Computer and Network Security Major

Suggested Course Sequence:

3rd-Class Year
Chem 200
Comp Sci 210
Comp Sci 223
Econ 201
ECE 281
English 211
Engr Mech 220
Law 220
Math 340
MSS 200
Physics 215
Pol Sci 211

2nd-Class Year
Beh Sci 310
Biology 315
Comp Sci 360
Comp Sci 364
Comp Sci 431
Comp Sci 467
Comp Sci 483
ECE 315
ECE 382
History 300
Math 356
Philos 310

1st-Class Year
Academy Opt CNS Option
Aero Engr 315
Astro Engr 310
Comp Sci 426
Comp Sci 438
Comp Sci 439
CNS Option
ECE 348
English 411
Mgt 400/419
MSS 415
Soc Sci 412
Aero Engr 341. Aeronautical Fluid Dynamics. Fluid properties, the basic equations of motion: the continuity equation, conservation of linear momentum, and conservation of energy (both the differential and the integral forms). Use of the integral momentum equation to experimentally determine the drag acting on a cylinder in a low-speed stream; spreadsheet computation of unsteady Poiseuille flow; spreadsheet computation of a steady, laminar boundary-layer; turbulent boundary layer experiment. Stream functions. Potential functions.

Aero Engr 342. Computational Aerodynamics. This course covers the theory and application of modern computational tools used to predict fluid flows around basic and complex geometries. The course is intended to give the student the necessary knowledge to choose the relevant computational tool and perform independent computational analysis of moderately complex geometries. The course will cover grid generation, computational fluid dynamic (CFD) solvers, and post processing using state-of-the-art tools, as well as computational potential methods such as panel codes or vortex lattice codes. The course is project-oriented and explores the important concepts of temporal and spatial resolution, stability and convergence, and flow-field analysis.


Aero Engr 352. Aircraft Dynamic Stability and Control. Aircraft equations of motion. Examination of aircraft dynamic modes based on both limited and full degree of freedom models utilizing analytical and numerical methods. Aircraft design considerations. Determination and evaluation of aircraft flying qualities against military specifications. Application of control system theory to the design of aircraft stability augmentation systems and autopilots.

Aero Engr 361. Propulsion I. Introduction to Brayton and jet engine cycles. Application of aero-thermodynamics to aircraft jet engines and major engine components. Overview of the design, performance and applications of turboprops/shafts, turbofans, turbojets, ramjets and scramjets and rockets. Focus on preliminary cycle analysis of aircraft gas turbine engines to include mission analysis, parametric cycle analysis and engine performance analysis.

Aero Engr 436. Aeroelasticity. Aeroelastic phenomena of an aircraft in flight. Dynamic pressure, Mach and angle of attack effects on the bending and twisting of aircraft components. Aeroelastic equations and coefficients related to flight characteristics such as flutter and divergence.

Aero Engr 442. Advanced Aerodynamics. Analytical and numerical solution techniques applied to incompressible, compressible, transonic and supersonic flight regimes over airfoils, wings and bodies. Introduction to hypersonic aerodynamics. Techniques include those historically used in incompressible flow up to and including state-of-the-art supersonic solutions using high speed computers.

Aero Engr 446. Introduction to Hypersonics. Analysis of heat transfer and high temperature effects on hypersonic vehicles. Application to reentry and transatmospheric vehicles.

Aero Engr 447. Advanced Applied Aerodynamics. Considers advanced topics in steady and unsteady aerodynamics in all speed ranges for study by analytical, experimental and computational methods.


Aero Engr 456L. Flight Test Techniques Laboratory. Application of fundamental flight test methods for defining the performance and flying qualities characteristic of high performance fixed wing aircraft. This laboratory experience serves as a final project for Aero Engr 456. Students receive credit by participating in a field trip to
Edwards AFB, a flight test sortie in a high performance aircraft, creation of a written report, and presentation of a final briefing. Scheduled during the same class period as Aero Engr 456.


**Aero Engr 466. Propulsion II.** Analysis of advanced aircraft engines. Preliminary aerodynamic and structural design of major engine components including inlets, compressors, combustors, turbines, mixers, afterburners and nozzles.

**Aero Engr 471. Aeronautics Laboratory.** Introduction to experimental methods and techniques. Introduction to instrumentation and data acquisition systems. Statistical analysis of data. Selected experiments in the fields of aerodynamics, gas dynamics, propulsion and flight mechanics.

**Aero Engr 472. Advanced Computational Aerodynamics.** Advanced theory and application of computational tools used to predict and analyze fluid flows of interest supporting Air Force research, development, test and evaluation programs. Working in teams, students gain the necessary knowledge and background to make contributions using the DOD’s High Performance Computing (HPC) Modernization Program resources. Projects include investigation of unsteady flows, boundary layers, turbulence models, shocks and multi-physics simulations.


**Aero Engr 482. Aircraft Design.** Design of an aircraft using a systems engineering approach to meet specifications provided. Detailed configuration optimization, aerodynamic analysis, structural layout, material selection, and structural component sizing, weight and center of gravity analysis, and stability and control analysis. Safety, reliability, maintainability, schedule and cost management concerns are addressed.

**Aero Engr 483. Aircraft Engine Design.** Preliminary design of an aircraft engine to meet specified performance requirements. Cycle selection, installation effects and engine sizing. Determination of installed and uninstalled performance of selected and sized engine. Preliminary design of major engine components to include variable geometry inlets, fans, compressor, main burner, turbine, afterburner and exhaust nozzles. Material selection for each component is accomplished based on criteria such as the stress and temperature environments, manufacturability, radar absorption capability, weight, and cost. Safety, reliability and maintainability concerns during the design process are addressed throughout the course. Course includes, if possible, a voluntary field trip to a government/industry design facility.

**Aero Engr 495. Special Topics.** Selected topics in aeronautical engineering.

**Aero Engr 499. Independent Study.** Individual study and research supervised by a faculty member. Topic established with the department head.