ME. MECHANICAL ENGINEERING

ME-140. SCIENTIFIC PROGRAMMING
Credits: 3

This course presents an introduction to computer programming with an emphasis on the techniques needed for data analysis and numerical problem solving for scientific and engineering applications. Basic programming idioms are presented including control structures, data types, methods for handling input and output as well as numerical methods such as array computing and vectorization. Emphasis is placed on proper software engineering practice as well as data analysis and presentation.

Click here for course fees

Co-Requisites

[[MTH-111]] concurrent or before

ME-175. MACHINING
Credits: 1

Familiarizing with traditional machining processes and measuring equipment used in manufacturing. Hands-on experience with traditional and numerical control (NC) machines; various manufacturing processes and fundamentals of metrology.
Click here for course fees.

ME-180. CADD LAB
Credits: 1

An introduction to the symbolic and visual languages used in the various engineering fields. The use of the computer in design and drafting and familiarization with various software packages in the CADD (Computer Aided Design and Drafting) laboratory. Blueprint reading and printed circuit layouts. Emphasis will also be placed on the representation and interpretation of data in graphical form as well as the fundamentals of 2-dimensional and 3-dimensional graphic formats.
Click here for course fees.

ME-215. MANUFACTURING PROCESSES
Credits: 3

An introduction to manufacturing which examines traditional processes such as metal forming and casting and advanced manufacturing processes associated with thin film deposition, microfabrication and piezoelectric devices. Quality assurance and quality control issues in manufacturing.

Pre-Requisites

[[ME-232]]

ME-231. STATICS
Credits: 3

Statics of particles, including resolution of forces into components, vector sums, and concurrent force systems. Statics of rigid bodies and the study of moments. Equilibrium of bodies in two- and three-dimensions and determination of reactions. Analysis of trusses and frames. Determination of centroids and moments of inertia. Kinematics of particles, including displacement, velocity, and acceleration.

Pre-Requisites

[[PHY-201]]

Co-Requisites

[[MTH-112]] concurrent or before
[[ME-180]] concurrent or before

ME-232. STRENGTH OF MATERIALS
Credits: 3

Analysis of statically determinate and indeterminate structural systems; computation of reactions, shears, moments, and deflections of beams, trusses, and frames. Bending and torsion of slender bars; buckling and plastic behavior.

Pre-Requisites

[[ME-231]], [[ME-180]], [[MTH-112]], and [[EGR-200]] or [[CHM-115]].

ME-234. DYNAMICS
Credits: 3

This course continues the development of Newtonian mechanics with application to the motion of free bodies and mechanisms. Topics include rectilinear motion, vector calculus, particle motion, inertial and rotating reference frames, rigid body motion, rotational dynamics, linear and rotational momentum, work and kinetic energy, virtual work and collision.

Pre-Requisites

[[ME-231]], [[ME-180]], [[MTH-112]]

ME-298. TOPICS IN MECHANICAL ENGINEERING
Credits: 1-3

Selected topics in the field of mechanical engineering.

Pre-Requisites

Sophomore standing and permission of the instructor.

ME-312. MANUFACTURING SYSTEM ENGINEERING
Credits: 3

Fundamentals of manufacturing processes and systems. Analytical models of manufacturing processes including metal removal rate, tool wear, setup and tool change times. Analysis and optimization of manufacturing productivity and throughput. Automation and computer control of manufacturing processes.

Pre-Requisites

Junior standing in mechanical engineering.

ME-314. INVERSE PROBLEMS IN MECHANICS
Credits: 3

Inverse problems are very common in engineering where the outputs are known but the inputs are unknown. This course will show how to properly setup a well-posed inverse problem, how to solve matrix inverses, and conduct hands on experiments by creating strain gage based force transducers.

Pre-Requisites

[[ME-333]]

ME-317. ROBOTICS
Credits: 3

The analysis and design of robots. Class covers the mechanical principles governing the kinematics of robotics. Course topics include forward kinematics and the determination of the closed form kinematic inversion, as well as workspace and trajectory generation. Class also covers the formation and computation of the manipulator Jacobian matrix.

Click here for course fee.

Pre-Requisites

[[EGR-222]] and [[ME-234]]

Co-Requisites

[[MTH-212]] concurrent or before

ME-321. FLUID MECHANICS
Credits: 3

Thermodynamics and dynamic principles applied to fluid behavior and to ideal, viscous and compressible fluids under internal and external flow conditions.

Pre-Requisites

[[ME-231]]

Co-Requisites

[[ME-322]] concurrent or before

ME-322. THERMODYNAMICS
Credits: 3

The fundamental concepts and laws of thermodynamics, thermodynamic properties of perfect and real gases, vapors, solids, and liquids. Applications of thermodynamics to power and refrigeration cycles and flow processes. Development of thermodynamic relationships and equations of state. Review of the first and second laws of physics. Reversibility and irreversibility.

Pre-Requisites

[[MTH-112]]

ME-323. FLUID MECHANICS LABORATORY
Credits: 1

Experiments with and analysis of basic fluid phenomena, hydrostatic pressure, Bernoulli theorem, laminar and turbulent flow, pipe friction, and drag coefficient.
Click here for course fees.

Co-Requisites

[[ME-321]] concurrent or before
[[ME-322]] concurrent or before

ME-324. HEAT TRANSFER
Credits: 3

Fundamental principles of heat transmission by conduction, convection, and radiation; application of the laws of thermodynamics; application of these principles to the solution of engineering problems.

Pre-Requisites

[[ME-321]] and [[MTH-211]]

ME-325. ENERGY SYSTEMS
Credits: 3

Fundamental principles of energy transmission and energy conversion. Comprehension of the physical systems in which the conversion of energy is accomplished. Primary factors necessary in the design and performance analysis of energy systems.

Pre-Requisites

[[ME-322]].

ME-326. HEAT TRANSFER LABORATORY
Credits: 1

Basic heat transfer modes are demonstrated experimentally. This includes conduction, convection, and radiation of heat as well as fin and heat exchanger.
Click here for course fees.

Pre-Requisites

[[ME-321]]

Co-Requisites

[[ME-324]] concurrent or before

ME-328. COMBUSTION ENGINES
Credits: 3

Investigation and analysis of internal and external combustion engines with respect to automotive applications. Consideration of fuels, carburetion, combustion, detonation, design factors, exhaust emissions and alternative power plants.

Pre-Requisites

[[ME-322]]

ME-330. VIBRATIONS LABORATORY
Credits: 1
Fees: 115

Experiments that complement vibration theories in ME 332, including spring and damper elements, underdamped vibration, torsional pendulum, resonance, transient and steady-state behaviors, base excitation, rotating unbalance, impulse response, and modal testing.
Click here for course fee.

Pre-Requisites

[[ME-234]], [[MTH-211]]

Co-Requisites

[[ME-332]] concurrent or before

ME-332. VIBRATIONS
Credits: 3
An introductory course in mechanical vibration dealing with free and forced vibration of single and multi-degrees of freedom for linear and nonlinear systems.

Pre-Requisites
[[ME-234]], [[MTH-211]]

ME-333. MACHINE DESIGN
Credits: 3
The first course of a two-course sequence in design of machine elements dealing with theories of deformation and failure, strength and endurance limit, fluctuating stresses, and design under axial, bending, torsional, and combined stresses. A study of column buckling, fasteners, and gears.

Pre-Requisites
[[ME-232]]

ME-335. FINITE ELEMENT METHODS
Credits: 4
Introduction to finite element method for static and dynamic modeling and analysis of engineering systems. Finite element formulation and computer modeling techniques for stress, plane strain, beams, axisymmetric solids, heat conduction, and fluid flow problems. Solution of finite element equation and post processing of results for further use in the design problem.
Click here for course fee.

Pre-Requisites
[[ME-232]]
Co-Requisites
[[MTH-211]] concurrent or before

ME-337. MICRO-ELECTRO-MECHANICAL SYSTEMS ENGINEERING
Credits: 3
This course explores the principles of MEMS by understanding materials properties, micro-machining, sensor and actuator principles. The student will learn that MEMS are integrated micro-devices combining mechanical and electrical systems, which convert physical properties to electrical signals and, consequently, detection. This course provides the theoretical and exercises the hands-on experience by fabricating a micro-pressure sensor.
Click here for course fees.

Pre-Requisites
Junior standing in engineering

ME-338. ADVANCED MACHINE DESIGN
Credits: 3
An advanced course in machine design topics that expands upon the concepts of Machine Design ([[ME-333]]).
This course goes into more detail of the basic machine fundamentals introduced previously such as levers, belts, pulleys, gears, cams and power screws. Emphasis is also placed on 3D printing and the future of additive manufacturing.

Pre-Requisites
[[ME-333]]

ME-340. HEATING, VENTILATION AND AIR CONDITIONING
Credits: 3
Introduction of fundamentals of HVAC design and construction. Study of the psychometric process and fundamental calculations and layout of HVAC systems. Calculations of heat loss and heat gain in commercial and residential structures.

Pre-Requisites
[[ME-322]]

ME-380. ADVANCED CADD
Credits: 3
An advanced course in Computer-Aided Drafting and Design (CADD) using SolidWorks. This course will introduce topics such as advanced modeling, advanced assemblies, Finite Element Analysis (FEA), and sheet metal.

Pre-Requisites
[[ME-180]], [[ME-335]]

ME-384. MECHANICAL DESIGN LABORATORY
Credits: 3
A laboratory for the development of open-ended problems in mechanical systems. Emphasis on experimental performance, data collection, evaluations, analysis, and design. This course provides hands-on experience with strain gauge application, measurement techniques, and analysis of topics in mechanical engineering.
Click here for course fees.

Pre-Requisites
[[ME-333]] and [[ME-335]]

ME-391. SENIOR PROJECTS I
Credits: 1
Design and development of selected projects in the field of mechanical engineering under the direction of a staff member. Technical as well as economic factors will be considered in the design. A detailed progress report is required.
Click here for course fees.

Pre-Requisites
Senior standing in Mechanical Engineering or departmental permission.

ME-392. SENIOR PROJECTS II
Credits: 2
Design and development of selected projects in the various fields of mechanical engineering under the direction of a staff member. Technical as well as economic factors will be considered in the design. A professional paper and detailed progress reports are required. This is a continuation of [[ME-391]]. An open-forum presentation and discussion of the professional paper are required.
Click here for course fees.

Pre-Requisites
[[ME-391]]

ME-395. INDEPENDENT RESEARCH
Credits: 1 - 3
Independent study and research for advanced students in the field of mechanical engineering under the direction of a staff member. A research paper at a level significantly beyond a term paper is required.

Pre-Requisites
Senior standing in mechanical engineering and approval of the department chairperson is required.

ME-396. INDEPENDENT RESEARCH
Credits: 1 - 3
Independent study and research for advanced students in the field of mechanical engineering under the direction of a staff member. A research paper at a level significantly beyond a term paper is required.

Pre-Requisites
Senior standing in mechanical engineering and approval of the department chairperson is required.

ME-397. SEMINAR
Credits: 1-3
Presentations and discussions of selected topics.

Pre-Requisites
Junior or Senior standing in mechanical engineering or special departmental permission.

ME-398. TOPICS IN MECHANICAL ENGINEERING
Credits: 1-3
Click here for course fees.

Pre-Requisites
Junior or senior standing in mechanical engineering.

ME-399. COOPERATIVE EDUCATION
Credits: 0-6
Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experiences, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures.
Requirements: minimum junior standing in Engineering; 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson. The co-op option for credit can only be taken one time for either 3 or 6 credits.