ENGINEERING (BS)

## 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/academic-standards-policies/general-requirements-bachelors-degree/) section of this catalog, including:

- 40 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirements (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements.

| Code | Title | Units |
|---|---|---|
| **MAJOR COURSES** | | |
| IME 1101 | Introduction to Industrial and Manufacturing Engineering | 1 |
| IME 1140 | Technical Graphics Communication for Design and Manufacturing | 1 |
| IME 1141 | Introduction to Metal Casting and Prototyping | 1 |
| IME 1142 | Materials Joining | 1 |
| IME 1143 | Introduction to Design and Manufacturing | 2 |
| IME 1156 | Introduction to Modern Electronics Manufacturing | 2 |
| IME 1223 | Process Improvement Fundamentals | 4 |
| IME 2243 | Intermediate Design and Manufacturing | 2 |
| IME 2315 | Financial Decision Making for Engineers | 2 |
| IME 3327 | Test Design and Analysis in Manufacturing Engineering | 4 |
| IME 3330 | Fundamentals of Manufacturing Engineering | 4 |
| IME 3356 | Manufacturing and Process Automation | 4 |
| IME 4418 | Product and Process Development | 4 |
| IME 4450 | Computer-Aided Manufacturing and Process Analysis | 4 |
| IME 4461 | Senior Project - Design I | 2 |
| IME 4462 | Senior Project - Design II | 2 |
| **Technical Electives** | | |
| Select from the following: | | 9 |
| BMED 3410 | Biomechanics | |
| BMED 4434 | Micro/Nano Fabrication | |
| BMED 4435 | Micro/Nano Fabrication Laboratory | |
| IME 3302 | Operations Research and Management | |
| IME 3303 | Project Organization and Management | |
| IME 3331 | Intermediate Metal Casting | |
| IME 3332 | Advanced Materials Joining | |
| IME 3336 | Advanced Computer Aided Manufacturing | |
| IME 3410 | Production Planning and Control Systems | |
| IME 3420 | Process and System Simulation | |
| IME 3443 | Facilities Design and Warehousing | |
| IME 4319 | Human Factors and Ergonomics in Engineering and Systems Design | |
| IME 4400 | Special Problems for Advanced Undergraduates | |
| IME 4401 | Sales Engineering | |
| IME 4408 | Systems Engineering | |
| IME 4415 | Service Enterprises Engineering and Management | |
| IME 4417 | Supply Chain and Logistics Management | |
| IME 4428 | Engineering Metrology | |
| IME 4432 | Additive Manufacturing | |

| | | |
|---|---|---|
| IME 4435 | Reliability for Design and Testing | |
| IME 4441 | Engineering Supervision | |
| IME 4456 | Sensing Systems and the Industrial Internet of Things | |
| IME 4460 | Value Chain Analysis | |
| IME 4470 | Special Advanced Topics | |
| IME 4471 | Special Advanced Laboratory | |
| IME 5510 | Model-Based Systems Engineering | |
| IME 5520 | Advanced Information Systems for Operations | |
| IME 5527 | Design of Experiments for Industrial Applications | |
| IME 5541 | Advanced Operations Research | |
| IME 5543 | Applied Human Factors | |
| IME 5544 | Advanced Engineering Economy | |
| IME 5545 | Advanced Simulation | |
| ITP 3341 | Packaging Polymers and Processing | |
| MATE 3401 | Advanced Materials Characterization | |
| ME 3302 | Thermodynamics | |
| ME 3313 | Intermediate Dynamics | |
| ME 3328 | Design for Strength and Stiffness | |
| ME 3341 | Fluid Mechanics | |
| ME 3315 | Energy Conversion | |
| ME 4480 | Composite Materials Analysis and Design | |
| **SUPPORT COURSES** | | |
| CSC 1032 | Programming for Scientists and Engineers | 3 |
| CHEM 1120 | Fundamentals of Chemical Structure and Properties (5A & 5C) [1] | 4 |
| EE 2115<br>& 2115L | Circuits & Electronics for Non-Majors<br>and Circuits & Electronics Laboratory for Non-Majors | 4 |
| ENGR 2211 | Introduction to Mechanics | 4 |
| ENGR 2212 | Introduction to Engineering Dynamics | 2 |
| MATE 1210<br>& MATE 1215 | Principles of Materials Engineering for Majors<br>and Materials Laboratory I | 4 |
| MATH 1151 | Linear Algebra | 3-4 |
| or MATH 2341 | Linear Analysis | |
| MATH 1261 | Calculus I (2) [1] | 4 |
| MATH 1262 | Calculus II | 4 |
| MATH 2263 | Calculus III | 3 |
| PHYS 1141 | General Physics I | 4 |
| PHYS 1143 | General Physics II | 4 |
| STAT 3210 | Engineering Statistics (Upper-Division 2/5) [1] | 3 |
| **GENERAL EDUCATION (GE)** | | |
| (See GE program requirements below) | | 33 |
| **FREE ELECTIVES** | | |
| Free Electives | | 0 |
| **Total Units** | | **128-129** |

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

# General Education (GE) Requirements

- 43 units required, 10 of which are specified in Major and/or Support.
- If any of the remaining 33 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/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).

- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

**Lower-Division General Education**

| | | |
|---|---|---|
| **Area 1** | **English Communication and Critical Thinking** | |
| 1A | Written Communication | 3 |
| 1B | Critical Thinking | 3 |
| 1C | Oral Communication | 3 |
| **Area 2** | **Mathematics and Quantitative Reasoning** | |
| 2 | Mathematics and Quantitative Reasoning (3 units in Support) [1] | 0 |
| **Area 3** | **Arts and Humanities** | |
| 3A | Arts | 3 |
| 3B | Humanities: Literature, Philosophy, Languages other than English | 3 |
| **Area 4** | **Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)** | |
| 4A | American Institutions (Title 5, Section 40404 Requirement) | 3 |
| 4B | Social and Behavioral Sciences | 3 |
| **Area 5** | **Physical and Life Sciences** | |
| 5A | Physical Sciences (3 units in Support) [1] | 0 |
| 5B | Life Sciences | 3 |
| 5C | Laboratory (may be embedded in a 5A or 5B course) (1 units in Support) [1] | 0 |
| **Area 6** | **Ethnic Studies** | |
| 6 | Ethnic Studies | 3 |
| **Upper-Division General Education** | | |
| Upper-Division 2/5 | Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Support) [1] | 0 |
| Upper-Division 3 | Arts and Humanities | 3 |
| Upper-Division 4 | Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.) | 3 |
| **Total Units** | | **33** |

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