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 (http://catalog.ufl.edu/UGRD/colleges-schools/UGENG/)
- **Degree:** Bachelor of Science in Mechanical 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

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Curriculum

- Aerospace Engineering
- Biomechanics Minor
- Combination Degrees
- Mechanical Engineering
- Sustainable and Resilient Energy Engineering Certificate

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.

Combination 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 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 MAE department or its website for more information.

Department Requirements

Minimum grades of C are required for the following:

Code	Title	Credits
EGM 2511	Engineering Mechanics: Statics	3
EGM 3344	Introduction to Numerical Methods of Engineering Analysis	3
EGM 3401	Engineering Mechanics: Dynamics	3

EGM 3520	Mechanics of Materials	3
EML 3100	Thermodynamics	3

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 program educational objectives of the mechanical engineering undergraduate program are to ensure that within a few years of graduation:

- Graduates will meet or exceed the expectations of employers of mechanical engineers.
- Qualified graduates will continue their professional development by pursuing 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 a high quality educational experience in mechanical engineering;
- Enhance student learning with extracurricular opportunities including undergraduate research mentored by nationally recognized researchers; and
- 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 provides 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 EGN 3353C
- Complete EML 3301C
- Complete EGM 3344 with a minimum grade of C
- Complete EML 3005
- 2.0 UF GPA required

SEMESTER 7

- Complete EML 4140
- Complete EML 4312
- Complete EML 4501
- 2.0 UF GPA required

SEMESTER 8

- Complete EML 4220
- Complete EML 4507
- Complete EML 4321
- 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.

Course	Title	Credits
Semester One		
Quest 1 (Gen Ed Humanities) [2]		3
Select one:		3
CHM 2045	General Chemistry 1 (**Critical Tracking**; Gen Ed Physical Sciences)	
CHM 2095	Chemistry For Engineers 1 (**Critical Tracking**; Gen Ed Physical Sciences)	
CHM 2045L	General Chemistry Laboratory (Gen Ed Physical Sciences)	1
ENC 1101 or ENC 1102	Expository and Argumentative Writing (Gen Ed Composition; Writing Requirement: 6,000 words; ACT/SAT placement scores do not exempt this requirement) or Argument and Persuasion	3
EML 2920	Department and Professional Orientation	1
MAC 2311	Analytic Geometry and Calculus 1 (**Critical Tracking**; State Core Gen Ed Mathematics)	4
	Credits	**15**
Semester Two		
COP 2273	Python Programming for Engineers	3
EML 2023	Computer Aided Graphics and Design (**Critical Tracking**)	3

ENC 2256	Writing in the Disciplines ((State Core Gen Ed Composition; Writing Requirement: 6,000 words)	3
MAC 2312	Analytic Geometry and Calculus 2 (**Critical Tracking**; Gen Ed Mathematics)	4
PHY 2048	Physics with Calculus 1 (**Critical Tracking**; State Core Gen Ed Biological and Physical Sciences)	3
PHY 2048L	Laboratory for PHY 2048 (Gen Ed Physical Sciences)	1
	Credits	**17**
Semester Three		
Quest 2 (Gen Ed Biological Sciences or Physical Sciences) [4]		3
COP 2271	Computer Programming for Engineers (take the Matlab section)	2
EGM 2511	Engineering Mechanics: Statics [1]	3
EML 2322L	Design and Manufacturing Laboratory	2
MAC 2313	Analytic Geometry and Calculus 3 (**Critical Tracking**; Gen Ed Mathematics)	4
PHY 2049	Physics with Calculus 2 (**Critical Tracking**; Gen Ed Biological Sciences and Physical Sciences)	3
PHY 2049L	Laboratory for PHY 2049 (Gen Ed Physical Sciences)	1
	Credits	**18**
Semester Four		
EGM 3344	Introduction to Numerical Methods of Engineering Analysis [1]	3
EGM 3520	Mechanics of Materials [1]	3
EMA 3010	Materials	3
EML 3100	Thermodynamics [1]	3
MAP 2302	Elementary Differential Equations (**Critical Tracking**)	3
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext) [2]		3
	Credits	**18**
Semester Five		
EEL 3003	Elements of Electrical Engineering [3]	3
EGM 3401	Engineering Mechanics: Dynamics [1]	3
EGN 3353C	Fluid Mechanics	3
EML 3301C	Mechanics of Materials Laboratory (Writing Requirement: 6,000 words)	3
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext) [2]		3
	Credits	**15**
Semester Six		
EML 3005	Mechanical Engineering Design 1	3
EML 4140	Heat Transfer	3
EML 4220	Vibrations	3
EML 4312	Control of Dynamic Systems	3
Gen Ed Social and Behavioral Sciences (Writing Requirement: 6,000 words) [2]		3
	Credits	**15**
Semester Seven		
EML 4147C	Thermal Sciences Design and Laboratory	3
Select one:		3
EML 4501	Mechanical Engineering Design 2	
EAS 4700	Aerospace Design 1	
EAS 4710	Aerospace Design 2 (can substitute if dual ME/ASE student)	
EML 4507	Finite Element Analysis and Design	3
Technical electives		6
	Credits	**15**
Semester Eight		
EML 4314C	Dynamics and Controls System Design Laboratory	3
EML 4321	Manufacturing Engineering	3
Select one:		3
EML 4502	Mechanical Engineering Design 3	
EML 4842	Autonomous Vehicles	
EML 4535C	Automation in Production Engineering	
EML 4914	Undergraduate Realization Thesis	
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) requirement. This is often done concurrently with another General Education requirement (typically, GE-C, H or S).
3 Can substitute EEL 3111C.
4 Students should select a Quest 2 class that is either a Physical or Biological Science. Upper division transfer students exempt from the Quest 2 course requirement must select one of the following to meet the Science Elective Requirement: BSC 2010 or CHM 2046 (see transfer admissions (https://mae.ufl.edu/students/undergraduate/admissions/transfer-admissions/) on department website).

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

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.

The Mechanical 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%7CDMAYH%40eng.ufl.edu%7C71f1da0d2bb2405acf0908db1519ea82%7C0d4da0f84a314d76ace60a62331e1b84%7C0%7C0%7C638126973271573797%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=Dc6bpEcUU8fM3vMsOTj6pGPQgyLzoSeoS8v2s%2BFVnBE%3D&reserved=0), under the General Criteria and the Program Criteria for Mechanical 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 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

Courses	SLO 1	SLO 2	SLO 3	SLO 4
EGM 2511	I		I	
EGM 3344	R			
EGM 3401	R			
EGM 3520	A		R	
EGN 3353C	A			
EML 2023			R	A
EML 2322L	R		A	A
EML 2920				I

EML 3005	R		A	R
EML 3100	A			
EML 3301C	R	I, A		A
EML 4140	R			
EML 4147C	R	A	R	A
EML 4220	R		R	
EML 4312	A		R	
EML 4314C	R	R	R	R
EML 4321	R		R	
EML 4501	R	R	A	R
EML 4507	R		R	
ENC 3246				R

Assessment Types

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