AEROSPACE ENGINEERING

Aerospace engineers are called upon to solve exciting problems of design, construction and operation of aircraft and spacecraft to meet the ever-increasing requirement for improved performance at lower unit cost. These challenges mean that aerospace engineers work at the continuously changing forefront of science, technology, and systems management.

About this Program

• College: Herbert Wertheim College of Engineering
  (http://catalog.ufl.edu/UGRD/colleges-schools/UGENG/)
• Degree: Bachelor of Science in Aerospace Engineering
• Credits for Degree: 128

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

Department Information

The Department of Mechanical & Aerospace Engineering (MAE) graduates many exceptional mechanical and aerospace engineers each year. The Mechanical Engineering program celebrated its 100 year anniversary in 2009 and is one of the founding departments of the Herbert Wertheim College of Engineering. Starting within mechanical as an aeronautical option, the Aeronautical Engineering program was founded in 1946. It grew to become the Aerospace Engineering program, which merged with Engineering Science and Mechanics in 1969. All these programs united (or reunited) in 2002. Going strong into the 21st century, MAE remains a vibrant and intellectually diverse program at both the undergraduate and graduate levels.

Website (https://mae.ufl.edu/)

CONTACT
352.392.0962
Email (advising@mae.ufl.edu) | Map (https://campusmap.ufl.edu/#/index/0725)

P.O. Box 116250
Gainesville, FL 32611-6250

1064 Center Drive
Building NEB, Room 181
Gainesville, FL 32611
Map (https://campusmap.ufl.edu/#/index/0033)

Curriculum

• Biomechanics Minor
• Combination Degrees
• Mechanical Engineering
• Sustainable and Resilient Energy Engineering Certificate

The undergraduate curriculum in Aerospace Engineering is a fully accredited baccalaureate program that provides a broad education with a strong foundation in mathematics, science, and basic engineering sciences. Advanced courses in aeronautics and astronautics complete the degree. Graduates will be prepared to work in the aerospace and related industries or to pursue graduate study.

Combination Bachelor’s/Master’s Degree Program

The Aerospace 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 (MAE) actively participates in the combination BS/MS degree program that allows students to double-count graduate courses toward both degrees. The combination-degree program reduces the cost for both degrees and enhances the student's marketability for career advancement. Interested students should contact the Department of Mechanical and Aerospace Engineering or its website for more information.

Department Requirements

Minimum grades of C are required for EGM 2511, EGM 3401, EGM 3520, EGM 3344, and EML 3100. The minimum grade of C is considered part of the prerequisite requirement for courses that list EGM 2511, EGM 3401, EGM 3520, EGM 3344, 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 whose critical-tracking grades do not meet department 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.

**Dual-Degree Programs**
There is great overlap between the aerospace engineering and mechanical engineering curriculum. The first six semesters of the two degree programs are identical. Through proper selection of electives, students can earn dual mechanical engineering/aerospace engineering BS degrees with one semester of additional work. Interested students should contact the Department of Mechanical and Aerospace Engineering or its website for more information.

**Educational Objectives**
The program educational objectives of the aerospace engineering undergraduate program are to ensure that within a few years of graduation:

- Graduates will meet or exceed the expectations of employers of aerospace engineers.
- Qualified graduates will continue their professional development by pursuing advanced study if they so desire.

**Mission**
- Serve the state of Florida, the United States and the engineering profession by providing a high-quality educational experience in aerospace engineering
- Enhance student learning with extracurricular opportunities including undergraduate research mentored by nationally recognized researchers
- Foster ongoing professional development of students, faculty, and staff

**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 provide opportunities for students to participate in research through classroom assignments, individual studies, undergraduate research scholarships and employment as research assistants.

**Critical Tracking**
Critical Tracking records each student's progress in courses that are required for progress toward 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 (https://cpm.flvc.org/advance-search/) may be used for transfer students.

**Semester 1**
- Complete 2 of 8 critical-tracking courses with a minimum grade of C within two attempts:
  - CHM 2045 or CHM 2095, EML 2023, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049
- 2.8 GPA required for the group of 8 critical-tracking courses
- 2.0 UF GPA required

**Semester 2**
- Complete an additional 2 of 8 critical-tracking courses with minimum grades of C within two attempts
- 2.8 GPA required for the group of 8 critical-tracking courses
- 2.0 UF GPA required

**SEMESTER 3**
- Complete an additional 2 of 8 critical-tracking courses with minimum grades of C within two attempts
- 2.8 GPA required for the group of 8 critical-tracking courses
- 2.0 UF GPA required

**SEMESTER 4**
- Complete the remaining 2 of 8 critical-tracking courses with minimum grades of C within two attempts
- 2.8 GPA required for the group of 8 critical-tracking courses
- 2.0 UF GPA required
SEMESTER 5
• Meet all Semester 1-4 critical-tracking requirements
• 2.0 UF GPA required

SEMESTER 6
• Complete EGM 3344 with minimum grade of C
• Complete EGM 3401 with minimum grade of C
• Complete EAS 4101
• Complete EGM 3520 with minimum grade of C
• 2.0 UF GPA required

SEMESTER 7
• Complete MAP 4305
• Complete EML 4312
• Complete EAS 4132
• Complete EML 3301C
• 2.0 UF GPA required

SEMESTER 8
• Complete EAS 4510
• Complete EAS 4400
• Complete EAS 4200
• 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>
</tr>
</thead>
<tbody>
<tr>
<td>Semester One</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHM 2045</td>
<td>General Chemistry 1 (Critical Tracking; Gen Ed Physical Sciences)</td>
<td>3</td>
</tr>
<tr>
<td>or CHM 2095</td>
<td>or Chemistry for Engineers 1</td>
<td></td>
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<tr>
<td>CHM 2045L</td>
<td>General Chemistry 1 Laboratory (Gen Ed Physical Sciences)</td>
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<tr>
<td>EML 2920</td>
<td>Department and Professional Orientation</td>
<td>1</td>
</tr>
<tr>
<td>ENC 1101</td>
<td>Expository and Argumentative Writing (Writing Requirement: 6,000 words)</td>
<td>3</td>
</tr>
<tr>
<td>or ENC 1102</td>
<td>or Argument and Persuasion</td>
<td></td>
</tr>
<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus 1 (Critical Tracking; State Core Gen Ed Mathematics)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Credits</td>
<td>15</td>
</tr>
<tr>
<td>Semester Two</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EML 2023</td>
<td>Computer Aided Graphics and Design (Critical Tracking)</td>
<td>3</td>
</tr>
<tr>
<td>ENC 3246</td>
<td>Professional Communication for Engineers (State Core Gen Ed Composition (<a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a>); Writing Requirement: 6,000 words)</td>
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<tr>
<td>MAC 2312</td>
<td>Analytic Geometry and Calculus 2 (Critical Tracking; Gen Ed Mathematics)</td>
<td>4</td>
</tr>
<tr>
<td>PHY 2048</td>
<td>Physics with Calculus 1 (Critical Tracking; State Core Gen Ed Physical Sciences)</td>
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<tr>
<td>PHY 2048L</td>
<td>Laboratory for Physics with Calculus 1 (Gen Ed Physical Sciences)</td>
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<tr>
<td>Approved Science elective</td>
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<td></td>
<td>Credits</td>
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<tr>
<td>Semester Three</td>
<td></td>
<td></td>
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<tr>
<td>COP 2271</td>
<td>Computer Programming for Engineers (take the Matlab section)</td>
<td>2</td>
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<tr>
<td>EAS 2011</td>
<td>Introduction to Aerospace Engineering</td>
<td>3</td>
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<tr>
<td>EGM 2511</td>
<td>Engineering Mechanics: Statics</td>
<td>3</td>
</tr>
<tr>
<td>MAC 2313</td>
<td>Analytic Geometry and Calculus 3 (Critical Tracking; Gen Ed Mathematics)</td>
<td>4</td>
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<tr>
<td>PHY 2049</td>
<td>Physics with Calculus 2 (Critical Tracking; Gen Ed Biological and Physical Sciences)</td>
<td>3</td>
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<tr>
<td>Code</td>
<td>Title</td>
<td>Semester</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------------------</td>
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</tr>
<tr>
<td>PHY 2049L</td>
<td>Laboratory for Physics with Calculus 2 (Gen Ed Physical Sciences)</td>
<td>4</td>
</tr>
<tr>
<td>EGM 3344</td>
<td>Introduction to Numerical Methods of Engineering Analysis</td>
<td>1</td>
</tr>
<tr>
<td>EGM 3520</td>
<td>Mechanics of Materials</td>
<td>1</td>
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<tr>
<td>EML 2322L</td>
<td>Design and Manufacturing Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>EML 3100</td>
<td>Thermodynamics</td>
<td>1</td>
</tr>
<tr>
<td>MAP 2302</td>
<td>Elementary Differential Equations (Critical Tracking)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Semester Four**

**Quest 2 (Gen Ed Social and Behavioral Sciences)**

- EAS 4101 | Aerodynamics | 1
- EEL 3003 | Elements of Electrical Engineering | 1
- EGM 3401 | Engineering Mechanics: Dynamics | 1
- EMA 3010 | Materials | 1
- MAP 4305 | Differential Equations for Engineers and Physical Scientists | 1
- Select one:
  - Gen Ed Humanities; Writing Requirement: 6,000 words | 1
  - Gen Ed Social and Behavioral Sciences; Writing Requirement: 6,000 words | 1

**Credits**

- 3
- 3
- 3
- 3
- 3

**Semester Five**

- EAS 4132 | Compressible Flow | 1
- EAS 4510 | Astrodynamics | 1
- EML 3301C | Mechanics of Materials Laboratory (Writing Requirement: 6,000 words) | 1
- EML 4312 | Control of Mechanical Engineering Systems | 1
- Approved Aerospace elective | 1

**Credits**

- 3
- 3
- 3
- 3
- 3

**Semester Six**

- EAS 4200 | Aerospace Structures | 1
- EAS 4400 | Stability and Control of Aircraft | 1
- EAS 4810C | Aerospace Sciences Lab and Design | 1
- State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext) | 1
- Approved Aerospace elective | 1

**Credits**

- 3
- 3
- 3
- 3
- 3

**Semester Seven**

- EAS 4300 | Aerospace Propulsion | 1
- EAS 4700 | Aerospace Design 1 | 1
- or EAS 4710 | Aerospace Design 2 | 1
- State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext) | 1
- Approved Technical electives | 1

**Credits**

- 3
- 3
- 3
- 3
- 3

**Total Credits**

- 128

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1. Students are also expected to complete the Gen Ed International and Gen Ed Diversity requirements. This is often done concurrently with another General Education requirement (typically, Gen Ed Composition, Gen Ed Humanities or Gen Ed Social and Behavioral Sciences).

2. ACT/SAT placement scores do not exempt this requirement.

3. Minimum grade of C required.

4. Can substitute EEL 3111C.

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### Approved Electives

#### Science Elective | Select One

#### Critical Tracking

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AST 3018</td>
<td>Astronomy and Astrophysics 1</td>
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</tr>
<tr>
<td>AST 3019</td>
<td>Astronomy and Astrophysics 2</td>
<td>3</td>
</tr>
<tr>
<td>BSC 2010</td>
<td>Integrated Principles of Biology 1</td>
<td>3</td>
</tr>
<tr>
<td>CHM 2046</td>
<td>General Chemistry 2</td>
<td>3</td>
</tr>
</tbody>
</table>
Aerospace Electives | Select Two

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EAS 4240</td>
<td>Aerospace Composites</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4412</td>
<td>Dynamics and Control of Space Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>EML 4140</td>
<td>Heat Transfer</td>
<td>3</td>
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<tr>
<td>EML 4220</td>
<td>Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>EML 4507</td>
<td>Finite Element Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>Any graduate-level course taught by the MAE department</td>
<td>3</td>
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</tr>
</tbody>
</table>

For technical and specialization electives, please see the department website (https://mae.ufl.edu/students/undergraduate/advising-curriculum/).

Academic Learning Compact

Aerospace engineers solve exciting problems of design, construction and operation of aircraft and spacecraft to meet the ever-increasing requirement for improved performance at lower unit cost. The undergraduate curriculum provides a broad education with a strong foundation in mathematics, science and basic engineering sciences. Advanced courses in aeronautics and astronautics complete the degree program and prepares students to work in aerospace industries or to pursue graduate study.

The Aerospace Engineering BS Program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org (https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.abet.org%2F&data=05%7C01%7CDMA%7D40eng.ufl.edu %7C971f0da0d2bb2405a60908d1519e6a82%7C0d4d0f84a314d76ace60a62331e1b84%7C0%7C0%7C53816973271417574%7CUnknown %7C%7Wf%7E8b0d3%7Eyw%7Jwjo%7EiMC4wLjAwMDAilCJQjoiV2luMziLCJBTil6Ik1haWwiLCJXVCi6Mn0%3D%7C0007%7C%7C %7C&sdata=x%6uc657xvX9QYo%7B9EJPKbAYPGg3OA7DmE0luN4%3D&reserved=0), under the General Criteria and the Program Criteria for Aerospace and Similarly Named Engineering Programs.

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 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 aerospace engineering problems.
2. Design and conduct aerospace engineering experiments, analyzing and interpreting the data.

Critical Thinking
3. Design an aerospace 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 writing and in speech to other aerospace 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>
<th>SLO 4</th>
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<tr>
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<td>EAS 4101</td>
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<tr>
<td>EAS 4510</td>
<td>R</td>
<td></td>
<td></td>
<td>R</td>
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</table>
## Assessment Types

- Assignments
- Exams
- Design projects and reports
- Presentations
- Additional assessments include exit and alumni surveys