## MECHANICAL AND AEROSPACE ENGINEERING

### Course Search

Not all courses are offered every semester. Refer to the schedule of courses for each term's specific offerings.

Courses at the University of Florida, with the exception of specific foreign language courses and courses in the online Master of Arts in Mass Communication program, are taught in English.

The prerequisites for all courses offered by the Department of Mechanical and Aerospace Engineering may require classification as a student in good standing in aerospace engineering, mechanical engineering and/or another engineering program for which the particular course is required.

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**EAS 4101 Stability and Control of Aircraft**

Static stability and control, equations of motion, stability derivatives, stability of longitudinal and lateral motion of aircraft.

**Prereq:** EAS 4101 and EML 4312

**EAS 4412 Dynamics and Control of Space Vehicles**

Review of aerospace applications in current guidance and control systems. Includes synthesis of open and closed loop guidance and control systems using classical and modern control theory.

**Prereq:** EAS 4510

**EAS 4510 Astrodynamics**

Introduction to the solar system. Includes study of two-body motion, Hohmann transfer, patched conics for interplanetary and lunar trajectories, and the restricted three-body problem. Also includes an introduction to powered flights and artificial satellite orbits.

**Prereq:** EAS 4510

**EAS 4530 Space Systems Design**

A discussion of the component systems of a spacecraft and a typical mission's requirements. The operation and character of different spacecraft hardware is presented as well as typical mission timelines from early conception to final operations. Topics include the space environment, guidance/control/navigation systems, spacecraft sensors and actuators, propulsion systems, thermal systems, power systems, launch systems, communication systems, structural systems and mission operations. This course is useful to engineers, scientists, computer scientists and any profession that uses data.

**Prereq:** EAS 4510

**EAS 4700 Aerospace Design 1**

Applications of the principles of analysis and design to aerospace vehicles. Emphasizes aeronautics.

**Prereq:** EAS 4510 and EML 4312

**EAS 4710 Aerospace Design 2**

Applications of the principles of analysis and design to aerospace vehicles. Emphasizes aeronautics.

**Prereq:** EAS 4101 and EAS 4400

**EAS 4810C Aerospace Sciences Lab and Design**

Experimental investigations of aerospace engineering systems. Wind tunnel testing. Design project with experimental validation.

**Prereq:** EAS 4101 and EML 3301C

**EAS 4905 Individual Study in Aerospace Engineering**

Selected problems or projects in the student's major field of engineering study.

**Prereq:** department chair recommendation

**EAS 4912 Integrated Product and Process Design 1**

The first of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget. Working closely with industry liaison engineers and a faculty coach, students gain practical experience in teamwork and communication, problem solving and engineering design, and develop leadership, management and people skills.

**Prereq:** EAS 4101, EGM 3520 and EML 3301C

**EAS 4913 Integrated Product and Process Design 2**

The second part of the integrated design sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget.

**Prereq:** EAS 4912

**EAS 4939 Special Topics in Aerospace Engineering**

Special topics in aerospace engineering.

**Prereq:** instructor permission
EGN 4912 Engineering Directed Independent Research 3 Credits
Provides firsthand, supervised research with a faculty advisor or postdoctoral or graduate student mentor. Projects may involve inquiry, design, investigation, scholarship, discovery or application. (S-U)
Prereq: EG student

EGS 1005 Prep for Success 1–4 Credits
Freshman success course that includes academic preparation in calculus, chemistry, student success and technical communications. (S-U)
Prereq: EG student

EML 2023 Computer Aided Graphics and Design 3 Credits
Sketching, descriptive geometry, computer graphics, computer aided drafting and design projects.

EML 2322L Design and Manufacturing Laboratory 2 Credits
Study and application of design, problem formulation, conceptual design, prototype development. Study of common manufacturing processes.
Prereq: EML 2023, ENC 3246 and EG-ME or EG-ASE major

EML 2920 Department and Professional Orientation 1 Credit
Principles of mechanical and aerospace engineering practice, professional standards, engineering ethics.

EML 3005 Mechanical Engineering Design 1 3 Credits
Design process, kinematics, gear trains and standard mechanical components.
Prereq: COP 2271, EML2322L and EGM 3520 with minimum grade of C

EML 3100 Thermodynamics 3 Credits
Application of the first and second laws of thermodynamics to closed and open systems and to cyclic heat engines. Includes the development of procedures for calculating the properties of multiphase and singlephase pure substances.
Prereq: CHM 2045, MAC 2313 and PHY 2048

EML 3301C Mechanics of Materials Laboratory 3 Credits
Experimental characterization of the mechanical properties of engineering materials, precision instruments, computer-based data acquisition, statistical uncertainty analysis, preparation of engineering reports. (WR)
Prereq: EGM 3520, EGM 3444, and ENC 2210 or ENC 3254 WR6

EML 4140 Heat Transfer 3 Credits
Steady state and transient analysis of conduction and radiation heat transfer in stationary media. Also discusses heat transfer in fluid systems, including forced and free convection.
Prereq: MAP 2302 with minimum grade of C and EAS 4101 or EGN 3353C

EML 4147C Thermo-Heat Transfer Design and Laboratory 3 Credits
Thermodynamics and heat transfer integrated with design and laboratory, including heat exchange design, phase-change heat transfer, thermodynamics of mixtures, psychometry, mass transfer and sensible heat recovery.
Prereq: EML 3100, EML 3301C and EML 4140

EML 4220 Vibrations 3 Credits
Single and multiple degree of freedom systems, including application to mechanical systems with problems employing computer techniques.
Prereq: EGM 3344, EGM 3401, EGM 3520 and MAP 2302 with minimum grades of C

EML 4304C Thermo/Fluid Design and Laboratory 3 Credits
Design and laboratories for turbomachinery, compressible flow, chemical reactions and thermodynamic cycles.
Prereq: EGN 3353C, EML 3100 and EML 3301C
EML 4312 Control of Mechanical Engineering Systems 3 Credits
Theory, analysis and design of control systems, including mechanical, electromechanical, hydraulic, pneumatic and thermal components and systems.
Prereq: EGM 3401, EGM 3344 and MAP 2302 with minimum grades of C

EML 4314C Dynamics and Controls System Design Laboratory 3 Credits
Experiments on dynamic systems in mechanical and aerospace engineering and design of relevant control systems.
Prereq: EML 3301C and EML 4312

EML 4321 Manufacturing Engineering 3 Credits
Descriptive and analytical treatment of manufacturing processes and production equipment automation computer control and integrated systems. Applications of mechanics stress analysis vibrations controls heat transfer. Discrete time simulation.
Prereq: EMA 3010, EML 2322L, and EGM 3520 with minimum grade of C

EML 4410 Combustion Engineering 3 Credits
Fundamentals of combustion processes and systems; including thermochemistry, rates and mechanisms, pollutant analysis, premixed and diffusion flames and applications to engines and turbomachinery.

EML 4450 Energy Conversion 3 Credits
Thermomechanical and thermoelectric energy conversion, conventional and unconventional techniques and analysis of energy systems interactions.

EML 4500C Reengineering Historic Machinery 3 Credits
Studies historic commercial machine or vehicle, including theory of operation, embedded engineering principles, and design. Reengineering and design of enhancements. Laboratory includes disassembly, observation of characteristics and conditions, implementation of enhancements, and rebuilding.
Prereq: EML 2322L, EML 3005, and EML 3100 with minimum grade of C

EML 4501 Mechanical Engineering Design 2 3 Credits
Integrated design and presentation of a mechanical system.
Prereq: EGN 3353C, EML 2322L, EML 3005 and EGM 3401 with minimum grade of C
Coreq: EML 4321 and EML 4507

EML 4502 Mechanical Engineering Design 3 3 Credits
Design and realization of a mechanical engineering system, component, or process subject to appropriate standards and constraints. Team Project.
Prereq: EML 4501
Coreq: EML 4321

EML 4507 Finite Element Analysis and Design 3 Credits
Stress-strain analysis and design of machine elements and finite element analysis.
Prereq: EGM 3344, EGM 3520 and MAP 2302 with minimum grades of C

EML 4600 Refrigeration and Air Conditioning Fundamentals 3 Credits
Fundamentals of refrigeration theory, vapor compression and absorption, refrigeration components and systems, psychrometric theory, analysis of cooling and dehumidifying coils.
Prereq: EML 3100

EML 4601 Heating and Air Conditioning System Design 3 Credits
Heating and air conditioning systems: equipment selection, system arrangement, load calculations, advanced psychrometrics, duct and piping system design, air distribution system design and indoor air quality.
Prereq: EML 3100

EML 4737 Hydronics and Pneumatics for Building Systems 3 Credits
Applications, design, maintenance and operations of various pneumatic, hydronic and other process systems. Includes in-depth design concepts and techniques as well as preparation of specifications and cost estimates.
Prereq: EGN 3353C

EML 4738 Hydraulic and Mechanical Power Transmission 3 Credits
Transmission of power in machines by hydraulic and mechanical means, including analytical design of components and their functions.
Prereq: EML 3005C

EML 4905 Individual Study in Mechanical Engineering 1-3 Credits
Selected problems or projects in the student's major field of engineering study.
Prereq: 2

EML 4912 Integrated Product and Process Design 1: Mechanical Engineering 3 Credits
The first part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget. Working closely with industry liaison engineers and a faculty coach, students gain practical experience in teamwork and communication, problem solving and engineering design, and develop leadership, management and people skills.
Prereq: EGN 3353C, EGM 3401, EML 3005 and EML 3301C

EML 4913 Integrated Product and Process Design 2: Mechanical Engineering 3 Credits
The second part of the integrated design sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget.
Prereq: EML 4912

EML 4926 Mechanical Consulting Practice 3 Credits
Synthesis and analysis of mechanical engineering systems, planning and execution of engineering contracts, and supervision of construction and tests.
Prereq: senior standing

EML 4930 Special Topics in Mechanical Engineering 1-3 Credits
Variable content in mechanical engineering not offered in other courses.
Prereq: instructor permission

EML 4945 Practical Work in Mechanical Engineering 1 Credit
Practical engineering work under industrial supervision, as set forth in the Herbert Wertheim College of Engineering regulations. (S-U)
Prereq: EG classification and a 2

EML 4949 Co-op Work Experience 1 Credit
Practical co-op work experience under approved industrial supervision. (S-U)
Prereq: EG classification and a 2