Prereq.: ME 2334 or equivalent

Optimization, product reliability and materials courses utilized to complete the project set forth.

Prereq.: ME 3633, 3752, 4243, 4433, 4183. 6 hrs.

4202 Mechanical Engineering Capstone Design II (2)

Prereq.: credit or registration in ME 4433 and 3603. 3 hrs. lab. Oral presentation, postgraduate research, and independent experimentation.

4621 Thermal Science Laboratory (1) Prereq.: ME 2353 or either ME 2723 or 2733. 2 hrs. lecture; 3 hrs. lab. Construction of programs to solve mathematical problems common to all engineers; numerical methods including solutions to linear and nonlinear differential equations approximation, interpolations, and integration.

4563 Mathematical Methods in Engineering (3) See MATH 4834.

4573 Interactive Computer Graphics (3) Prereq.: experience in mathematics and computer programming. Also offered as CSC 4356. Analytical treatment of graphics using the digital computer, graphical display and input devices, computer graphics systems and standards; two- and three-dimensional transformations; geometric modeling, interactive techniques; basic data structures; realism in 3-D graphics; future trends.

4583 Applied Interactive Graphics and Computer-Aided Design (3) Prereq.: ME 4433. Also offered as CSC 4156. Application of interactive graphics techniques to solve specific problems in engineering design and data reduction.

4611 Thermal System Laboratory (1) Prereq.: ME 2354 or equivalent and credit or registration in ME 4433 and 3603. 3 hrs. lab. Oran. Design, simulation, and analysis of thermal systems; calculation of energy balances; heat transfer.

4633 Internal Combustion Engines (3) Prereq.: ME 2354 or 3333 or equivalent. Classification of internal combustion engines, gas turbines, cylinders with different components, spark-ignition gasoline engines, diesel, carburetion, compression-ignition engines, combustion and diesel fuel, fuel atomization and atomizers, combustion chambers, two- and four-stroke cycle engines, and exhaust systems.

4643 Thermal Environmental Engineering (3) Prereq.: ME 2354 and credit or registration in ME 4433 or equivalent. Design of thermal environment for humans, animals, processes, and inanimate objects; the means of control.

4663 Power Plant Engineering (3) Prereq.: ME 2354 and 4433 or equivalent. Power plants for industrial and central-station use; emphasis on cycles, design, capabilities, and economics of the plant as a whole; components used in various types of plants.

4673 Introduction to Modern Control Theory (3) Prereq.: ME 4183 or equivalent. State space modeling, controllability, observability, stability, asymptotic behaviors, and solution of differential equations; laws via minimum principle and dynamic programming.

4683 Sensors and Actuators (3) V Prereq.: EE 3950. ME 4433. S and A fundamentals, principles of various transduction (sensing and actuating) methods, especially electro mechanical sensors and actuators; actual designing, building, and testing of S and A devices.

4723 Advanced Materials Analysis (3) Prereq.: ME 2723 or 2733, 3701 or equivalent. 1 hr. lecture; 6 hrs. lab. Components and operation of modern analytical instruments using photon or electron beams and X-rays; macroscopic and microscopic examination of materials coupled with separate and combined testing of mechanical, tribological, and corrosion properties.

4733 Deformation and Fracture of Engineering Materials (3) F Prereq.: CE 4800 and either ME 2723 or 2733 or equivalent. Effect of temperature, strain rate, corrosion, and microstructure on stress-strain behavior and fracture of engineering materials, including metals, ceramics, and plastics.

4743 Kinetics in Materials Processes (3) Prereq.: ME 2354, ME 2723 or 2733 or equivalent. Applications of the principles of diffusion and thermodynamics to describe the kinetics of microstructural evolution in engineering materials.

4763 Fundamentals of Corrosion Science and Engineering (3) F Prereq.: ME 2723 or 2733 or equivalent and any first course in thermodynamics. Corrosion principles; electrochemical and galvanic cell principles; polarization and activation; principal methods used in corrosion prevention.

4783 Composite Materials: Manufacturing, Properties, and Design (3) Prereq.: ME 3834 or equivalent. Constituent materials, micro- and macromechanics, mechanical behavior, fracture, manufacturing and design of composite materials, including polymer, ceramic, and metal matrix.
residual stresses; plastic forming of metals.


7753 Thermodynamics of Solid Materials (3) Prereq.: ME 2723 or 2733 and first year level course in thermodynamics. Review of thermodynamics and material property relationships; chemical equilibrium in reactions; solid solutions and phase diagram enunciation; reaction kinetics; high temperature and corrosion; hydrogen embrittlement, etc.; thermodynamics of surfaces and corrosion.

7813 Computation of Boundary Layer Flows and Heat Transfer (3) Prereq.: ME 3834 and 4433 or equivalent. Finite-difference methods for the solution of parabolic or boundary layer equations; use of a computer program for two-dimensional boundary layers; wall boundary layers, jets and wakes, flows in pipes, annuli, nozzles, and diffusers.

7823 Computation of Fluid Flow and Heat Transfer (3) Prereq.: ME 3834, 4433 and ME 4533 or equivalent. Finite-difference methods for solving equations of fluid motion for a program used to solve complex problems involving fluid flow, heat transfer, and chemical reaction; mathematical models for turbulence, radiation, and heat transfer in their computing input, mesh generation, and application of prediction procedures for practical situations.

7833 Inviscid Fluid Flow (3) Prereq.: ME 7863 or equivalent. Fluid dynamics as continuum mechanics; potential flow using complex variables in two dimensions and superposition in three dimensions; viscous flow and Navier-Stokes equations; compressible flow, including Mach waves, shocks, and linearized aerodynamics.

7901 Seminar (1) All graduate students are expected to attend this course every semester; only 1 sem. hr. of credit in this course allowed toward degree. Pass-fail grading.

7903 Independent Study in Mechanical Engineering (3) May be taken for a max. of 6 hrs. of credit; Directed independent study for graduate students.

7933, 7943 Mechanical Engineering Problems (3,3) May be taken for a max. of 6 hrs. of credit when topics vary, with consent of department. Mechanical engineering treatment of advanced problems in Mechanical Engineering; 3 hrs. lab. May be taken for a max. of 6 hrs. of credit when topics vary, with consent of department. Mechanical engineering treatment of advanced problems in Mechanical Engineering. 8000 Thesis Research (1-12 per sem.) S’Y” grading.

9000 Dissertation Research (1-12 per sem.) S’Y’” grading.

MEDICAL PHYSICS + MEDP

General education courses are marked with stars (★).

★ 2051 Radiation Science for Medical Applications (3) F,S Matter and energy; structure of the atom and nucleus, radioactivity; types of radiation; radiation interactions; dose and biological effects; radiation detection and measuring; radiation safety; background radiation; applications of nuclear science in medicine, cancer therapy, and imaging.

4101 Tracer Methodology for Biological Sciences (3) F,S 2 hrs. lecture, 1 hr. lab. Introduction to the fundamental principles of tracer methodology in the biological sciences. Properties of ionizing radiation, instruments for detection and measuring radiation, and biological use of radioactive materials.

4111 Introduction to Medical Imaging (3) Prereq.: PHYS 2002 or equivalent; MAT 1550 or equivalent. Physics and engineering principles of medical imaging technologies. X-ray imaging, computed tomography, magnetic resonance imaging, ultrasound, and nuclear medicine; clinical applications of imaging in radiodiagnosis.


4332 Radiation Detection Laboratory (1) Prereq.: credit or registration in MEDP 4531. 3 hrs. lab. Laboratory exercises covering fundamental principles of radiation detection systems and data analysis techniques used for radiation exposure characterization, radiation therapy, radiological imaging, and medical health physics.

4351 Radiation Detection and Instrumentation (2) Prereq.: PHYS 4098 or equivalent. Introduction to the physics of detection, instrumentation, and data analysis; use of radiation detectors (x-rays, y-rays, neutrons, and charged particles) using scintillation crystal, solid state, film, and gas detectors. Provides understanding of techniques of detection, systems used in radiation therapy, radiological imaging, and health physics.

4999 Special Problems in Medical Physics and Health Sciences (1-4) Prereq.: thorough knowledge of mathematics, science, and engineering related to the topic or proposed problem, and consent of instructor. May be taken for a max. of 12 sem. hrs. of credit when topics vary. Theoretical or experimental problems involving the application of medical physics and health physics technology.

7743 Defects, Diffusion, and Transformations in Solids (3) Prereq.: PHYS 4098 or equivalent. Advanced topics in corrosion, high temperature and corrosion, hydrogen embrittlement, etc.; thermodynamics of surfaces and corrosion.

7753 Thermodynamics of Solid Materials (3) Prereq.: ME 2723 or 2733 and first year level course in thermodynamics. Review of thermodynamics and material property relationships; chemical equilibrium in reactions; solid solutions and phase diagram enunciation; reaction kinetics; high temperature and corrosion; hydrogen embrittlement, etc.; thermodynamics of surfaces and corrosion.

7813 Computation of Boundary Layer Flows and Heat Transfer (3) Prereq.: ME 3834, 4433 and ME 4533 or equivalent. Finite-difference methods for solving equations of fluid motion for a program used to solve complex problems involving fluid flow, heat transfer, and chemical reaction; mathematical models for turbulence, radiation, and heat transfer in their computing input, mesh generation, and application of prediction procedures for practical situations.

7833 Inviscid Fluid Flow (3) Prereq.: ME 7863 or equivalent. Fluid dynamics as continuum mechanics; potential flow using complex variables in two dimensions and superposition in three dimensions; viscous flow and Navier-Stokes equations; compressible flow, including Mach waves, shocks, and linearized aerodynamics.

7901 Seminar (1) All graduate students are expected to attend this course every semester; only 1 sem. hr. of credit in this course allowed toward degree. Pass-fail grading.

7903 Independent Study in Mechanical Engineering (3) May be taken for a max. of 6 hrs. of credit; Directed independent study for graduate students.

7933, 7943 Mechanical Engineering Problems (3,3) May be taken for a max. of 6 hrs. of credit when topics vary, with consent of department. Mechanical engineering treatment of advanced problems in Mechanical Engineering; 3 hrs. lab. May be taken for a max. of 6 hrs. of credit when topics vary, with consent of department. Mechanical engineering treatment of advanced problems in Mechanical Engineering. 8000 Thesis Research (1-12 per sem.) S’Y” grading.

9000 Dissertation Research (1-12 per sem.) S’Y’” grading.

MILITARY SCIENCE + MILS

Noncitizen aliens require approval from their governments prior to enrollment in these courses.

1010 Rifle and Pistol Marksmanship (1) 1 hr. lecture; 1 hr. laboratory. Restricted to freshmen and sophomores or permission of instructor. May be taken for a max. of 6 sem. hrs. credit. Medical physics or health physics projects that study specific aspects of radiation therapy, medical imaging, or medical technology applications in medical physics and health physics technology.

1091 Advanced Topics in Medical Physics and Health Physics (1-3) Prereq.: consent of instructor. May be taken for a max. of 6 sem. hrs. credit. Advanced treatment of a specific area of medical physics or health physics technology of current interest.

1011 Leadership and Personal Development (1) Prereq.: credit or registration in 1011 and 1012 or permission of instructor; 2 hrs. lab. Overview of leadership fundamentals, including setting direction, problem-solving, listening, presenting briefs, providing feedback, and developing communication skills.

1015 Air Force Physical Fitness Training (1) 1.5 hrs. lab. Open to all USAF students. May be taken for a max. of 8 sem. hrs. of credit. Development of strength, stamina, agility, coordination, and flexibility through a combined program of group and individual exercise.

2161 Innovative Team Leadership (2) F,S Prereq.: MILS 1011 and 1012 or permission of instructor; 2 hrs. lecture; 1.5 hrs. lab. Explores the dimensions of creative and innovative tactical leadership strategies and styles by studying historical case studies and conducting interactive student exercises.

2162 Foundations of Tactical Leadership (2) F,S Prereq.: MILS 2161 or permission of instructor; 2 hrs. lecture; 1.5 hrs. lab. Examines the challenges of leading tactical teams in the complex contemporary operating environment (COE). Comprehends the historical basis of the Army leadership framework explores the dynamics of adaptive leadership in the context of military operations.

3011 Adaptive Tactical Leadership (4) F,S Prereq.: MILS 2161 and 2162 or equivalent. 3 hrs. lecture; 3 hrs. lab. Study, practice, and evaluation of adaptive team leadership skills as presented with the demands of the ROTC Leadership and Assessment Course (LDAC). Challenges and skills are used to develop self-awareness and critical thinking skills.