# Mechanical Engineering (ME)

**ME 230** Thermodynamics 4 Credit Hours  
**Prerequisite(s):** PHYS 150 and (MATH 116 or Mathematics Placement with a score of 215) and (CHEM 134 or CHEM 144)  
**Corequisite(s):** ME 230R  
**Restriction(s):**  
Cannot enroll if Major is  
**ME 230R** Thermodynamics 0 Credit Hours  
Recitation component for ME 230. Must be taken concurrently with ME 230.  
**Corequisite(s):** ME 230  

**ME 260** Design Stress Analyses 4 Credit Hours  
Vector treatment of static force and moment equilibrium of particles, rigid bodies and plane structures. Fundamental mechanics of materials: stresses and deformation in axial loading; torsion; bending; shear. Combined loadings. Stress and strain transformations. (F,W,S).  
**Prerequisite(s):** PHYS 150 and (ENGR 216 or ECE 385*) and (MATH 205* or Mathematics Placement with a score of 215 or MATH 215*)  
**Corequisite(s):** ME 260R  
**Restriction(s):**  
Cannot enroll if College is Engineering and Computer Science  
**ME 260R** Design Stress Analysis 0 Credit Hours  
Recitation component of ME 260. Must be taken concurrently with ME 260.  
**Corequisite(s):** ME 260  

**ME 265** Applied Mechanics 4 Credit Hours  
A comprehensive introduction to the science of applied mechanics, encompassing a study of forces and the stresses, deflections, and motions which they produce. Topics include the concept of equilibrium and static force analysis; the mechanics of deformable bodies (internal stresses, constitutive relationships, strains, deflections, failure); statics of indeterminate systems; kinematics; kinetics of particles, systems of particles, and rigid bodies. Four hours lecture. This course is not open to ME majors. (F, S, W).  
**Prerequisite(s):** PHYS 150 and (MATH 205* or Mathematics Placement with a score of 215 or MATH 215*)  
**Restriction(s):**  
Cannot enroll if Major is Mechanical Engineering.  

**ME 290** Spec Topics in Mech Engin 1 to 3 Credit Hours  
Special topics in mechanical engineering selected according to students' interest and availability of instructors and equipment.  

**ME 299** Internship/Co-op 1 Credit Hour  
This is a Cooperative Education course. Students wishing to experience a work experience before graduation may elect to participate in the Cooperative Education Program (minimum of two terms). (F,W,S).  
**Restriction(s):**  
Cannot enroll if Class is Junior or Senior or Graduate  

**ME 299L** Internship/Co-op Lab 0 Credit Hours  
This is a Cooperative Education course. Students wishing to experience a work experience before graduation may elect to participate in the Cooperative Education Program (minimum of two terms). (F,W,S).  
**Corequisite(s):** ME 299  

**ME 325** Thermal Fluid Sciences I 4 Credit Hours  
**Prerequisite(s):** ENGR 216 and ME 230 and ME 260  
**Restriction(s):**  
Can enroll if College is Engineering and Computer Science  

**ME 345** Engineering Dynamics 4 Credit Hours  
Vector treatment of the kinematics and kinetics of particles, systems of particles and rigid bodies. Newton's laws, work/energy and impulse/momentum principles. Introduction to mechanical vibrations. (F, S, W).  
**Prerequisite(s):** ENGR 216* and ME 260 and (MATH 216 or MATH 228)  
**Restriction(s):**  
Can enroll if College is Engineering and Computer Science  

**ME 349** Instrument & Measurement Systems 3 Credit Hours  
Modern instrumentation systems are considered beginning with generic issues such as calibration, error analysis, and dynamic response characteristics of instrumentation. Specific transducer systems (temperature, force and pressure, etc.) are presented, as well as interfacing techniques and elementary signal processing. (F,W,S).  
**Prerequisite(s):** (ME 265 or ME 345) and ECE 305  
**Corequisite(s):** ME 349L  
**Restriction(s):**  
Can enroll if Class is Sophomore or Junior or Senior  
Can enroll if Level is Undergraduate  
Can enroll if College is Engineering and Computer Science  

**ME 3601** Design and Analysis of Machine Elements 4 Credit Hours  
Application of mechanics of materials to analysis and design of elementary mechanical components and systems. Topics include: stress and strain analysis; stress concentration; failure theories; safety factor; fatigue; fracture; combined loading; impact; buckling. Components considered: fasteners; springs; bearings; gears; beams; shafts and other power transmission components. Numerical techniques. (F, S, W).  
**Prerequisite(s):** (ENGR 216 or ME 215) and (ME 260 or ME 265)  
**Restriction(s):**  
Can enroll if College is Engineering and Computer Science  
Cannot enroll if Major is  

**ME 364** Prob, Stats, and Rel in Mach D 3 Credit Hours  
Introduction to probability, statistics, and reliability with emphasis on mechanical engineering applications. The course covers basic probability, descriptive statistics, probability distributions of discrete and continuous variables, statistical inferences, DOE (design of experiments), ANOVA (analysis of variance), regression, and correlation. (F, S, W).  
**Prerequisite(s):** ME 260 and ENGR 216  

**ME 375** Thermal Fluid Sciences II 4 Credit Hours  
**Prerequisite(s):** ME 325 and ECE 305*  
**Restriction(s):**  
Can enroll if College is Engineering and Computer Science
ME 379  Thermal-Fluids Laboratory  3 Credit Hours
An experimental investigation of thermodynamic, fluid mechanic, and heat transfer principles. Students will learn about thermal-fluids instrumentation and conduct experiments. In addition, they will design their own experiments to demonstrate their understanding of the principles. (F,W,S).
Prerequisite(s): ME 325 and (ME 349 or BENG 351) and ME 375* and (COMP 270 or COMP 106 or Composition Placement Score with a score of 40 or Composition Placement Score with a score of 107 or COMP 220)
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 381  Manufacturing Processes I  4 Credit Hours
This course introduces the students to the fundamentals and principles of manufacturing processes for engineering materials. It seeks to transfer an understanding of the application of principles of engineering materials and their influence on manufacturing processes. Topics covered include structure and properties of materials, various conventional shaping processes viz. solidification, powder and particulate, deformation, and material removal processes; heat treatment and surface processing, and materials joining. Topics on recent advancements including but not limited to microfabrication, nanofabrication, additive manufacturing is also covered. Case studies of design for manufacturing and measurement of product quality; economical aspects and cost considerations in manufacturing systems will be studied. Three lecture hours and three laboratory hours. (F, S, W).
Prerequisite(s): ENGR 250 and (ME 260 or ME 265)
Corequisite(s): ME 381L
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 399  Internship/ Co-op  1 Credit Hour
This is a Cooperative Education course. Students wishing to experience a work experience before graduation may elect to participate in the Cooperative Education Program (minimum of two terms)
Restriction(s):
Can enroll if Class is Junior or Senior or Graduate

ME 410  Finite Element Method wth Appl  3 Credit Hours
A presentation of the basic concepts and fundamentals of the Finite Element Method of Analysis in general, followed by applications to both continuum and field problems. Selected areas of application: dynamics and vibration including wave propagation; acoustics; fluid mechanics including film lubrication and ground water flow; heat transfer; elasticity and stress/strain analysis including structures; electrical field problems including electrostatics and electromagnetics (YR).
Prerequisite(s): (ME 345 and ME 3601 and ME 375*) or (BENG 370 and BENG 325*)
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4191  Structural Mech & Design  4 Credit Hours
A presentation of the methods of plane elasticity to solve a variety of problems arising in the analysis and design of structures. Review of the concepts of plane stress and strain, basic equations of plane elasticity and problems, energy methods approximate-numerical techniques, elastic-plastic bending and torsion, fracture and fatigue. (YR).
Prerequisite(s): ME 345 and ME 3601
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if Level is Undergraduate
Can enroll if College is Engineering and Computer Science

ME 4202  Design Turbo. and Wind Gen.  4 Credit Hours
Principles of turbomachinery design and practices with emphasis on wind power generation. Euler's equation for energy transfer calculations. Two- and three-dimensional velocity diagrams. Aerodynamics of wind turbines. Wind turbine design and control. Power generation of wind turbines, wind energy system economics and environmental impacts. Design procedures and characteristics of compressors, fans and blowers. Basic design calculations and selection of pumps. A turbomachinery design project by using the theory learned from the course may be required. (YR).
Prerequisite(s): ME 375
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 423  Thermal Sys Des & Optimization  4 Credit Hours
Design, analysis, and optimization of thermal fluid systems using principles of thermodynamics, fluid mechanics, and heat transfer. Application of thermal sciences in component and system design. Optimized design methodology for improving operations of thermal systems to minimize energy consumption and/or operating costs. (OC)
Prerequisite(s): ME 375*
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4301  Computational Thermo-Fluids  3 Credit Hours
Prerequisite(s): ME 325 and ME 375*
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4361  Design of HVAC Systems  4 Credit Hours
A comprehensive treatment of the design principles and practices in the heating, ventilating, and air conditioning. Psychrometrics, design loads, distribution systems, equipment selection. (YR).
Prerequisite(s): ME 325 and ME 375*
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 440  Intro to Mechanical Vibration  3 Credit Hours
This introductory course on mechanical vibrations covers theories with applications, which include free and forced vibration analysis of damped and undamped, discrete (ranging from single to multi-degree-of-freedom), and simple continuous structures (such as strings, shafts, and beams), and design of vibration absorbers. Students may not receive credit for both ME 440 and ME 4461. (YR)
Prerequisite(s): ME 345 and ME 349
Restriction(s):
Can enroll if College is Engineering and Computer Science
Cannot enroll if Major is
ME 442  Control Systems Analysis and Design  4 Credit Hours
Prerequisite(s): ECE 305 and ME 345
Corequisite(s): ME 442L
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 445  Sound and Noise Controls  4 Credit Hours
Full Course Title: Introduction to Sound and Noise Controls This course covers basic topics in sound theory, applications, and noise control system design. Topics include sound generation, radiation and transmission, human hearing system mechanism, sound quality metrics, design of silenced, mufflers and resonator, audio system and speaker design, building acoustics, acoustical material properties and material testing, sound measurement, and Octave band analysis. The student is required to conduct a course project related to noise control system design. Students may not receive credit for both ME 445 and ME 4461. (YR)
Prerequisite(s): (ME 265 and BENG 351) or (ME 345 and ME 349)
Restriction(s):
Can enroll if College is Engineering and Computer Science
Cannot enroll if Major is

ME 4461  Mech Vibration & Noise Control  4 Credit Hours
Fundamentals of mechanical vibration and principles of noise control. Use of transducers and instruments to conduct sound and vibration measurements. Free and forced vibration in single and multiple degrees-of-freedom systems, damping, eigenvalues, eigenvectors, frequency response function, modal analysis, description of sound fields, acoustical materials and material testing, acoustics of rooms and enclosures, sound quality, and principles of noise control. Students will be required to conduct either a vibration or a noise control project. Two one-and-one-half hour lectures and one three-hour laboratory. (YR).
Prerequisite(s): (ME 345 or ME 265) and (ME 349* or BENG 351*)
Corequisite(s): ME 4461L
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4471  Solar Energy Sys Analy&Design  4 Credit Hours
The course introduces students to the fundamentals of solar energy conversion and solar energy systems. Principles in thermodynamics and heat transfer required to understand the solar energy use is reviewed. Design of different types of solar energy systems are explored and assessed. Issues relating to the practical implementation of solar energy will also be considered. (OC).
Prerequisite(s): ME 325 and ME 375*
Restriction(s):
Can enroll if College is Engineering and Computer Science
Cannot enroll if Major is

ME 452  Sustainable Energy & Environ  4 Credit Hours
This course introduces students to fundamentals of energy sources. It covers a wide range of conventional and alternative, (including renewable) sources, and presents tools for assessing their sustainability and environmental impacts. It also reviews issues related to energy storage, transportation and distribution, challenges, and future opportunities. A course project is completed involving the design and plan for practical implementation of a sustainable energy technology. (YR).
Prerequisite(s): ME 325 and ME 375*
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 460  Design for Manufacturing  3 Credit Hours
Prerequisite(s): ME 3601 and ME 381
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4671  Senior Design I  4 Credit Hours
A guided design project course with emphasis on the decision-making process associated with establishing alternatives and evaluation procedures to synthesize designs. Students propose design projects and work in teams to produce analytical designs, and conduct evaluative experiments, and/or construct a physical design prototype. Engineering ethics and responsibility. At the end of the semester, the students are required to submit written reports and give oral presentations with a demonstration of their projects. (FW).
Prerequisite(s): ME 345 and ME 3601 and ME 375 and ME 379*
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if Major is Mechanical Engineering

ME 4681  ME/BENG Dual Senior Design  4 Credit Hours
Full Title: Interdisciplinary Senior Design for ME/BENG Dual Degree Students A guided interdisciplinary design project course where student teams propose design projects, design a device, system or process related to mechanical-and bio-engineering and conduct evaluative experiments and/or construct a physical prototype. Engineering ethics and responsibility. At the end of the semester, the students are required to submit written reports and give oral presentations with a demonstration of their projects. Credit can only be awarded for one of the following courses: BENG 4671, ME 4671, and ME 4681. (F, W).
Prerequisite(s): BENG 351 and BENG 370 and BENG 364 and ME 375 and (BENG 375 or BENG 381)
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if Major is

ME 469  Senior Design II  1 to 4 Credit Hours
Student teams develop mechanical or interdisciplinary design projects, or continue projects begun in ME 4671. Work includes mechanical engineering design, and could possibly include fabrication and testing. Projects can involve efforts by interdisciplinary teams. Written and oral presentations are required.
Prerequisite(s): ME 4671
Restriction(s):
Can enroll if College is Engineering and Computer Science
ME 472  Prin & Appl of Mechatron Sys  4 Credit Hours
This course provides the student with hands-on interdisciplinary experience of mechatronic systems, which integrate mechanical, electrical/electronic components with microprocessors to design a high-performance system. Subjects include Mechanical and Electrical Actuators, Digital Transducers and Modulators, Microcomputers and Microcontrollers. Laboratory projects cover robotic programming, materials handling, and fluid power systems. Student will be required to perform a course design project with mechatronic application in nature. (OC)
Prerequisite(s): (ME 265 or ME 345) and (ME 442 or ECE 460*)
Restriction(s):
Cannot enroll if Class is Freshman or Sophomore
Can enroll if College is Engineering and Computer Science

ME 481 Manufacturing Processes II  3 Credit Hours
A study of casting, welding, plastic forming, and machining of materials; analysis of forces, energy requirements, and temperature effects; design specifications economically obtainable in terms of dimensional accuracy, surface finish, and material properties, functional characteristics of equipment. Two lectures and a laboratory. (OC).
Prerequisite(s): ME 381
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 483  Dsgn Cons in Poly and Comp Mat  3 Credit Hours
Physical and mechanical behavior of unreinforced and reinforced (composite) polymeric materials in relation to their applications in modern technology. Emphasis is given to the design considerations with these materials in contrast to those with metallic materials. Time-dependent properties, such as creep and stress relaxation, are considered. (OC).
Prerequisite(s): ME 360 or ME 3601
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 490 Directed Design Project  1 to 3 Credit Hours
Directed design project involving not only design but also analysis, fabrication, and/or testing. Topics may be chosen from any of the areas of mechanical engineering. The student will submit a report on their project and give an oral presentation at the end of the term. Enrollment in this course requires approval from the ME department. Registration for more than 1 credit is only permitted in special cases and will be considered on an individual basis. (F, S, W).
Restriction(s):
Cannot enroll if Class is
Can enroll if College is Engineering and Computer Science

ME 492 Guided Study in Mechanical Engineering  1 to 3 Credit Hours
Individual study, design, or laboratory research in a field of interest to the student. Topics may be chosen from any of the areas of mechanical engineering. The student will submit a report on their project at the end of the term. Enrollment in this course requires approval from the ME department. Registration for more than 1 credit is only permitted in special cases and will be considered on an individual basis. (F, S, W).
Restriction(s):
Cannot enroll if Class is
Can enroll if College is Engineering and Computer Science

ME 493 Advanced Vehicle Energy Sys  3 Credit Hours
This course will introduce the advanced energy conversion systems in automotive vehicles and cover the fundamentals, characteristics, and design consideration of the energy systems. The topic includes using alternative fuels in internal combustion engines, advanced power train systems in hybrid, electric, and fuel cell vehicle, and exhaust energy recovery systems. (YR).
Prerequisite(s): ME 325 and ECE 305
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 4981 Automotive Engineering  4 Credit Hours
The course covers the basic topics in automotive engineering: a) fundamental vehicle dynamics; b) Engine-transmission compatibility and matching; c) analysis of vehicle performance in acceleration, gradability, speed, fuel economy, ride comfort, stability and safety; d) computer modeling and simulation of vehicle systems by numerical techniques; e) transmission design and analysis; f) design of vehicle systems such as brakes, suspensions, steering mechanisms and other subsystems. (YR).
Prerequisite(s): ME 345 and ME 3601
Restriction(s):
Can enroll if College is Engineering and Computer Science

ME 499 Internship/ Co-Op  1 Credit Hour
A four-month professional work experience period of the Engineering Internship Program, integrated and alternated with the classroom terms.
Restriction(s):
Can enroll if Class is Senior or Graduate

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering
The following abbreviations are used to denote the frequency of offering:
(F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally