**MECHANICAL ENGINEERING**

Mechanical engineering is concerned with motion and the processes whereby other energy forms are converted into motion. Mechanical engineers are responsible for conceiving, designing, manufacturing, testing and marketing devices and systems that alter, transfer, transform and utilize the energy forms that cause motion.

**About this Program**
- **College:** Herbert Wertheim College of Engineering
- **Degree:** Bachelor of Science in Mechanical Engineering
- **Credits for Degree:** 128
- **Additional Information**
- **Related Mechanical and Aerospace Engineering Programs**

To graduate with this major, students must complete all university, college, and major requirements.

The baccalaureate program in mechanical engineering is fully accredited and provides a broad education with a strong foundation in mathematics, science and basic engineering sciences. Advanced courses are available to develop specialized interests in the engineering aspects of manufacturing, robotics, solid mechanics, thermal and fluid systems, dynamics and controls, and biomechanics. Graduates are prepared to work in a variety of industries or to pursue graduate study.

Students considering a career in biomedical engineering should be aware that graduate education is often required. The Herbert Wertheim College of Engineering offers M.S. and Ph.D. degrees in biomedical engineering.

**Combined Bachelor’s/Master’s Degree Program**

The mechanical engineering professional often benefits from an advanced degree to meet the challenging needs of industry and government. Accordingly, the Department of Mechanical and Aerospace Engineering actively participates in the combined B.S./M.S. degree program that allows students to double-count graduate courses toward both degrees. The combined-degree program reduces the cost for both degrees and enhances the student’s marketability for career advancement. Interested students should contact the MAE department or its website for more information.

**Department Requirements**

Minimum grades of C are required for the following:

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EGM 2511</td>
<td>Engineering Mechanics: Statics</td>
<td>3</td>
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<tr>
<td>EGM 3344</td>
<td>Introduction to Numerical Methods of Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EGM 3401</td>
<td>Engineering Mechanics: Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EGM 3520</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>EML 3100</td>
<td>Thermodynamics</td>
<td>3</td>
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</tbody>
</table>

The minimum C grade is part of the prerequisite requirement for courses listing EGM 2511, EGM 3344, EGM 3401, EGM 3520, or EML 3100 as a prerequisite. The prerequisite course and subsequent course cannot be taken in the same term, even if the prerequisite is being repeated.

An aerospace or mechanical engineering student whose cumulative, upper-division or department grade point average falls below a 2.0 or who does not meet critical tracking requirements will be placed on academic probation and required to complete a probation contract with an MAE academic advisor. Students normally are allowed a maximum of two terms (consecutive or non-consecutive) on academic probation. Students who do not satisfy the conditions of the first term on probation may be dismissed from the department.

All graduating seniors must complete an exit interview with their advisor before graduating.

**Dual-Degree Programs**

There is much overlap between the aerospace engineering and mechanical engineering curriculum. The first six semesters are identical for both programs. Through proper selection of electives, students can earn a dual mechanical engineering/aerospace engineering degree with one semester of additional work. Contact the Department of Mechanical and Aerospace Engineering or visit the website for more information.

**Educational Objectives**

The objective of the mechanical engineering program at UF is to prepare students to attain the following goals within a few years of graduation:

- Graduates will meet the expectations of employers of mechanical engineers.
- Qualified graduates will pursue advanced study if they so desire.

**Mission**

The mission of the undergraduate program is to serve the state of Florida, the United States and the engineering profession by providing quality educational programs in mechanical engineering; conduct a nationally recognized research program; and foster ongoing professional development of students and faculty.

**Research Programs**

The department’s active research programs are sponsored by private industry, the National Science Foundation, Department of Defense, NASA, National Institutes of Health and other agencies.

These programs keep faculty at the leading edge of technology and provides opportunities for students to participate in research through classroom assignments, individual studies, undergraduate research scholarships and employment as research assistants.

**Related Mechanical and Aerospace Engineering Programs**

- Combined Degree
- Dual Degree in Mechanical Engineering and Aerospace Engineering
- Bachelor of Science in Aerospace Engineering
- Biomechanics minor

**Critical Tracking**

Critical Tracking records each student’s progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.
Semester 1
- Complete 1 of 8 critical-tracking courses with a minimum grade of C within two attempts: CHM 2045 or CHM 2095, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049, approved science elective
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2
- Complete 1 additional critical-tracking course with a minimum grade of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3
- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4
- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5
- Complete all 8 critical-tracking courses with minimum grades of C in each course within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Model Semester Plan
To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Semester One</td>
<td>Select one:</td>
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</tr>
<tr>
<td>CHM 2045</td>
<td>General Chemistry 1 (Critical Tracking; Gen Ed Physical Sciences)</td>
<td>3</td>
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<tr>
<td>CHM 2095</td>
<td>Chemistry for Engineers 1 (Critical Tracking; Gen Ed Physical Sciences)</td>
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<tr>
<td>CHM 2045L</td>
<td>General Chemistry 1 Laboratory (Gen Ed Physical Sciences)</td>
<td>1</td>
</tr>
<tr>
<td>EML 2920</td>
<td>Department and Professional Orientation</td>
<td>1</td>
</tr>
<tr>
<td>IUF 1000</td>
<td>What is the Good Life (Gen Ed Humanities)</td>
<td>3</td>
</tr>
<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus 1 (Critical Tracking; State Core Gen Ed Mathematics)</td>
<td>4</td>
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</tbody>
</table>

Semester Two
- EML 2023 Computer Aided Graphics and Design 3
- ENC 3246 Professional Communication for Engineers (State Core Gen Ed Composition; Writing Requirement: 6,000 words)
- MAC 2312 Analytic Geometry and Calculus 2 (Critical Tracking; Gen Ed Mathematics)
- PHY 2048 Physics with Calculus 1 (Critical Tracking; State Core Gen Ed Biological and Physical Sciences)
- PHY 2048L Laboratory for Physics with Calculus 1 (Gen Ed Physical Sciences)

Science elective
- Credits 3

Semester Three
- COP 2271 Computer Programming for Engineers (take the matlab section)
- EGM 2511 Engineering Mechanics: Statics
- EML 2322L Design and Manufacturing Laboratory
- MAC 2313 Analytic Geometry and Calculus 3 (Critical Tracking; Gen Ed Mathematics)
- PHY 2049 Physics with Calculus 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)
- PHY 2049L Laboratory for Physics with Calculus 2 (Gen Ed Physical Sciences)
- State Core Gen Ed Social and Behavioral Sciences

State Core Gen Ed Humanities
- Credits 3

Semester Four
- EGM 3344 Introduction to Numerical Methods of Engineering Analysis
- EGM 3520 Mechanics of Materials
- EMA 3010 Materials
- EML 3100 Thermodynamics
- MAP 2302 Elementary Differential Equations (Critical Tracking)

State Core Gen Ed Humanities
- Credits 3

Semester Five
- EEL 3003 Elements of Electrical Engineering
- EGM 3401 Engineering Mechanics: Dynamics
- EGN 3353C Fluid Mechanics
- EML 3301C Mechanics of Materials Laboratory (Writing Requirement: 6,000 words)

Gen Ed Social and Behavioral Sciences
- Credits 3

Semester Six
- EML 3005 Mechanical Engineering Design
- EML 4140 Heat Transfer
- EML 4220 Vibrations
- EML 4312 Control of Mechanical Engineering Systems
- Select one:
  - Gen Ed Humanities; Writing Requirement: 6,000 words
  - Gen Ed Social and Behavioral Sciences; Writing Requirement: 6,000 words

Semester Seven
- EML 4147C Thermo-Heat Transfer Design and Laboratory
Select one:

<table>
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<th>Title</th>
<th>Credits</th>
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<td>EML 4501</td>
<td>Mechanical Engineering Design 2</td>
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<tr>
<td>EAS 4700</td>
<td>Aerospace Design 1</td>
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<tr>
<td>EAS 4710</td>
<td>Aerospace Design 2 (can substitute if dual ME/ASE student)</td>
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<tr>
<td>EML 4507</td>
<td>Finite Element Analysis and Design</td>
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Technical electives: 6

Semester Eight

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<td>EML 4314C</td>
<td>Dynamics and Controls System Design Laboratory</td>
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<tr>
<td>EML 4321</td>
<td>Manufacturing Engineering</td>
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<tr>
<td>EML 4502</td>
<td>Mechanical Engineering Design 3</td>
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</table>

Specialization elective: 3

Technical elective: 3

Credits: 15

Total Credits: 128

1 Minimum grade of C required.

2 Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements. This is often done concurrently with another general education requirement (typically, GE-C, H or S).

3 Can substitute EEL 3111C.

Approved Electives

Science Elective

Critical tracking: choose one

<table>
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<tr>
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<tr>
<td>AST 3018</td>
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<td>BSC 2010</td>
<td>Integrated Principles of Biology 1</td>
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<td>CHM 2046</td>
<td>General Chemistry 2</td>
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<td>Chemistry for Engineers 2</td>
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<tr>
<td>PHY 3101</td>
<td>Introduction to Modern Physics</td>
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Academic Learning Compact

Mechanical engineers are responsible for creating and manufacturing devices and systems that alter, transfer, transform and utilize energy forms that cause motion. The baccalaureate program provides a broad education with a strong foundation in mathematics, science and basic engineering sciences. Advanced courses develop specialized engineering skills in manufacturing, robotics, solid mechanics, thermal and fluid systems, dynamics and controls, and biomechanics.

Accredited by the Engineering Accreditation Commission of ABET.

Before Graduating Students Must

- Pass an assessment by two or more faculty and/or industry practitioners of performance on a major design experience.
- Pass assessment in two courses of individual assignments targeted to each learning outcome. Assessment will be provided by the instructor of the course according to department standards.
- Complete an exit interview in your final semester.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major Will Learn to

Student Learning Outcomes (SLOs)

Content

1. Apply knowledge of mathematics, science and engineering principles to mechanical engineering problems.

2. Design and conduct mechanical engineering experiments and analyze and interpret the data.

Critical Thinking

3. Design a mechanical engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.

Communication

4. Communicate technical data and design information effectively in speech and in writing to other mechanical engineers.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

<table>
<thead>
<tr>
<th>Courses</th>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
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<tr>
<td>ENC 3254</td>
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Assessment Types

- Written exams
- Laboratory and oral reports
- Design project
- Additional assessments include:
  - Exit interview
  - Alumni survey