ME 4330 Introduction to Robotics (3)
Cross-listed as ELC 4330
See ELC 4330 for course information.

ME 4346 Introduction to Aeronautics (3)
Pre-requisite(s): A grade of C or better in ME 2321 and a grade of C or better or concurrent enrollment in ME 2345
Introduces the applied science of atmospheric flight. The course teaches about airplanes and how they fly from a design and application perspective. Included are topics in fluid dynamics, airfoil and wing theory, aircraft performance, stability, and aircraft design.

ME 5323 Introduction to Finite Element Methods (3)
Pre-requisite(s): ME 3321 (or equivalent), 4324 (or equivalent), and 4345 (or equivalent)
Advanced analysis of the finite element theory with emphasis on non-linear applications for thermal and fluidic applications. Course will formulate the finite element form from several classes of constitutive equations, discuss solution methods, and construct and implement algorithms for solving the finite element form.

ME 5338 Experimental Methods in Heat Transfer and Fluid Flow (3)
Pre-requisite(s): ME 4335 or consent of instructor
Consideration of experimental methods including experiment planning and design, error and uncertainty analysis, temperature measurement (in fluids and solids), flow rate measurement, flow visualization, and advanced data analysis; selected experiments conducted.

ME 5339 Tribology (3)
Topics include the nature of rough surfaces, contact mechanics between nonconformal and nominally-flat surfaces, nature of friction, lubricants and lubrication theory, and surface damage and fatigue. Computational analyses of surfaces and lubricant flow are performed using Python.
ME 5340 Intermediate Fluid Mechanics (3)
Pre-requisite(s): ME 3321
Introduction to vectors and tensors, deformation and stress in fluids, kinematics of fluid flows, conservation laws, Navier-Stokes equations, energy equation, introduction to computational fluid dynamics (CFD), introduction to vorticity dynamics and selected topics in compressible fluid flow.

ME 5341 Intermediate Heat Transfer (3)
Pre-requisite(s): ME 4345 (or equivalent)
Study of conduction, convection, and radiation. Steady and transient one- and multi-dimensional heat transfer with emphasis on analytical methods, numerical techniques, and approximate solutions.

ME 5342 Inviscid Flows (3)
Pre-requisite(s): ME 5340 or concurrent enrollment
Introduction to the dynamics of inviscid, incompressible fluids; vector representation theorems; vorticity transport theorem; solution methods to steady and unsteady, two-dimensional, axisymmetric and three-dimensional flows; computational methods for inviscid flows; and forces and moments on bodies in two-dimensional flows.

ME 5343 Computational Fluid Dynamics (3)
Pre-requisite(s): ME 3321

ME 5344 Viscoelasticity (3)
The Theory of Viscoelasticity is fundamental in the study of time rate dependent materials, with specific emphasis on applications to engineering systems with plastics and materials with polymeric behavior.

ME 5346 Introduction to Aeronautics (3)
Introduces the applied science of atmospheric flight. The course teaches about airplanes and how they fly from a design and application perspective. Included are topics in fluid dynamics, airfoil and wing theory, aircraft performance, stability, and aircraft design.

ME 5347 Analysis and Design of Propulsion Systems (3)
Pre-requisite(s): ME 3321, 3345
Introduction to compressible flow, including flows with simple area change, heat addition, friction, and shock waves. Analysis, parametric design, and performance of ramjets, turbojets, turbosfans, and turboprops. Introduction to the operating principles of major engine components. Introduction to rockets.

ME 5348 Wind Energy (3)
This course presents fundamentals about wind turbines, both commercial and residential. Included are topics in aerodynamics, structures, power generation, control economics, environments, noise, and design.

ME 5351 Intermediate Numerical Methods (3)
Pre-requisite(s): MTH 2311 and 3326
Introduction to engineering computational methods for design, from theory to algorithm to implementation
Topics will include: roots of equations, optimization, linear systems, integration and differentiation, curve-fitting, and systems of ordinary differential equations.

ME 5352 Theory of Elasticity (3)
Pre-requisite(s): ME 3320, 3321, and MTH 3326
The Theory of Elasticity is fundamental to the study of linear and non-linear solid mechanics. This course introduces the foundations of elasticity for a deformable body, including the concept of deformation and stress using tensor calculus.

ME 5353 Continuum Mechanics (3)
Pre-requisite(s): ME 3320 and Graduate standing
Introductory course into the mechanics of a continuous medium. Topics include the foundational concepts of stress, strain, and constitutive relationships presented in Cartesian tensor notation. Studies will focus on both solid and fluid mechanics.

ME 5357 Cardiovascular Engineering and Instrumentation (3)
Cross-listed as BME 5357, EGR 5357, ELC 5357
See BME 5357 for course information.

ME 5360 Renewable Energy Devices (3)
Educates graduate students from engineering disciplines in the design and applications of various renewable energy sources, materials, and devices. Introduces the basic concepts, principles, potentials, and limitations of several energy conversion and storage devices with a particular focus on solar cells, fuel cells, batteries, and supercapacitors.

ME 5364 Introduction to Additive Manufacturing (3)
This course introduces various aspects of additive manufacturing, which has become prominent in industry over the past two decades. The course gives the students a basic understanding of additive manufacturing and its use in design, both for rapid prototyping and for functional manufacturing. The course highlights the advances that additive manufacturing makes upon traditional manufacturing techniques.

ME 5365 Properties and Processing of Electronic Materials (3)
Study of the design and applications of conventional and advanced electronic materials ranging from typical Si and electroceramics to complex oxides and conducting polymers. Fundamental issues controlling their properties, processing, and reliability are addressed. In addition, a variety of thin film deposition techniques such as dc/rf magnetron sputtering, thermal/e-beam evaporation, and chemical vapor deposition are covered.

ME 5382 Mechanical Behavior of Polymers and Polymeric Composites (3)
Pre-requisite(s): ME 3320 or equivalent and ME 3322 or equivalent
Elastic and viscoelastic behavior of polymers and polymeric composites, predicting long-term behavior from short-term tests using time-temperature-superposition; relating chemical structure to mechanical properties for thermosets, thermoplastics, and semi-crystalline plastics; relating processing to mechanical properties; and predicting stiffness and strength from properties of fibers and polymeric matrices.

ME 5383 Deformation and Fracture in Metals (3)
Pre-requisite(s): ME 3320 or equivalent and ME 3322 or equivalent
This course introduces students to advanced theories of deformation and fracture that limit lifetimes in service of components and structures made of metals and alloys. Fracture mechanics are introduced as a tool in the life prediction of components that develop cracks before catastrophic failure. Plastic collapse, creep, fatigue, and environmental stress cracking are covered. Failure analysis methodology and tools are introduced and illustrated.
ME 5385  Failure Analysis: Theory and Practice  (3)
Pre-requisite(s): ME 3322
Introduction to basic failure theories and their application to the analysis of component and system failure in service; methodology of systematic failure analysis of actual service failures; introduction to tools used in failure analysis; case studies used extensively for teaching and assignments.

ME 5396  Special Topics in Engineering  (3)
Cross-listed as BME 5396, EGR 5396, ELC 5396
See EGR 5396 for course information.

ME 5397  Special Topics in Engineering  (3)
Cross-listed as BME 5397, EGR 5397, ELC 5397
See EGR 5397 for course information.

ME 5V99  Master's Thesis  (1-6)
Students completing a master’s program with a thesis must complete six hours of ME 5V99.

ME 6396  Advanced Topics in Engineering  (3)
Study of advanced topics in engineering. This course may be repeated for a total of four times.

ME 6V97  Engineering Research  (1-12)
Pre-requisite(s): Consent of student's supervisory graduate committee and admission to doctoral candidacy
Doctoral students may enroll in up to 12 semester hours of engineering research hours prior to taking the preliminary exam and being accepted into candidacy for the doctoral degree. These engineering research hours will count toward the degree.

ME 6V99  Dissertation  (1-6)
Required of all doctoral candidates. In no case will fewer than 12 semester hours be accepted for a dissertation. Students may not enroll for doctoral research hours until they have been officially accepted into candidacy for the doctoral degree. After initial enrollment, students must register for at least one semester hour of doctoral research every term thereafter (summer term excluded).