Mechanical Engineering (ME)

Courses

ME 104. Engineering Graphics. 1 Credit.
This course introduces students to the creation of 2D engineering drawings using AutoCAD software. Topics covered include line types, drawing sheet layouts, sketching, orthographic projections, section views, isometric drawing, dimensioning, tolerances, and threads and fasteners.
Fall and Spring.

ME 150. Engineering the Future-Values and Society. 3 Credits.
This course explores the intricate relationship between human cultures, values, and engineering practices. It delves into how cultural backgrounds, ethical frameworks, and societal values influence engineering decisions, designs, and implementations. Through case studies, discussions, and projects, students will gain an understanding of the social context in which engineers operate and develop the skills to incorporate diverse perspectives in their professional work.
FSS.

ME 160. Ethics in Engineering and Science. 3 Credits.
This course presents a philosophical examination of the nature of engineering and scientific practices, as well as applied technology. We will consider such questions as: How do the societal functions of engineers/scientists and the practical application of technologies relate to basic moral and intellectual values? What moral obligations are implied by the uses and creation of technology? What are the ethical duties of engineers and scientists in the practice of their careers?
FSS.

ME 170. Engineering in Global Context. 3 Credits.
This course examines how engineering is intertwined with larger economic, social, cultural, and technological dynamics in an era of intensified globalization. Its major goals are to help you understand and appreciate what engineering is, how engineers are trained, what engineers do, and how engineering and society interact. The course approaches these themes through discussion of: the relation and interaction of engineering, science, technology, and society; the historical origins and development of engineering as a profession; diversity issues in engineering and other STEM fields; professional practice in cross-national/cultural contexts; and contemporary challenges related to globalization, ethics, and sustainability. In summary, the course is designed to help students understand what it means to identify as, and/or work with, engineers.
FSS.

ME 198. First Year Seminar. 3 Credits.
First Year Seminar. Introduction to Mechanical Engineering. Basic Mechanical Engineering concepts will be covered.
Reserved for New Incoming Freshman
Spring.

ME 201. Engineering Materials. 3 Credits.
This course covers the basic behavior and processing of engineering materials, including metals, ceramics, plastics, and alloys. Phase behavior of alloys, response to applied loads, crystalline and noncrystalline behavior are included.
P: ME 206 with a C or higher, OR CHEM 211 and CHEM 212 and CHEM 213 and CHEM 214 all with a C or higher, AND declared Mechanical Engineering or Mechanical Engineering Technology major or Chemistry major
Fall and Spring.

ME 204. Programming for Engineers. 2 Credits.
This course introduces students to the fundamental principles of programming for solving engineering problems and familiarizes students with the process of computational thinking and translation of real life engineering to computational problems. Programming languages covered include MATLAB and Python.
P: MATH 202 with a C or higher or concurrent enrollment, AND declared Mechanical Engineering or Mechanical Engineering Technology major, or Mechanical Engineering Principles or Electrical Engineering Principles Certificate or declared Chemistry major
Fall and Spring.

ME 206. Chemistry for Engineers. 4 Credits.
This course will provide engineering students with a background in important concepts and principles of chemistry. Emphasis will be on areas relevant for an engineering context with practical applications. In addition to the fundamental concepts of atomic structure, solutions, stoichiometry, kinetics, and enthalpy of reactions, the connections between chemistry, physics, and materials science will be investigated.
P: MATH 104 or concurrent enrollment
Fall and Spring.

ME 213. Mechanics I. 3 Credits.
Elementary vector operations, resultant of two- and three-dimensional force systems, centroid, hydrostatic forces, equilibrium of trusses and frames, laws of friction and impending motion, moments of inertia, virtual work, stability.
P: MATH 202 with a C or higher, AND declared Mechanical Engineering, or Mechanical Engineering Technology major or Chemistry major
Fall and Spring.

ME 214. Mechanics II. 3 Credits.
Displacement, velocity and acceleration components, kinematics of particles using rectilinear and curvilinear coordinates, relative motion, solution and plane motion of rigid bodies, work and potential energy of particles and rigid bodies, linear and angular impulse and momentum, central force motion.
P: ME 213 with a C or higher
Fall and Spring.

ME 216. Basic and Green Manufacturing Processes. 3 Credits.
This course introduces basic and green manufacturing processes. It covers basic machine and hands-on processes to shape materials to desired specifications. This course also introduces sustainability in manufacturing by looking at the efficient use of energy and raw materials to minimize pollution and waste during the process. The concept of industrial sustainability is explored, and the effects of manufacturing on the environment are examined.
P: None. REC: ME 201
FSS.

ME 220. Mechanics of Materials. 3 Credits.
This course teaches how to design and analyze simple structures for predetermined strength and deformation requirements. Topics include theory of stress-strain; Hooke's law; analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads; and analysis of statically indeterminate systems.
P: ME 213 with a C or higher; Major in Mechanical Engineering Technology or Mechanical Engineering
Spring.

ME 221. Mechanics of Materials Lab. 1 Credit.
This lab teaches students an applied analysis of the distribution of forces in static structures; analysis of axial, torsional, and bending stresses; and loading analysis of systems.
P: ME 220 or concurrent enrollment
Spring.

ME 308. Electrical and Electronic Circuits. 3 Credits.
This course provides an introduction to DC and AC electrical circuit analysis, electronic devices and circuits, transducers, electric machines, and power transmission. This course includes both lecture and lab.
P: PHYSICS 202 with a C or higher OR Concurrent enrollment, AND declared Mechanical Engineering Technology major OR declared Mechanical Engineering major or Chemistry major.
Fall Only.

ME 312. Engineering Measurements. 2 Credits.
This course teaches students instrumentation and techniques for measurement of mechanical phenomena. It includes generalized measurement systems, characteristics of dynamic signals, calibration, recording systems, error and statistical analysis.
P: ME 308 with a C or higher OR concurrent enrollment
Spring.

ME 313. Engineering Measurements Lab. 1 Credit.
This course introduces students to the laboratory analysis of Engineering Measurements including instrumentation and measurement systems, calibration, error and statistical methods applied to engineering processes.
P: ME 312 with at least a C or concurrent enrollment
Spring.

ME 324. Engineering Thermodynamics. 3 Credits.
This course teaches student engineering applications of thermodynamics including the first and second laws, behavior of condensable and non-condensable substances, analysis of open and closed systems, equations of state, and power and refrigeration cycles.
P: PHYSICS 202 with a C or higher, ME 206 or CHEM 211, CHEM 212, CHEM 213, and CHEM 214 with a C or higher; declared major in Mechanical Engineering or Mechanical Engineering Technology
Spring.

ME 326. Numerical Methods. 3 Credits.
This courses teaches students applied numerical analysis for linear and non-linear engineering problems; systems of linear equations, non-linear equations, eigen value problems, and optimization techniques; approximate numerical integration and differentiation; developing numerical methods; and solving for initial and boundary value problems. The course includes both a lecture and a lab.
P: MATH 305 with a C or higher OR concurrent enrollment, MATH 209 with a C or higher, and ME 204 with a C or higher
Fall Only.

ME 334. Industrial Decision Processes. 3 Credits.
Industrial decision processes, or operations research, is an applied science that deals with quantitative decision making, usually involving the allocation and control of limited resources. Its focus is using advanced analytical methods for industrial decision making via mathematical optimization and statistical analysis. This course will provide students with the tools and concepts to analyze real world problems in terms of economics and risk.
P: MATH 104 with a C or better or higher level math placement and junior standing. REC: MATH 260 or other introductory statistics course.

ME 336. Fluids. 3 Credits.
This course provides an introduction to fluid properties, fluid statics, and fluid dynamics; potential flow; dimensional analysis; closed conduits and external flow; boundary-layer theory; compressible flows; and turbomachinery.
P: ME 214 with a C or higher, MATH 209 with a C or higher, and MATH 305 with a C or higher OR concurrent enrollment
Fall Only.

ME 337. Fluids Lab. 1 Credit.
This laboratory course introduces students to the experimental analysis of Fluid Dynamics concepts including measurement of fluid properties, applications of Bernoulli's equation, and fluid power systems.
P: ME 336 with a C or higher or concurrent enrollment
Fall Only.

ME 340. Analysis of Dynamic Systems. 3 Credits.
This course introduces students to mathematical modeling and analysis of dynamic systems with mechanical, thermal, and fluid elements. Topics include time and frequency domain solutions, linearization techniques, state space modeling and solutions.
P: ME 204 with a C or higher, ENGR 214 with a C or higher, MATH 209 with a C or higher, and MATH 305 with a C or higher
Spring.

ME 344. Mechanical Vibration. 3 Credits.
Mechanical structures and systems are susceptible to vibrations, i.e. periodic changes in the physical state. Vibrations can both be a hindrance and a benefit to machines. This course studies about modeling and analyzing single and multiple degrees of freedom systems. Vibrations of machine elements. Design vibration isolation systems. Balance rotating machinery. Random excitation and response of mechanical structures. Students will utilize basic MATLAB skills to solve problems related to vibrations. Students who completes this course should have a clear understanding of vibrations and modeling of mechanical systems. They will analyze free and forced vibrations and will develop mathematical techniques to model and design mechanical systems.
P: MATH 305 with a C or higher or concurrent enrollment, MATH 209 with a C or higher, and ME 214 with a C or higher.

ME 408. Finite Element Analysis. 3 Credits.
Applying introductory concepts of finite element methods like direct stiffness, energy and/or weighted residual methods in analytically solving linear and nonlinear structural and thermal problems. Introduces common finite element programs used in academia and industry. Formulate 1D, 2D and 3D elements models. Comparison of exact solutions with approximate finite element predictions
P: MET 207 with a C or higher, ME 204 with a C or higher, and ME 220 with a C or higher
Fall Only.

ME 420. Machine Component Design I. 3 Credits.
Detailed design and selection of machine components such as shafts, fasteners, springs, and gears. Analysis of stresses and deformation of the machine components under combined static and dynamic loads, stress concentrations, and fatigue.
P: ME 220 with a C or higher
Fall Only.

ME 422. Machine Component Design II. 3 Credits.
Design of advanced machine elements such as bearings, gears, brakes, clutches, flywheels, and flexible mechanical elements. Application of mechanics, materials and machine components principles and methods to design mechanical devices and assemblies.
P: ME 420 with a C or higher
Spring.

ME 430. Heat Transfer. 3 Credits.
This course teaches students fundamental concepts of steady-state and transient conduction, convection, and radiation. It also includes an introduction to heat exchanger principles and applications.
P: ME 324 with a C or higher, MATH 209 with a C or higher, and MATH 305 with a C or higher
Spring.

ME 431. Thermal Lab. 1 Credit.
This laboratory course includes thermodynamic experiments such as gas laws and internal combustion engines, and heat transfer experiments on conduction, convection and radiation.
P: ME 430 with a C or higher or concurrent enrollment
Spring.

ME 432. Automatic Controls. 3 Credits.
This combined lecture and lab course gives students an introduction to feedback control system concepts; mathematical modeling of mechanical, hydraulic, electro-mechanical, and servo systems; feedback system characteristics and performance; stability; design; and compensation of control systems.
P: ME 340 with a C or higher
Fall Only.

ME 436. Computational Fluid Dynamics. 3 Credits.
Computational Fluid Dynamics (CFD) has become an indispensable tool in engineering practice, enabling the analysis and visualization of fluid flow phenomena across a wide range of applications. This course introduces the fundamentals of CFD, focusing on the mathematical formulation of fluid dynamics problems, numerical methods for solving them, and the practical application of simulation tools.
Fall Only.

ME 460. Senior Design. 3 Credits.
Senior design is the mechanical engineering synthesis course in which students complete a senior design process that includes project proposal, design definition, design analysis, design completion, oral presentation, and a written report.
P: Senior standing in Mechanical Engineering major or Mechanical Engineering Technology major
Spring.

ME 465. Composite Materials. 3 Credits.
An overview of matrix and fiber systems, processing techniques, anisotropic elasticity, unidirectional lamina, multidirectional laminate theory, failure theories, and design of composite structures.
P: ME 216, ME 220, MATH 203.

ME 478. Vehicle Dynamics. 3 Credits.
This course concentrates on core technologies to provide the essential information required to understand how different vehicle systems work. It gives a complete overview of the components and workings of a vehicle from the engine through to the chassis and electronics. This course also includes the latest trends, such as self- driving vehicles, hybrids, and electric cars
P: ME 213, ME 214.

ME 488. Aerodynamics. 3 Credits.
This course provides a theoretical foundation in classical aerodynamics, focusing on the behavior of inviscid and compressible fluid flows. Students will explore the fundamental principles governing airfoil and wing theory, potential flow, boundary layer behavior, and shock wave phenomena. Emphasis is placed on analytical methods and physical interpretation rather than experimental or computational techniques. By the end of the course, students will be able to analyze aerodynamic forces and flow behavior in both subsonic and supersonic regimes using first principles and classical models.

ME 494. Co-op. 1-2 Credits.
Participation in a full-time position at a host organization providing direct, on-the-job experience with professionals already successful in the selected field. The co-op will be in a position closely related to a professional career associated with the major. Students must complete at least two (2) co-op credits during the fall or spring semester and one (1) credit in the summer to be considered full-time status. Course is repeatable for credit. No more than 6 credits may be used to meet requirements for a major and no more than 3 credits may be used to meet requirements for a minor; may vary by academic department.
P: Junior standing and minimum 2.0 GPA in major emphasis (Dept. will monitor GPA req.).

ME 498. Independent Study. 1-4 Credits.
Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript. Course is repeatable for credit.
P: fr or so st with cum gpa > or = 2.50; or jr or sr st with cum gpa > or = 2.00.
Fall and Spring.