Mechanical Engineering

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The Mechanical Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, https://www.abet.org.

Program Goals, Objectives & Design Integration

The mission of the Mechanical Engineering Department is to provide an excellent educational experience for the students in its programs. This experience includes an emphasis on the technical, communication, and teamwork skills that graduate engineers need to succeed in both the workplace and society in general. In order to achieve these goals, the department places great importance on teaching, research, scholarship, engineering practice, and service to the university community and the Engineering profession. The mechanical engineering program is structured to prepare the graduate for the professional practice of engineering and/or graduate school. The curriculum emphasizes a rigorous treatment of the mathematical and scientific approach to the solution of engineering problems. It provides a coherent set of courses in energy conversion and structures/motion in mechanical systems. The program has design across the curriculum and is capped with an integrated design experience in the form of a senior project.

Programs

- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Mechanical Engineering with Co-op

Courses

MEE 0843. Technology Transformations. 3 Credit Hours.
Expand your knowledge by looking at how various technologies such as electricity, automobiles, airplanes, telephones, bridges, highways, electronics, computers, and information technology have transformed the world around us. What would we do without them? Where do they come from? How do they work? Technology is developed by people who have the ideas, design the machines and processes, and suffer the costs and benefits of technological changes in our society. Learn about science and technology through history of discovery, invention and innovation through lectures and labs. We will also study several promising fields which may lead us to the future of technology. NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core.

Course Attributes: GS

Repeatability: This course may not be repeated for additional credits.

MEE 0844. The Bionic Human. 3 Credit Hours.
Can we replace our "worn-out" body parts with space-age materials? Will the day come when an injured athlete buys a tendon for the next big game? Why are your parents spending so much time at the doctor? We are on the verge of building "the bionic human" by repairing many of our body parts indefinitely. Become familiar with bio-engineered technologies for age-, disease-, sports-, and accident-related injuries. Learn why weight bearing exercise strengthens bones, the difference between MRI, CAT scan, and X-Ray, and what the folks at the Food and Drug Administration do. By the time you finish this course, you'll know how a pig heart could save your life, how stem cell research could affect your future, the purpose of animal testing, and why walking through airport security could be a problem if you have had your hip replaced. NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core. Students cannot receive credit for this course if they have successfully completed MEE 0944, BIOE 0844 or BIOE 0944.

Course Attributes: GS

Repeatability: This course may not be repeated for additional credits.

MEE 0944. Honors Bionic Human. 3 Credit Hours.
From MRIs to engineered organs, modern healthcare has become synonymous with applications of bioengineering and technology. This course focuses on the new bioengineering paradigm, exploring the ways in which disciplines intersect to produce advances in healthcare. A key goal is to enable students to make more informed decisions about healthcare based on their understanding not only of technological advancements but of the ethical and societal issues arising as a consequence. This discovery-based seminar includes interactive lectures, hands-on and virtual labs, discussion, research and presentations. NOTE: This course fulfills a Science & Technology (GS) requirement for students under GenEd and Science & Technology Second Level (SB) for students under Core. Students cannot receive credit for this course if they have successfully completed MEE 0944, BIOE 0844 or BIOE 0944.

Cohort Restrictions: Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

Course Attributes: GS, HO

Repeatability: This course may not be repeated for additional credits.

MEE 1001. Introduction to Mechanical Engineering. 2 Credit Hours.
Provides an understanding of the study and practice associated with mechanical engineering and technology disciplines. Understand the importance of good communications and teamwork skills in a successful engineering and technology career. Understand the basics of problem solving and design. Discipline-specific labs.

Repeatability: This course may not be repeated for additional credits.

MEE 1019. Automotive Design I. 1 Credit Hour.
Design of automotive chassis, suspension, and drive train for participation in Society of Automotive Engineers competitions. Grade based on participation (50%) and/or design report (50%).

Repeatability: This course may not be repeated for additional credits.

MEE 1029. Automotive Design II. 1 Credit Hour.
Continuation of MEE 1019 (0180). Grade based on participation (50%) and/or design report (50%).

Repeatability: This course may not be repeated for additional credits.

MEE 1039. Automotive Design III. 1 Credit Hour.
Continuation of MEE 1029 (0181). Grade based on participation (50%) and/or design report (50%).

Repeatability: This course may not be repeated for additional credits.

MEE 1117. Fundamentals of Mechanical Engineering Design. 2 Credit Hours.
An introduction to the art of communicating design ideas in two and three dimensions with a combination of hand sketching and computer modelling. Specific topics include: isometric, orthographic and perspective hand sketching; computer-aided design (CAD) modeling - part model, assembly and mechanism synthesis; CAD drawings - orthographic, auxiliary and sectional views, dimensioning and annotations. A culminating team project will facilitate introduction of rapid prototyping techniques necessary to convert a design intent into a functional product.

College Restrictions: Must be enrolled in one of the following Colleges: Engineering.

Repeatability: This course may not be repeated for additional credits.

MEE 2011. Linear Systems. 3 Credit Hours.
This course introduces junior-level engineering students to linear-systems analysis and numerical methods in engineering. Numerical-analysis procedures typically encountered in the upper-level mechanical-engineering curriculum are considered and include: linear matrix equations and their solutions, eigenvalue problems, numerical interpolation, differentiation and integration, and the numerical solution of differential equations.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Bioengineering, Civil Engineering, Mechanical Engineering.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MATH 1042|Minimum Grade of C-|May not be taken concurrently
OR MATH 1942|Minimum Grade of C-|May not be taken concurrently
OR MATW Y|May not be taken concurrently)
AND (MATH 2043|Minimum Grade of C-|May be taken concurrently
OR MATH 2943|Minimum Grade of C-|May be taken concurrently)
AND (MATH 3041|Minimum Grade of C-|May not be taken concurrently
OR MATH 3941|Minimum Grade of C-|May not be taken concurrently)

MEE 2305. Instrumentation and Data Acquisition Lab. 1 Credit Hour.
Students will learn the instrumentation of basic static and dynamic mechanical systems. Students will use data-acquisition hardware and software. Students will carry out statistical analysis of results, evaluate error propagation, and provide written lab reports.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2332|Minimum Grade of C-|May be taken concurrently
OR ENGT 3323|Minimum Grade of C-|May be taken concurrently)
AND (ECE 2112|Minimum Grade of C-|May be taken concurrently)
AND (ECE 2113|Minimum Grade of C-|May be taken concurrently)

MEE 3011. Analysis and Computation of Linear Systems in Mechanical Engineering. 3 Credit Hours.
Many types of mechanical-engineering situations are modeled as systems of coupled linear equations, or as systems of coupled linear differential equations. Modern computing techniques offer very powerful functionality for calculating linear-equation systems and will be used extensively in this course. Upon completion of this course students will attain: proficiency in coding, a conceptual foundation for core linear algebra and eigenfunction analysis, and insight for both numerical and exact solution strategies applicable to a wide range of problems encountered in mechanical engineering.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2332|Minimum Grade of C-|May not be taken concurrently
OR BIOE 3312|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 2043|Minimum Grade of C-|May not be taken concurrently
OR MATH 2943|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 3041|Minimum Grade of C-|May not be taken concurrently
OR MATH 3941|Minimum Grade of C-|May not be taken concurrently)

MEE 3117. Computer-Aided Mechanical Design. 3 Credit Hours.
An introduction to the mathematical and computational fundamentals of finite element method and the use of an industry standard Computer Aided Design (CAD) package to analyze failure. It is expected that before taking this course, students have a fundamental understanding of concepts from statics, dynamics, solid mechanics and design of machine elements. A culminating design project will help students understand the design and assembly of complex machines by analysis of individual components and the interaction between them, from the prime mover to the load.

Degree Restrictions: Must be enrolled in one of the following Degrees: Bach of Science in Mech Eng.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MEE 3011|Minimum Grade of D-|May not be taken concurrently)
AND (MEE 3301|Minimum Grade of D-|May not be taken concurrently)

MEE 3301. Machine Theory and Design. 3 Credit Hours.
The course includes design process and consideration of materials, reliability, stress and deflection, failure criteria from static and dynamic loadings. Topics also include analysis of mechanical components including rotating shafts, screws, welded parts, bearings, gears, and belts. There will be individual and team design projects with written reports and presentations.

Degree Restrictions: Must be enrolled in one of the following Degrees: Bach of Science in Mech Eng.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 1117|Minimum Grade of C-|May not be taken concurrently
OR MEE 1117|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 2332|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 2333|Minimum Grade of C-|May not be taken concurrently
OR ENGR 2933|Minimum Grade of C-|May not be taken concurrently)

MEE 3302. Kinematics of Mechanisms. 3 Credit Hours.
This course builds on the concepts of kinematics first presented in sophomore level Dynamics and explores its application to mechanical design. Starting with an introduction to links, joints and kinematic chains, students will learn the analysis and design of spatial mechanisms with an emphasis on position, velocity and acceleration of linkages. In addition to graphical and numerical analysis, computer aided mechanism design will be performed using SolidWorks Motion.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 2332|Minimum Grade of C-|May not be taken concurrently.

MEE 3304. Mechanical Design and Fabrication. 3 Credit Hours.
This course builds on the theoretical foundation of MEE 3301 - Machine Element Design and ENGR 3117 - Computer Aided Design. Students will learn to incorporate design constraints associated with the practical fabrication and assembly of a mechanism. In this machine-shop-intensive course, students will be trained in precision machining and assembly techniques. A significant portion of the grade will rely on the quality of workmanship and accuracy of output.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MEE 2305|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3117|Minimum Grade of D-|May not be taken concurrently
OR MEE 3117|Minimum Grade of D-|May not be taken concurrently)
AND (MEE 3301|Minimum Grade of D-|May not be taken concurrently)

MEE 3305. Materials Laboratory. 1 Credit Hour.
Laboratory experiments related to the nature and properties of materials, including: stress, strain, factures, microstructure, metallography, and nondestructive testing.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2333|Minimum Grade of C-|May not be taken concurrently
OR ENGR 2933|Minimum Grade of C-|May not be taken concurrently
OR ENGT 2322|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3496|Minimum Grade of C-|May be taken concurrently
OR ENGR 3201|Minimum Grade of C-|May be taken concurrently
OR ENGT 3396|Minimum Grade of C-|May be taken concurrently
OR ENGT 3201|Minimum Grade of C-|May be taken concurrently)
AND (MEE 2305|Minimum Grade of C-|May be taken concurrently)

MEE 3421. Dynamic Systems. 3 Credit Hours.
A study of the dynamic response of physical systems, concentrating on mechanical systems in translation, rotation, and combined motion. Mathematical models are developed using interacting elements, inter-connecting laws, and physical laws. Both the state variable and input-output analysis are considered. Solutions for the model response include using the following techniques: analytical, Laplace Transform, transfer function, matrix methods, and numerical analysis. Design project.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 3011|Minimum Grade of C-|May not be taken concurrently.

MEE 3422. Modeling and Control of Electromechanical Systems. 3 Credit Hours.
Control systems are integral parts of our modern life. This course introduces the control of electromechanical systems with an emphasis on linear systems. Analyzing systems using transfer functions and Laplace transforms is studied, and the stability of control systems and their transient response is covered. In addition, frequency-domain techniques and the design of feedback-control systems will be discussed.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 3011|Minimum Grade of C-|May not be taken concurrently.

MEE 3506. Fluid Mechanics Laboratory. 1 Credit Hour.
This laboratory aims to familiarize the students with different data acquisition techniques and devices to measure and control the behavior of various fluid systems. Experiments will include pressure and velocity measurements as well as modern transducers and pressure/flow regulators.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3553|Minimum Grade of C-|May be taken concurrently
OR ENGT 2521|Minimum Grade of D-|May be taken concurrently.

MEE 4040. Special Topics. 1 to 4 Credit Hour.
A course designed to present new and emerging areas of engineering. The course may also be used to present areas not normally taught in the College. Course requirements vary with the topic and instructor. Offered as needed or as appropriate.

Class Restrictions: Must be enrolled in one of the following Classes: Junior 60 to 89 Credits, Senior 90 to 119 Credits, Senior/Fifth Year 120+ Credits.

Repeatability: This course may be repeated for additional credit.

MEE 4173. Data Acquisition and Analysis for Engineers. 3 Credit Hours.
Course content includes the use of microcomputers for automated data acquisition, process control, and data analysis. The principles and applications of sensors, transducers, recording instruments, signal conditioning, and control instrumentation, and sampling theory. Data analysis using Fourier transform and least squares method. Computer software development for interfacing and graphics. Hands-on lab and design project required.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MATH 2101|Minimum Grade of C-|May not be taken concurrently
OR MEE 2011|Minimum Grade of C-|May not be taken concurrently
OR MEE 3011|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 2305|Minimum Grade of C-|May not be taken concurrently)
AND (ECE 2112|Minimum Grade of C-|May not be taken concurrently
OR ECE 2332|Minimum Grade of C-|May not be taken concurrently
OR ECE 2312|Minimum Grade of C-|May not be taken concurrently)

MEE 4191. Independent Research in Mechanical Engineering. 2 to 5 Credit Hours.
Arranged each semester, please consult with the instructor.

Repeatability: This course may be repeated for additional credit.

MEE 4212. Tribology and Surface Engineering. 3 Credit Hours.
Tribology encompasses the interdisciplinary science and engineering of interacting surfaces in relative motion. Tribology is in every aspect of our lives and has a tremendous impact on manufacturing, energy production and use, transportation vehicles, health care, mining safety and reliability, and space exploration. This course introduces the nature of engineering surfaces, methods of surface characterization, modes of friction and wear, theories of contacts, and lubrication.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3201|Minimum Grade of D-|May not be taken concurrently.

MEE 4311. Mechanics of Composite Materials. 3 Credit Hours.
Introduction to the behavior of composite materials and their use in engineering structures: behavior and properties of the constituent fibers and matrics, micromechanical predictions of composite properties, anisotropic elasticity, behavior of composite laminae, classical lamination theory; fracture mechanisms, failure theories; behavior of composite plates and beams.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2333|Minimum Grade of C-|May not be taken concurrently
OR ENGR 2933|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3201|Minimum Grade of D-|May not be taken concurrently)
AND (MATH 2101|Minimum Grade of C-|May not be taken concurrently
OR MEE 2011|Minimum Grade of C-|May not be taken concurrently
OR MEE 3011|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 3041|Minimum Grade of C-|May not be taken concurrently
OR MATH 3941|Minimum Grade of C-|May not be taken concurrently)

MEE 4314. Impact and Crashworthiness. 3 Credit Hours.
This course is an advanced course on impact mechanics, impact biomechanics, as well as vehicle crashworthiness standards and accident data analysis. Students will learn about FMVSS and NCAP crash tests, FARS and NASS real world accident databases, and methods to analyze crash and accident data.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2332|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 2333|Minimum Grade of C-|May not be taken concurrently
OR ENGR 2933|Minimum Grade of C-|May not be taken concurrently)

MEE 4382. Independent Study in Mechanical Engineering. 1 to 6 Credit Hour.
Arranged each semester, please consult with the instructor.

Repeatability: This course may be repeated for additional credit.

MEE 4405. Vibrations Laboratory. 1 Credit Hour.
This course covers instrumentation and data acquisition of single degree of freedom, multi-degree of freedom, and continuous vibratory systems. It also covers data analysis software in time domain and frequency domain, simulation of basic vibratory systems, and statistical analysis of results.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MEE 4422|Minimum Grade of D-|May be taken concurrently)
AND (MEE 2305|Minimum Grade of C-|May not be taken concurrently)

MEE 4411. Introduction to Mobile Robotics. 3 Credit Hours.
Introduction to Mobile Robotics will teach you, through the use of project-based learning, fundamental concepts in mapping, planning, control, and dynamics that are used in mobile robotics. By the end of this course you will be able to program both a ground and aerial robot to autonomously and safely navigate through an obstacle-filled environment. You will work with both simulated and real robots and use both off-the-shelf software and write code from scratch using ROS.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 4412|Minimum Grade of D-|May not be taken concurrently
OR MEE 5412|Minimum Grade of D-|May not be taken concurrently.

MEE 4412. Modern Dynamics for Robotics. 3 Credit Hours.
This course focuses on the algebraic and differential equations governing the static and dynamic 3D motion of rigid bodies, including vectors, vector differentiation, and dyads. The equations of motion for multibody systems will be derived using Newton-Euler, Lagrange, and Kane's methods. Computational tools for 3D force and motion analysis will be used to simulate physical systems.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 3011|Minimum Grade of C-|May not be taken concurrently.

MEE 4413. Robotic Manipulation. 3 Credit Hours.
This course is an introduction to the design, modeling and control of robot manipulators, using modern dynamic formulations for multi-degree of freedom, 3D rigid body systems. This course covers 3D spatial transformations, forward and inverse kinematics, Jacobians, joint space and operational space control, and force control. This course also introduces ROS for communication and control of 2 6 axis robotic arms.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MEE 4412|Minimum Grade of D-|May not be taken concurrently
OR MEE 5412|Minimum Grade of D-|May not be taken concurrently
OR ENGR 4334|Minimum Grade of D-|May not be taken concurrently
OR ENGR 5334|Minimum Grade of D-|May not be taken concurrently)
AND (MEE 3421|Minimum Grade of D-|May not be taken concurrently
OR MEE 3422|Minimum Grade of D-|May not be taken concurrently)

MEE 4414. Optimization and Control of Mechanical Systems. 3 Credit Hours.
From the everyday commute to flight control, optimization and optimal control play an important role. This course covers topics related to optimization and designing optimal controllers for mechanical systems. Topics include optimization, introduction to calculus of variations, finding optimal paths and route planning for autonomous vehicles, dynamic programming, linear optimal control, and model predictive control. Applications of the course concepts in robotics and modern mechanical systems will be discussed through several examples.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 3422|Minimum Grade of C-|May not be taken concurrently
OR ECE 3412|Minimum Grade of C-|May not be taken concurrently.

MEE 4422. Mechanical Vibrations. 3 Credit Hours.
The study of single degree, two degrees, and multi-degrees of freedom systems, harmonic and non-harmonic excitation, damped and undamped response, free, forced, transient, and random vibrations, resonance beating, force transmission, isolation, base, and self excitation. Term design project. Computer numerical methods.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 2332|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 3011|Minimum Grade of C-|May not be taken concurrently
OR MEE 2011|Minimum Grade of C-|May not be taken concurrently)
AND (MATH 3041|Minimum Grade of C-|May not be taken concurrently
OR MATH 3941|Minimum Grade of C-|May not be taken concurrently)

MEE 4506. Energy Conversion Laboratory. 1 Credit Hour.
This laboratory will emphasize advanced measurement techniques in energy systems. Computer based data acquisition and statistics are integral parts of the course. Experiments will include: gas and liquid measurements, heat and mass transfer, and engine measurements.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3571|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 2305|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 3506|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 4571|Minimum Grade of D-|May be taken concurrently)
AND (MEE 4572|Minimum Grade of D-|May be taken concurrently)

MEE 4512. Compressible Fluid Dynamics. 3 Credit Hours.
This course will introduce students to the subject of high speed gas dynamics. Compressible flows exhibit fundamentally different behavior from that observed in low speed, constant density fluids. Such flows are found in aerodynamics, combustors, turbines, jets, gas pipelines, and wind tunnel test facilities. Students will study phenomena associated with supersonic flows, including normal and oblique shocks, expansion fans, and compressible flows with friction and/or heat transfer. An introduction to high temperature and rarefied gas dynamics will also be included.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3571|Minimum Grade of C-|May not be taken concurrently)

MEE 4513. Aerodynamics. 3 Credit Hours.
The forces and moments exerted by moving fluids on solid bodies are of concern in numerous applications. While the performance of flight vehicles is of particular interest, aerodynamics is also a subject of importance in passenger and race car design, wind turbines, structures, sea vessels, etc. Students will study various topics in low speed aerodynamics, including thin airfoil theory and airfoil nomenclature, finite wing theory, high lift and drag reduction devices, separated and vortical flows, and rotating blades. An introduction to transonic flows and computational aerodynamics will also be included.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Civil Engineering, Mechanical Engineering.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently.

MEE 4571. Advanced Thermodynamics and Combustion. 3 Credit Hours.
Review of basic concepts, first and second laws, entropy (statistical and classical), power and refrigeration cycles, thermodynamic relationships, mixtures, chemical reactions and equilibrium, introduction to combustion process. Term design project.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3571|Minimum Grade of C-|May not be taken concurrently.

MEE 4572. Heat and Mass Transfer. 3 Credit Hours.
Principles and applications of heat transfer by conduction, convection, and radiation processes. Combined modes of heat transfer. Graphic and numerical solutions. Steady and unsteady as well as multi-dimensional conduction heat transfer. Forced and free convection. Heat exchanger theory. Introduction to radiation. Term design project. Computer Numerical methods.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MATH 3041|Minimum Grade of C-|May not be taken concurrently
OR MATH 3941|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3571|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)

MEE 4573. Internal Combustion Engines. 1 Credit Hour.
Types of engines, design considerations, combustion, friction, emission.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
MEE 4571|Minimum Grade of D-|May be taken concurrently.

MEE 4574. Heating, Ventilating, and Air Conditioning. 3 Credit Hours.
Course content includes human comfort criteria, heating and cooling loads, HVAC system types, room air distribution, terminal unit selection, fans and ducts, pumps and piping, computer-aided design; term design project.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 3571|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)

MEE 4575. Renewable and Alternative Energy. 3 Credit Hours.
Current state of renewable and alternative energy; different scenarios of producing energy: mechanical heat engines, ocean thermal energy converters, thermoelectricity, solar radiation, biomass, photovoltaic converters, wind energy, and ocean engines; design of hydrogen-powered systems: polymer electrolyte membrane fuel cells.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3571|Minimum Grade of C-|May not be taken concurrently.

MEE 4577. Power Generation and Storage Technologies. 3 Credit Hours.
This course will give an overview of electric power generation technologies including coal, gas, and nuclear power plants, as well as some emerging technologies such as photovoltaic. This course will also discuss technologies used in power transmission and distribution such as overhead power line conductors. Power storage technologies will also be introduced, including compressed air, flywheel, hydrogen, and batteries.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 3571|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3201|Minimum Grade of C-|May be taken concurrently)
AND (ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)

MEE 4578. Fundamentals of Combustion. 3 Credit Hours.
This course is focused on concepts and applications of chemically reacting systems. Topics include heat of reaction, chemical equilibrium, chemical kinetics, chemical mechanisms, coupling chemical and thermal analyses of reacting systems, laminar premixed and diffusion flames, turbulent flames and pollutant emissions.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(ENGR 3571|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently)
AND (MEE 4572|Minimum Grade of D-|May be taken concurrently)

MEE 4643. Manufacturing Engineering. 3 Credit Hours.
This course will provide an overview of existing and emerging manufacturing technologies in the modern society. Topics include state-of-the-art processing methods for metals and alloys, ceramics and powder metallurgy, polymers and composites, additive manufacturing of a wide range of solid materials, as well as micro- and nano- fabrications.

Field of Study Restrictions: Must be enrolled in one of the following Fields of study: Mechanical Engineering.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
(MEE 3301|Minimum Grade of C-|May not be taken concurrently)
AND (ENGR 3201|Minimum Grade of C-|May not be taken concurrently)

MEE 4731. Cardiovascular Fluid Dynamics. 3 Credit Hours.
Mechanics of blood circulation, fluid mechanics of the heart, blood flow in arteries, unsteady flow in veins, current concepts in circulatory assist devices, biofluidics, and other selected topics.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites:
ENGR 3553|Minimum Grade of C-|May not be taken concurrently
OR ENGR 3953|Minimum Grade of C-|May not be taken concurrently.