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.


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 (http://catalogue.uci.edu/informationforadmittedstudents/requirementsforabachelorsdegree/).

All students must meet the School Requirements (http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#schoolrequirementstext).

Major Requirements

<table>
<thead>
<tr>
<th>Mathematics and Basic Science Courses:</th>
<th></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>
<tr>
<td>One additional General Education Category II course offered by the Schools of Physical Sciences, Biological Sciences, or Information and Computer Sciences.</td>
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</tbody>
</table>

Engineering Topics Courses:

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

<table>
<thead>
<tr>
<th>Core Courses:</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
ENGRMAE 80
ENGRMAE 91
ENGRMAE 106
ENGRMAE 107
ENGRMAE 112

or ENGRMAE 115
ENGRMAE 120
ENGRMAE 130A
ENGRMAE 130B
ENGRMAE 145
ENGRMAE 147
ENGRMAE 150
ENGRMAE 150L
ENGRMAE 151A
ENGRMAE 151B
ENGRMAE 155

or ENGRMAE 156
or ENGRMAE 157
ENGRMAE 170

Technical Elective Courses:

Students select a minimum of 12 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 that is not used for the degree and is not project-based may be used as a technical elective.

At least 8 units of the technical electives must come from ENGRMAE upper-division courses. 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.

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.

(The nominal Mechanical Engineering program will require 186 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
ENGRMAE 117 Solar and Renewable Energy Systems
ENGRMAE 118  Sustainable Energy Systems
ENGRMAE 164  Air Pollution and Control

**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.

**Freshman**

**Fall**
- MATH 2A
- ENGRMAE 10
- CHEM 1A or ENGR 1A
- ENGR 7A
- General Education

**Winter**
- MATH 2B
- PHYSICS 7C
- PHYSICS 7LC
- General Education

**Spring**
- MATH 2D
- PHYSICS 7D
- PHYSICS 7LD
- Basic Science
- General Education

**Sophomore**

**Fall**
- MATH 3A
- PHYSICS 7E
- PHYSICS 52A
- ENGRMAE 30
- General Education

**Winter**
- MATH 3D
- ENGR 54
- ENGRMAE 60
- ENGRMAE 80
- General Education

**Spring**
- MATH 2E
- ENGRMAE 91
- ENGRMAE 130A
- ECON 23 or 20A
- General Education

**Junior**

**Fall**
- ENGRMAE 115 or 112
- ENGRMAE 130B
- ENGRMAE 150
- ENGRMAE 150L
- General Education

**Winter**
- ENGRMAE 52
- ENGRMAE 147
- General Education
- ENGRMAE 155, 156, or 157
- General Education

**Spring**
- ENGRMAE 106
- ENGRMAE 120
- ENGRMAE 145
- General Education

**Senior**

**Fall**
- ENGRMAE 107
- ENGRMAE 170
- ENGRMAE 151A
- ENGR 190W
- Technical Elective
- Technical Elective
- General Education
- General Education

**Winter**
- ENGRMAE 151B
- Technical Elective
- Technical Elective
- General Education

**Spring**
- Technical Elective
- Technical Elective
- General Education

*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.

- Materials Science and Engineering, B.S.
- Materials Science and Engineering, M.S.
- Materials Science and Engineering, Minor
- Materials Science and Engineering, Ph.D.