Mechanical Engineering (ME)

ME 3010
Linear Systems
3
* Prerequisite(s): ENGR 2030, MATH 2250, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Covers analysis of linear systems in the time and frequency domains. Focuses on modeling and analysis of physical systems. Introduces Fourier and Laplace transforms. Includes a design component. Lab access fee of $45 for computers applies.

ME 3130
Kinematics
3
* Prerequisite(s): ENGR 2030, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Covers the analysis of dynamic mechanisms including: relative motion of links in mechanisms; velocities and accelerations of machine parts; rolling contact; cams; and synthesis of mechanisms. Introduces computer-aided engineering techniques for mechanism analysis. Includes a design component. Lab access fee of $45 for computers applies.

ME 3140
Machine Design
3
* Prerequisite(s): ENGR 2140, ENGR 2160, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Presents methods for static and dynamic stress and failure analysis for mechanical systems. Teaches how to create machine design models and free-body diagrams, calculate stress, estimate deflection, select an appropriate failure theory, and design to prevent failure. Gives experience using commercial FEA software to create models of simple structures and machine components. Includes a design component. Lab access fee of $45 for computers applies. Canvas Course Mats $85/McGraw applies.

ME 3160
Intermediate Materials
3
* Prerequisite(s): ENGR 2140, ENGR 2160, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Teaches in further depth the mechanical behavior of engineering materials including metals, woods, plastics, ceramics and composites. Looks at characteristics, failure mechanisms, and designing with various engineering materials. Lab access fee of $45 for computers applies.

ME 3170
Introduction to Plastics and Composites
3
* Prerequisite(s): ENGR 2140, ENGR 2160, CHEM 1210, MATH 2250, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Introduces the structure, processing, properties and uses of plastic and composite materials. Surveys manufacturing methods. Teaches the use of plastic and composite materials in various products. Lab access fee of $45 for computers applies.

ME 3210
Manufacturing Processes for Engineers
3
* Prerequisite(s): ENGR 2140, ENGR 2160, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Introduces manufacturing processes, including machining, injection molding, casting, 3D printing, and forming. Introduces Computer Numeric Control (CNC) machining and Computer Aided Manufacturing (CAM). Lab access fee of $45 for computers applies.

ME 3300
Applied Thermodynamics
3
* Prerequisite(s): ENGR 2300, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Introduces thermodynamic analysis and design of vapor, gas, refrigeration and heat pump systems, along with exergy analysis. Covers thermodynamic relations, ideal gas mixture and psychometric applications, reacting mixtures, and combustion. Includes a design component. Lab access fee of $45 for computers applies.

ME 3310
Fluid Mechanics
3
* Prerequisite(s): ENGR 2030, University Advanced Standing, and (Formal Acceptance into the Mechanical Engineering Program or Departmental Approval)

Covers the fundamentals of fluid mechanics including fluid properties, fluid statics, the Bernoulli equation, fluid kinematics, the integral and differential analyses of fluid flow. Introduces dimensional analysis, similitude, and modeling. Covers viscous internal and external flows, and turbomachines. Includes a design component. Lab access fee of $45 for computers applies.

ME 3320
Heat Transfer
3
* Prerequisite(s): (ENGR 2300, ME 3310, or Departmental Approval) and University Advanced Standing

Focuses on the three modes of heat transfer: conduction, convection, and radiation. Introduces steady and unsteady heat conduction, convection heat transfer principles, forced and free internal and external convection flows. Covers radiation heat transfer, combined modes of heat transfer, and analysis and design of heat exchangers. Includes a design component. Lab access fee of $45 for computers applies.

ME 3335
Thermal/Fluid Experimentation WE
2
* Prerequisite(s): (ENGR 2300 or Departmental Approval) and University Advanced Standing
* Corequisite(s): ME 3320

Covers temperature, pressure, and flow measurement, along with calibration of thermal/fluid sensors in a lab setting. Focuses on experiments to investigate various phenomena in fluid flow, thermodynamics, and heat transfer. Investigates the performance of pumps, fans, and heat exchangers. Includes substantial amount of writing and satisfies WE requirements. Course Lab access fee of $45 applies.

ME 4010
Automatic Controls
3
* Prerequisite(s): ME 3010 and University Advanced Standing

Covers analysis of control systems using Evans, Nyquist and Bodes methods. Introduces digital control and feedback compensation concepts for system performance improvement. Includes a design component. Lab access fee of $45 for computers applies.

ME 4015
Control and Vibration Experimentation
2
* Prerequisite(s): ME 4010 and University Advanced Standing

Introduces system modelling and characterization in the time and frequency domains, feedback and compensation, Proportional Integral Derivative (PID) control, control of velocity and position in a lab setting. Covers motion measurement, force measurement, free vibration, frequency response, impact response, noise, and signal processing. Includes a writing component. Lab access fee of $45 for computers applies.

ME 4180
Compliant Mechanisms
3
* Prerequisite(s): ME 3140 and University Advanced Standing

Covers the design and analysis of compliant mechanisms and compliant structures. Includes large-deflection analysis/force displacement relationships, prediction of failure of compliant members, and synthesis of compliant mechanisms. Includes a design component. Lab access fee of $45 for computers applies.

ME 4380
Design of Thermal/Fluid Systems
3
* Prerequisite(s): ENGR 2300, ME 3320, and University Advanced Standing

Applies the principles of thermodynamics, fluid mechanics, and heat transfer to the design of conventional and emerging thermal/fluid systems. Includes lectures and design projects. Lab access fee of $45 for computers applies.

ME 4390
Heating Ventilating and Air Conditioning Design
3
* Prerequisite(s): ENGR 2300, ME 3320, and University Advanced Standing

Covers air conditioning components and systems, moist air properties and conditioning processes. Covers indoor environmental quality indicators, space heating and cooling load calculations, and building energy consumption estimation. Focuses on water- and air-system design, refrigerants and refrigeration systems. Includes lectures and design projects. Lab access fee of $45 for computers applies.

ME 4410
Computer Aided Engineering
3
* Prerequisite(s): ME 3140, ME 3320 and University Advanced Standing

Covers the application of computer-aided engineering tools in design; 3-D geometry and solid modeling; finite element analysis, kinematic analysis, and other software in engineering analysis. Includes a design component. Lab access fee of $45 for computers applies.

ME 4420
Finite Element Methods
3
* Prerequisite(s): ENGR 2140, ME 3320 and University Advanced Standing

Covers discrete approximation of engineering problems, energy and weighted residual methods, and coordinate systems and mapping. Focuses on one-, two-, and three-dimensional formulation of problems in solid and fluid mechanics and heat transfer, time-dependent problems, and optimization techniques. Lab access fee of $45 for computers applies.

ME 4510
Mechanical Engineering Seminar
1
* Prerequisite(s): University Advanced Standing
* Prerequisite(s) or Corequisite(s): ME 4810

Introduces various mechanical engineering careers and related industries. Emphasizes importance of life-long learning and active participation in professional societies and communities through lectures given by practicing engineers using their own experiences. Introduces various engineering codes of ethics. Intended as a culminating seminar for graduating seniors to prepare for their engineering careers. Lab access fee of $45 for computers applies.

ME 4550
Global Engineering
3
* Prerequisite(s): University Advanced Standing and Formal Acceptance into the Mechanical Engineering Program or Department Approval

Focuses on importance of issues associated with global product development including product development needs in unfamiliar cultures, managing distributed design teams and manufacturing at remote and/or distributed sites. Introduces first-hand how global companies approach these issues. Lab access fee of $45 for computers applies.

ME 4810
Mechanical Engineering Capstone I
3
* Prerequisite(s): University Advanced Standing, Formal Acceptance into the Mechanical Engineering Program, and Departmental Approval

Serves as a comprehensive two-semester design experience from conception to modeling or prototype. Uses, where possible, multidisciplinary team application of the engineering design process along with project management, manufacturing methods and economic analysis. Culminates in a design review based on formal presentations of fully documented, detailed proposed designs. Capstone I and II must be taken in consecutive semesters. Lab access fee of $45 for computers applies.

ME 481R
Mechanical Engineering Internship
1 to 3
* Prerequisite(s): University advanced standing. Admission into the Mechanical Engineering program and instructor approval.

Provides opportunities to apply classroom theory while students work as employees in a job that relates to their careers. Includes regular communication between students and the course coordinator. Credit is determined by the number of hours a student works during the semester and completion of individually set goals. May apply for up to 3 credits; may be graded as credit/no credit.

ME 4820
Mechanical Engineering Capstone II
3
* Prerequisite(s): ME 4810 and University Advanced Standing

Serves as a second semester of the two-semester design experience from conception to modeling or prototype. Uses, where possible, multidisciplinary team application of the engineering design process along with project management, manufacturing methods and economic analysis. Culminates in a demonstration of a final product (model or working prototype) with verification and documentation of how final product meets customer needs. Capstone I and II must be taken in consecutive semesters. Lab access fee of $45 for computers applies.

ME 490R
Advanced Current Topics in Mechanical Engineering
1 to 3
* Prerequisite(s): University Advanced Standing and Formal Acceptance into the Mechanical Engineering Program or Department Approval

Provides exposure to emerging topics and technologies of current interest in mechanical engineering. Varies each semester depending upon the state of technology. May be repeated for a maximum of 6 credits toward graduation without prior written department approval. Lab access fee of $45 for computers applies.