Aerospace and Aeronautical Engineering Courses

Courses

AERO 2131. Aerospace Materials Lab.
Aerospace Materials Lab: This course will focus on the implementation of different manufacturing methods in the design process for aerospace structures. The students will be introduce1to the fundamentals of the machining trade and different types of manufacturing, such as Additive, Subtractive methods 1 and composite manufacturing (Vacuum Assisted Resin Transfer Molding and hand lay-up).
Department: Aerospace Engineering
1 Credit Hour
1 Total Contact Hour
1 Lab Hour
0 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 1305 w/C or better)

AERO 2331. Aerospace Materials.
Aerospace Materials: This course is designed to introduce the students to basic materials science with an emphasis on properties and how they are influenced by thermal and mechanical treatments. The students will be able to relate the microstructure of a material to its properties, and understand the effects of the environment on materials and the possible failure modes of structures. The students will be provided with demonstrations of various processes in the laboratory.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (CHEM 1105 w/C or better AND CHEM 1305 w/C or better)

AERO 3312. Aerodynamics 1.
Aerodynamics 1: This course builds on the studentâ€™s background in Fluid Mechanics to deal primarily with flows (low-speed and highspeed) relevant to aerospace applications, with particular emphasis on components related to an airplane. Both inviscid and viscous flows will be considered in the analysis of airfoils, wings, nozzles, and diffusers.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 w/C or better)

AERO 3323. Aerospace Structures I.
Aerospace Structures I: This course is designed to introduce the students to the analysis and the design of aerospace structures. Review concepts of stress, strain, and equations of elasticity. Plane stress and plane strain. Applications to aerospace structural elements including 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.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 2331 w/C or better) AND (MECH 2322 w/C or better)

AERO 3343. Systems Modelling and Control.
Systems Modelling and Control: The course will provide the basis for system modelling in time and frequency domain with an emphasis in aerospace applications. The course will deliver concepts and the best practices for design and implementation of model-based feedback control of SISO systems. The course will include laboratories and project experiences for real-time implementation.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 2326 w/C or better) AND (MECH 2340 w/C or better AND MECH 2342 w/C or better)

AERO 4311. Flight Dynamics and Controls.
The course will deliver fundamentals on design, implementations and testing of communications systems in Aerospace applications. The course will provide the participants with fundamentals on digital and analog signal processing, signal loses and attenuation; and will prepare students to design flight communication systems and ground stations using a variety of instruments.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3312 w/D or better AND AERO 3343 w/D or better)

AERO 4312. Aircraft Design.
The design of aircraft follows a distinct process but one that varies widely with vehicle application and requirements This course introduces the broad aircraft design process including sub-system interactions, then leads students through specific design tasks. These tasks include sizing of strictures and control surfaces, wing loading and structural supports, aircraft configuration, weight distribution, and human considerations.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3312 w/D or better AND AERO 3323 w/D or better AND MECH 3352 w/D or better)

AERO 4313. Aerospace Structures II.
This course is designed to introduce students to the analysis and the design of aerospace structures. Bending of plates and shells. Buckling analysis. Energy principles and minimum potential energy. Introduction to the finite element method. Airworthiness and airframe loads. Strength and damage characteristics of ductile, brittle and composite materials. Elements of fracture mechanics and fatigue.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3323)

AERO 4319. Special Topics in Aeronautics.
Selected topics of current interest in the field of aeronautical engineering.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours

AERO 4322. Aerospace Propulsion.
Operation and design principles of a wide variety of aerospace propulsion systems, including propellers, turbine engines, chemical rockets, electric thrusters, nuclear rockets, and propellant-less and other advanced propulsion concepts. How stored energy is converted to vehicle momentum through gas dynamics processes. Introduction to propulsion system integration and testing, and aerospace mission propulsion system selection.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (CHEM 1305 w/C or better AND MECH 2311 w/C or better)

AERO 4329. Special Topics Aerostructures.
Analysis and design of aero-structural components are covered. It may include computational analysis methods.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3323 w/D or better)

AERO 4331. Aerodynamics II.
The behavior of fluids at high speeds varies significantly from low speed flows. This course will introduce the supersonic and hypersonic environment, inviscid hypersonic flows, hypersonic laminar boundary layers, hypersonic thermo-chemical concepts, and the aero-mechanics of re-entry trajectories for spacecraft and missiles.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3312 w/C or better)

AERO 4332. Hypersonic Vehicle Design.
supersonic and hypersonic vehicles range from missiles, to space launch vehicles, and high altitude high speed aircraft. this course introduces the design requirements and principles for common hypersonic vehicle applications. The operating environment, operational loads, and subsystem requirements are applied to the design process.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3352 w/D or better)

AERO 4335. Structural Dynamics.
This course is designed to introduce the students to aerospace dynamics. Many aerospace structures are subjected to time-varying loadings, including impact and cyclic excitations. Dynamic response to these loadings can have a character very different from static response. This dynamic behavior must be anticipated in the design of the structure if its performance is to be satisfactory.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 2326 w/C or better AND MECH 2340 w/C or better)

AERO 4339. Special Topics in Hypersonics.
Selected topics of current interest in the field of hypersonics.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours

AERO 4351. Orbit and Attitude Dynamics.
This course provides an overview of orbital mechanics (astrodynamics) and attitude dynamics. Two body Keplerian problems, three dimensional orbits, orbital maneuvers, restricted three body problems, spacecraft reference frames, attitude stabilization, pointing laws, disturbance torques, and spin stabilization are studied. Active spacecraft attitude control hardware is analyzed for performance and implementation. Interplanetary orbits, orbital perturbations, and formation flying are also introduced at a fundamental level.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3343 w/D or better AND MATH 2326 w/C or better)

AERO 4353. Spacecraft Environments.
The environment that a spacecraft must operate in is very different from the environment on the surface of the Earth. The spacecraft environment begins during construction and testing, and carries through into launch, operation in space, and end of life. This course gives an overview of all facets of the space environment including thermal, plasma, radiation, vacuum, solar, and particulates, and introduces you to environmental considerations affecting spacecraft design and operation.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 2326 w/C or better) AND (PHYS 2420 w/C or better) OR (PHYS 2120 w/C or better AND PHYS 2320 w/C or better)

AERO 4355. Space Mission Design.
Processes involved in space-bound missions, from mission conception through to launch, operations, and end-of -life. Mission concept development and utility, space law and planetary protection, cost estimation, scheduling, operations, and end-of-life disposal requirements. How mission constraints affect spacecraft design requirements. Payload development and integration, thermal protection systems.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours

AERO 4359. Special Topics in Astronautics.
Selected topics of current interest in the field of aeronautical engineering.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

AERO 4364. Aerospace Communications.
The course will deliver fundamentals on design, implementations, and testing of communications systems in Aerospace applications. The course will provide the participants with fundamentals on digital and analog signal processing, signal loses and attenuation, and will prepare to design flight communication systems and ground stations using a variety of instruments.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2342 w/C or better)

AERO 4365. Aerospace Systems Engineering.
A holistic view of aerospace systems covering systems engineering; design drivers, trade studies, and design decisions; cost and weight estimation, vehicle performance; safety and reliability; lifecycle topics; vehicle attributes and subsystems; risk analysis; project management; and system realization.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (CE 2326 w/C or better)

AERO 4366. Aerospace Senior Design.
Students work on a design project specified by the instructor. They are expected to demonstrate knowledge of the engineering design process and apply the knowledge to the project.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (AERO 3312 w/D or better AND AERO 3323 w/D or better AND AERO 3343 w/D or better AND AERO 4322 w/D or better AND AERO 4365 w/D or better AND MECH 3352 w/D or better)

AERO 4396. Independent Study in Aero..
Selected topics/projects are the focus of this course. The course is designed to have a few students working on designated topics in Aerospace Engineering.
Department: Aerospace Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours
Major Restrictions:
Restricted to majors of AERO

Classification Restrictions:
Restricted to class of SR