A E-AEROSPACE ENGINEERING (A E)

A E 102. Introduction to Aerospace Engineering
1 Credit
A survey course of aeronautical, aerospace, and astronautical engineering, with an emphasis on basic aerospace concepts and major aerospace principles without going into detailed math and analysis. Students are given the opportunity to listen to guest speakers and participate in projects utilizing the NMSU Ultralight and NMSU wind tunnel. Restricted to: Main campus only.

A E 339. Aerodynamics I
3 Credits
Fluid properties, conservation equations, incompressible 2-dimensional flow; Bernoulli’s equation; similarity parameters; subsonic aerodynamics: lift and drag, analysis and design of airfoils. May be repeated up to 3 credits. Restricted to: A E majors.
Prerequisite(s): M E 234 or M E 237 and M E 228 or MATH 392.

A E 362. Orbital Mechanics
3 Credits
Dynamics of exoatmospheric flight of orbiting and non-orbiting bodies; 2-body orbital dynamics and Kepler's laws; orbits in 3 dimensions; orbit determination; orbit design and orbital maneuvers; lunar and interplanetary trajectories. May be repeated up to 3 credits.
Prerequisite(s): M E 228 or MATH 392, M E 234 or M E 237, and M E 261.

A E 363. Aerospace Structures
3 Credits
Advanced concepts of stress and strain, introduction to the analysis of aero structures, complex bending and torsion, thin walled sections and shells, computational techniques. Prerequisites: C E 301

A E 364. Flight Dynamics and Controls
3 Credits
Fundamentals of airplane flight dynamics, static trim, and stability; spacecraft and missile six degree of freedom dynamics; attitude control of spacecraft. May be repeated up to 3 credits.
Prerequisite(s): M E 228 or MATH 392, M E 234 or M E 237, and M E 261.

A E 400. Undergraduate Research
1-3 Credits (1-3)
Performed with the direction of a department faculty member. May be repeated for a maximum of 6 credits.
Prerequisite(s): Consent of faculty member.

A E 405. Special Topics
3 Credits
Topics of modern interest to be offered by the departmental staff. Consent of instructor required.

A E 419. Propulsion
3 Credits
Propulsion systems, thermodynamic cycles, combustion, specific impulse; principles of gas turbines, jet engines, and rocket propulsion systems. Prerequisites: A E 439

A E 424. Aerospace Systems Engineering
3 Credits
Basic principles of top down systems engineering and current practice; preliminary and detailed design of aircraft and space vehicles, including requirement, subsystem interaction, and integration, tradeoffs, constraints and non-technical aspects.
Prerequisite(s): A E 362.

A E 428. Aerospace Capstone Design
3 Credits
Team Project-analysis, design, hands-on build test, evaluate.
Prerequisite(s)/Corequisite(s): A E 447. Prerequisite(s): A E 363 and A E 424.

A E 439. Aerodynamics II
3 Credits
Principles of compressible flow, momentum and energy conservation; thermal properties of fluids; supersonic flow and shock waves; basics of supersonic aerodynamics.
Prerequisite(s): A E 339, M E 240, and M E 328.

A E 447. Aerofluids Laboratory
3 Credits (2+3P)
Use of subsonic wind tunnels and other flow to study basic flow phenomena and methods of fluid measurement and visualization.
Prerequisite(s)/Corequisite(s): A E 439. Prerequisite(s): M E 345.

A E 451. Aircraft Design
3 Credits
Conceptual design of aircraft based on existing designs, empirical relationships, and theory. Dimensioning, structural design, and performance analysis of major subcomponents such as fuselage, wing, and propulsion system. Static stability and control analysis.
Prerequisite(s): A E 339 and A E 363.

A E 509. Individualized Study
3 Credits
Individualized study covering specialized topics in aerospace engineering. Consent of instructor required. Restricted to A E & M E majors.

A E 510. Special Topics
1-6 Credits (1-6)
Topics in aerospace engineering. May be repeated for a maximum of 6 credits. Consent of instructor required.

A E 527. Control of Mechanical Systems
3 Credits
Rigorous introduction to the control of dynamical systems, with a focus on mechanical systems. Includes basic systems theory, controllability, feedback and stabilization, observers and dynamic feedback, and applications of methods to systems of importance in mechanical engineering. Consent of instructor required. Cross-listed with: M E 527

A E 529. Nonlinear and Optimal Control
3 Credits
Introduction to optimal control theory, Pontryagin's Maximum Principle, control of simple mechanical systems, Lagrangian and Hamiltonian methods, introduction to geometric control-Lie algebras, distributions, controllability and observability. Cross-listed with: M E 529
A E 552. Introduction to Gasdynamics
3 Credits
Gas kinetics, rarefied gas dynamics, collision dynamics; velocity
distribution function, finite rate chemical process; thermal nonequilibrium
and chemically reacting flows; introduction to quantum and statistical
mechanics; Boltzmann equation and the BGK model; moments of the
Boltzmann Equation; the Navier-Stokes Equation; the structure of shock
waves.

A E 562. Astrodynamics
3 Credits
Two-body problem, orbit analysis, and classical orbit determination
methods; trajectory design and optimization; orbital maneuvers using
impulsive or continuous thrust; relative motion and rendezvous;
perturbations and Lagrange planetary equations; interplanetary mission
design including gravity assists; introduction to the three-body problem,
halo orbits, and invariant manifolds in mission design.

A E 566. Aeroelasticity
3 Credits
Introduction to aeroelasticity with emphasis on fluid-structure
interactions occurring in aircraft. Phenomena considered include
flutter/LCD (limit cycle oscillation), buffeting, divergence, and control
reversal. Primary emphasis on structural dynamics, with use of simple
aerodynamic models.

A E 598. Special Research Programs
1-3 Credits (1-3)
Individual investigations, either analytical or experimental. May be
repeated for a maximum of 6 credits. Restricted to A E & M E majors.

A E 599. Master's Thesis
15 Credits (15)

A E 600. Doctoral Research
1-15 Credits (1-15)
This course number is used for assigning credit for research performed
prior to successful completion of the doctoral qualifying examination.

A E 700. Doctoral Dissertation
15 Credits (15)