

MECHANICAL ENGINEERING (EGME)

EGME 110 Manufacturing Processes 3 Credit Hours (2,3)

An introduction to basic manufacturing processes. Both theory and applications of various processes are covered in lecture and laboratory. Topics include: machining processes, welding and related processes, metal forming processes, and plastic forming processes. Included in machining processes is a limited scope computer aided design and computer numerical control project. The topics of measuring instruments and laboratory safety will also be addressed in the lecture and laboratory. Completion of a high school trigonometry course is expected for enrollment.

Pre or Corequisite(s): EGME141 and MATH111 (or equivalent/satisfactory score on ACT/SAT, or Placement Exam) or Permission of Instructor

EGME 141 Solid Modeling 3 Credit Hours (2,2)

An application of standard solid modeling software to draw, dimension, and design mechanical parts and assemblies. Topics covered include: standard drafting techniques, orthographic projections, wireframe and solid methods, dimensioning, assemblies, and constraining. An introduction to animation of assemblies is also included.

Pre or Corequisite(s): MATH102

EGME 225 Mechanics of Materials 3 Credit Hours (3,0)

A study of stress analysis and measurements. Topics include axial, shear, torsion, bending stresses, axial strains, shear strains, Poisson's ratio, Hooke's law and the transformation of stresses and strains. Deflection of beams and buckling of columns are also treated.

Prerequisite(s): EGEM220 with a grade of C or better

Pre or Corequisite(s): MATH152

EGME 240 Assembly Modeling and GD&T 3 Credit Hours (2,3)

The course is a continuation of EGME141. Parametric modeling and design of assemblies by the use of solid models. Emphasis will be placed on animation of assemblies to display the functionality of assemblies.

Prerequisite(s): EGME110, EGME141, MATH131 and sophomore standing

EGME 275 Engineering Materials 3 Credit Hours (3,0)

A study of the physical structure of engineering materials, including metals, ceramics, polymers, and composites, as well as their properties and applications. Failure modes of materials, such as corrosion, fatigue, plastic deformation, and brittle failure, are also covered. For metal alloys, there is an emphasis on the interpretation of phase diagrams and time-temperature-transformation diagrams.

Prerequisite(s): CHEM115 or (CHEM108 and CHEM109)

Pre or Corequisite(s): EGME225 or EGMT225

EGME 276 Strength of Materials Lab 1 Credit Hour (0,3)

Laboratory experiments covering topics in mechanics of materials and engineering materials. Theory from mechanics of materials and engineering materials will be covered through hands-on experiments.

Prerequisite(s): (Pre- or corequisites: EGME225 and EGME275) or (Pre-requisite EGMT225 and Pre or corequisite EGME275)

EGME 310 Vehicle Engineering 2 Credit Hours (2,0)

A systematic overview of topics within the areas of automotive vehicle dynamics, component design, and testing. An introduction to gross vehicle dynamics is followed by a detailed study of specific vehicle subsystems, including both their design and their role in the overall vehicle behavior. Dynamic behaviors covered include rollover, acceleration, braking, cornering, ride, and load transfer. Subsystems considered include the brakes, steering system, suspension, tires, and drive train. Vehicle dynamics simulation is introduced.

Prerequisite(s): PHYS221 or PHYS231

Pre or Corequisite(s): EGEM220 or EGMT225

EGME 337 Thermodynamics 4 Credit Hours (4,0) (4,0,1)

A study of the theory and applications of thermodynamics. Topics covered include: thermodynamic properties, heat, work, First and Second Laws of thermodynamics, entropy, power and refrigeration cycles, gas mixtures, and an introduction to transport theory.

Prerequisite(s): MATH152 and PHYS232

EGME 338 Fluid Mechanics 3 Credit Hours (3,0) (3,0,1)

A study of the theory and applications of fluid statics and fluid dynamics. Topics covered include: hydrostatics, buoyancy and stability, Bernoulli and energy equations, dimensional analysis, flow in pipes, pumps, potential flow, open-channel flow, introductory gas dynamics, integral and differential analysis of flow, exact and approximate solutions of the Navier-Stokes equations, and computational fluid dynamics (CFD).

Prerequisite(s): EGEM220, MATH251, MATH310

EGME 350 Machine Design 4 Credit Hours (3,3)

Design and selection of machine components and power transmission units. Selected topics in load, stress, and deflection analysis in more depth than EGME225, notably (but not exclusively) torsion of thin-walled sections, thick-walled pressure vessels, interference fits, buckling problems by eigenvalue analysis, and Castigliano's theorems. Deterministic and stochastic theories of static failure, dynamic loading, and fatigue. Performance analyses of machine components, such as shafts, bearings, gears, worms, fasteners, and belt/chain drives. Laboratory covers finite element analysis using commercial software, and involves a major group design project.

Prerequisite(s): EGME141, 225, 275, and 276

Pre or Corequisite(s): MATH310

EGME 415 Vehicle Dynamics 2 Credit Hours (2,0)

A study of vehicle dynamics, treating selected topics in automobile dynamics with more theoretical depth than EGME310, but also surveying heavy trucks, tracked and off-road vehicles (including terrain interaction), railway vehicles, and water-borne vessels. Dynamic modeling, as well as a thorough understanding of underlying physical phenomena, are emphasized.

Prerequisite(s): EGEM320, EGNR340 and EGME310

EGME 425 Vibrations and Noise Control 4 Credit Hours (3,2) (3,2,1)

An introductory course on vibrations analysis, noise control, and acoustics. The vibrations portion includes the theory of discrete and continuous vibrating systems, and such applications as vibration mitigation, machinery vibrations, and rotor dynamics. The noise control/acoustics portion includes the theory of airborne sound, sound fields in bounded spaces, an overview of human hearing, and noise mitigation. Measurement techniques and signal analysis are covered in the laboratory segment.

Prerequisite(s): EGME225, EGEM320, EGNR340, MATH251 and MATH310

EGME 431 Heat Transfer 3 Credit Hours (3,0) (3,0,1)

Theory and applications of heat transfer. Steady-state and transient conduction, forced convection, natural convection, radiation. Analysis of heat exchangers, boiling and condensation, introduction to numerical methods in heat transfer.

Prerequisite(s): EGME337, EGME338 and (EGNR265 or EGNR140)

EGME 432 Thermal and Fluids Lab 2 Credit Hours (1,3)

Practical applications of thermodynamics, fluid mechanics, and heat transfer. Hands-on training in the operation of thermodynamic components, power generation systems, and fluid mechanical devices. Experimentation in heat transfer. Includes major project in the area of power generation and dissipation.

Prerequisite(s): EGME337 and EGME338

Pre or Corequisite(s): EGME431

EGME 442 Finite Element Analysis 3 Credit Hours (2,2)

This course will cover the fundamentals of finite element analysis. Topics include: modeling elements, boundary conditions, loading, convergence and an introduction to modal analysis. Commercial software will be used in the laboratory along with 3-D mesh generation.

Prerequisite(s): EGME350 and MATH310