Mechanical Engineering, B.S.

Program Educational Objectives: Graduates of the program will have the professional and scientific education that allows them to be successful as career engineers and in graduate programs. Specifically, they will be able to (1) function in professional environments in industry, government, and academia applying and building upon engineering science knowledge, problem-solving skills, and communication skills; (2) function as members of teams and in leadership roles applying ethical and inclusive standards including the ASME code of ethics within and beyond traditional Mechanical Engineering disciplines; and (3) remain current with technology and contemporary scientific, environmental and societal issues, and consequently improve skills and knowledge through a lifelong process of learning. (Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

The undergraduate Mechanical Engineering curriculum includes a foundation of mathematics, physics, and chemistry. Engineering courses in fundamental areas constitute much of the remaining curriculum. A few technical electives allow undergraduate students to specialize in Aerospace Engineering, Energy Systems and Environmental Engineering, Flow Physics and Propulsion Systems, and Design of Mechanical Systems or to pursue broader understanding in these areas. A senior capstone design experience culminates the curriculum.

High School Students: See School Admissions information.

Transfer Students: Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following required courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one course in general chemistry (with laboratory), and one course in introductory programming.

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samueli School of Engineering at 949-824-4334.

All students must meet the University Requirements.

All students must meet the School Requirements.

Major Requirements

Mathematics and Basic Science Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>CHEM 1A</td>
<td>General Chemistry</td>
</tr>
<tr>
<td>or ENGR 1A</td>
<td>General Chemistry for Engineers</td>
</tr>
<tr>
<td>CHEM 1LE</td>
<td>Accelerated General Chemistry Lab</td>
</tr>
<tr>
<td>MATH 2A- 2B</td>
<td>Single-Variable Calculus I and Single-Variable Calculus II</td>
</tr>
<tr>
<td>MATH 2D</td>
<td>Multivariable Calculus I</td>
</tr>
<tr>
<td>MATH 2E</td>
<td>Multivariable Calculus II</td>
</tr>
<tr>
<td>MATH 3A</td>
<td>Introduction to Linear Algebra</td>
</tr>
<tr>
<td>MATH 3D</td>
<td>Elementary Differential Equations</td>
</tr>
<tr>
<td>PHYSICS 7C</td>
<td>Classical Physics</td>
</tr>
<tr>
<td>PHYSICS 7LC</td>
<td>Classical Physics Laboratory</td>
</tr>
<tr>
<td>PHYSICS 7D- 7E</td>
<td>Classical Physics and Classical Physics</td>
</tr>
<tr>
<td>PHYSICS 7LD</td>
<td>Classical Physics Laboratory</td>
</tr>
<tr>
<td>PHYSICS 52A</td>
<td>Fundamentals of Experimental Physics</td>
</tr>
</tbody>
</table>

One additional General Education Category II course offered by the Schools of Physical Sciences, Biological Sciences, or Information and Computer Sciences.

Engineering Topics Courses:

Students must complete a minimum of 24 units of engineering design.

Core Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ENGR 54</td>
<td>Principles of Materials Science and Engineering</td>
</tr>
<tr>
<td>ENGRMAE 10</td>
<td>Introduction to Engineering Computations</td>
</tr>
<tr>
<td>ENGRMAE 30</td>
<td>Statics</td>
</tr>
<tr>
<td>ENGRMAE 52</td>
<td>Computer-Aided Design</td>
</tr>
<tr>
<td>ENGRMAE 60</td>
<td>Electric Circuits</td>
</tr>
</tbody>
</table>
or EECS 70A | Network Analysis I
---|---
ENGRMAE 80 | Dynamics
ENGRMAE 91 | Introduction to Thermodynamics
ENGRMAE 106 | Mechanical Systems Laboratory
ENGRMAE 107 | Fluid Thermal Science Laboratory
ENGRMAE 112 | Propulsion
or ENGRMAE 115 | Applied Engineering Thermodynamics
ENGRMAE 120 | Heat and Mass Transfer
ENGRMAE 130A | Fluid Dynamics I
ENGRMAE 130B | Fluid Dynamics II
ENGRMAE 145 | Theory of Machines and Mechanisms
ENGRMAE 147 | Vibration
ENGRMAE 150 | Mechanics of Structures
ENGRMAE 150L | Mechanics of Structures Laboratory
ENGRMAE 151 | Mechanical Engineering Design
ENGRMAE 155 | Composite Materials and Structures
or ENGRMAE 156 | Mechanical Behavior and Design Principles
or ENGRMAE 157 | Lightweight Structures
ENGRMAE 170 | Introduction to Control Systems
ENGRMAE 189 | Senior Project - Special Topics (minimum of 3 units)

**Technical Elective Courses:**
Students select a minimum of 16 units of technical electives. For students majoring in both Aerospace Engineering and Mechanical Engineering, a core course in one major cannot be counted as a technical elective in the other major. Any upper-division course in the department not used for the degree may be used as a technical elective. At least 8 units of the technical electives must come from ENGRMAE upper-division courses other than project-based courses ENGRMAE 188, ENGRMAE 189, and ENGRMAE 199. With approval of the Undergraduate Advisor, students may choose any remaining technical elective units from other departments’ upper-division courses that have primarily technical content. Preapproved courses from other departments are listed on the MAE website: http://engineering.uci.edu/files/mae-technical-electives.pdf

**Engineering Professional Topics Course:**
ECON 20A | Basic Economics I
---|---
or ECON 23 | Basic Economics for Engineers
ENGR 190W | Communications in the Professional World

At most an aggregate total of 4 units of 199 or H199 courses may be used to satisfy degree requirements.

(Not the nominal Mechanical Engineering program will require 188 units of courses to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary.)

**Specialization in Aerospace Engineering:**
Completion of a Senior Design Project in this area, and
select two of the following:
ENGRMAE 112 | Propulsion
ENGRMAE 135 | Compressible Flow
ENGRMAE 136 | Aerodynamics
ENGRMAE 158 | Aircraft Performance
ENGRMAE 159 | Aircraft Design
ENGRMAE 175 | Dynamics and Control of Aerospace Vehicles

**Specialization in Energy Systems and Environmental Engineering:**
Completion of a Senior Design Project in this area, and
select two of the following:
ENGRMAE 110 | Combustion and Fuel Cell Systems
ENGRMAE 112 | Propulsion
ENGRMAE 114 | Fuel Cell Fundamentals and Technology
ENGRMAE 115 | Applied Engineering Thermodynamics
Specialization in Flow Physics and Propulsion Systems:
Completion of a Senior Design Project in this area, and
select two of the following:

- ENGRMAE 110: Combustion and Fuel Cell Systems
- ENGRMAE 112: Propulsion
- ENGRMAE 113: Electric Propulsion
- ENGRMAE 132: Computational Fluid Dynamics
- ENGRMAE 135: Compressible Flow

Specialization in Design of Mechanical Systems:
Completion of a Senior Design Project in this area, and
select two of the following:

- ENGR 165: Advanced Manufacturing
- ENGRMAE 152: Introduction to Computer-Aided Engineering
- ENGRMAE 171: Digital Control Systems
- ENGRMAE 172: Design of Computer-Controlled Robots
- ENGRMAE 183: Computer-Aided Mechanism Design
- ENGRMAE 188: Engineering Design in Industry

Design unit values are indicated at the end of each course description. The faculty advisors and the Student Affairs Office can provide necessary guidance for satisfying the design requirements. Selection of elective courses must be approved by the student's faculty advisor and the departmental undergraduate advisor.

*ENGR 7A-ENGR 7B is a technical elective, available only to lower-division students in Fall and Winter quarters. Both ENGR 7A & ENGR 7B must be taken to count as a technical elective. If ENGR 7A-ENGR 7B is taken, this will replace one technical elective course in the senior year.*
The sample program of study chart shown is typical for the accredited major in Mechanical Engineering. Students should keep in mind that this program is based upon a rigid set of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Students should consult with their academic counselor to structure their program of study. Mechanical Engineering majors are encouraged to consult with academic counselors as needed, and students who are academically at risk are mandated to see a counselor as frequently as deemed necessary by the advising staff.

Students can dual major in Mechanical Engineering and Aerospace Engineering by satisfying the degree requirements for both majors.