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.

More Info

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.

Courses

EAS 2011 Introduction to Aerospace Engineering 3 Credits
Overview of aerospace engineering. Standard atmosphere, basic aerodynamics, airplane performance, stability and control, propulsion, and space flight.
Prereq: PHY 2048 or PHY 2060, with minimum grade of C

EAS 3020C Introduction to Flight 3 Credits
Introduction to the science and engineering of aircraft. Overview of applied aerodynamics, performance, stability, propulsion and structures. Includes lab sessions flying and making measurements in a general aviation aircraft.
Prereq: PHY 2048 or PHY 2053, MAC 2311, or instructor permission

EAS 4101 Aerodynamics 3 Credits
Incompressible aerodynamics, integral and differential governing equations, potential flow, boundary layers, airfoils, wings, numerical techniques.
Prereq: EAS 2011 or EAS 3020C or EGN 3353C and COP 2271, EML 3100, MAC 2313 and MAP 2302 with minimum grades of C

EAS 4132 Compressible Flow 3 Credits
One-dimensional and quasi one-dimensional compressible fluid flows. Includes mach waves, normal shocks, oblique shocks, Prandtl-Meyer expansions, isentropic flow with area change, Fanno flow and Rayleigh flow.

EAS 4200C Aerospace Structures 3 Credits
Review of plane states of stress and strain. Includes analysis of thin-walled beams with open and closed section, unsymmetrical bending of wing sections, torsion of skin-stringer and multi-cell sections, flexural shear in open and closed sections, Shear Center and failure criteria. Also includes introduction to composite materials and demonstration of behavior of some simple structural elements.
Prereq: EGM 3520

EAS 4240 Aerospace Structural Composites 1 3 Credits
Various types and applications of structural composites used in flight structures. Also includes an introduction to analysis of structural composites.
Prereq: EGM 3520

EAS 4300 Aerospace Propulsion 3 Credits
Basics of air-breathing and rocket engines used in flight systems.

EAS 4400 Stability and Control of Aircraft 3 Credits
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 3 Credits
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.

EAS 4510 Astrodynamics 3 Credits
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.

EAS 4530 Space Systems Design 3 Credits
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, 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 3 Credits
Applications of the principles of analysis and design to aerospace vehicles. Emphasizes astronautics.
Prereq: EAS 4510 and EML 4312

EAS 4710 Aerospace Design 2 3 Credits
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 3 Credits
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 1-4 Credits
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 3 Credits
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 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: EAS 4912

EAS 4939 Special Topics in Aerospace Engineering 1-4 Credits
Special topics in aerospace engineering.
Prereq: instructor permission
EAS 4949 Co-op Work Experience 1 Credit
Practical engineering work under industrial supervision, as set forth in the
college regulations. (S-U)
Prereq: EG student

EGM 2511 Engineering Mechanics: Statics 3 Credits
Reduction of force systems, equilibrium of particles and rigid bodies,
vector methods and their application to structures and mechanisms.
Prereq: PHY 2048
Coreq: MAC 2313

EGM 3344 Introduction to Numerical Methods of Engineering Analysis 3 Credits
Methods for numerical solution of mathematical problems with emphasis
on engineering applications using MATLAB. Includes roots, optimization,
linear algebraic equations, matrices, curve fitting, differentiation,
integration and ordinary differential equations.
Prereq: EGM 2511 and COP 2271
Coreq: MAP 2302

EGM 3401 Engineering Mechanics: Dynamics 3 Credits
Continues the dynamics sequence begun in EGM 3400 plus extended
coverage of three-dimensional rigid-body dynamics and orbital motion.
Prereq: EGM 2511 or EGM 2500, and MAC 2313

EGM 3520 Mechanics of Materials 3 Credits
Stress and strain at a point, stress-strain-temperature relations and
mechanical properties of materials. Systems subject to axial load,
torsion and bending. Design concepts, indeterminate structures and
applications.
Prereq: EGM 2511 (not EGM 2500) and MAC 2313

EGM 4313 Intermediate Engineering Analysis 3 Credits
Ordinary differential equations, systems of ordinary differential equations,
partial differential equations, Fourier series and complex analysis. Also
includes equations of heat conduction, wave propagation and Laplace.
Prereq: MAP 2302 and EGM 3344

EGM 4590 Biodynamics 3 Credits
Dynamic analysis of the human musculoskeletal system. Includes
development of lumped mass, planar rigid body and 3-D rigid body
models of human movement. Also includes calculation of internal forces
in muscles and joints and analysis of muscle function using dynamics
principles and musculoskeletal geometry.
Prereq: EGM 3400 or EGM 3401, or instructor permission

EGM 4592 Bio-Solid Mechanics 3 Credits
Introduction to solid and fluid mechanics of biological systems. Includes
rheological behavior of materials subjected to static and dynamic
loading, the mechanics of cardiovascular, pulmonary and renal systems,
and the mathematical models and analytical techniques used in
biosciences.
Prereq: EGM 3520

EGM 4853 Bio-Fluid Mechanics and Bio-Heat Transfer 3 Credits
A study of biotheral fluid sciences with an emphasis on the
physiological processes occurring in human blood circulation and the
underlying mechanisms from an engineering prospective.
Prereq: EGN 3353C

EGN 3353C Fluid Mechanics 3 Credits
Statics and dynamics of incompressible fluids. Application to viscous
and inviscid flows. Dimensional analysis. Compressible flow.
Prereq: MAC 2313, EGM 2511 and EML 3100, or EML 3007

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)

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, EML 2322L 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

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 3544 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 4722 Introduction to Computational Fluid Dynamics 3 Credits
General theory, skepticism, and practice of computational fluid dynamics. Computational grids and generation, boundary conditions, fluid dynamics, numerical methods, visualization, turbulence modelling, and various special topics.

EML 4737 Hydraulics 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: 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: 2.3 UF GPA and department permission

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 2.0 UF GPA

EML 4949 Co-op Work Experience 1 Credit
Practical co-op work experience under approved industrial supervision. (S-U)
Prereq: EG classification and a 2.0 UF GPA