MECHANICAL ENGINEERING (MENG)

MENG 210 | STATICS
Units: 3-4 Repeatability: No
Prerequisites: PHYS 270 and MATH 150
Equilibrium analysis of particles and rigid bodies using vector analysis of forces and moments in two and three dimensions; free body diagrams; friction; analysis of trusses; distributed forces; basics of shear and moment diagrams; centroids; and moments of inertia. Three hours lecture weekly. Fall and spring semesters.

MENG 260 | INTRODUCTION TO THERMAL SCIENCES
Units: 3-4 Repeatability: No
Prerequisites: MATH 151 and PHYS 270
Introduction to basic engineering thermodynamics, fluid mechanics, and heat transfer. Applications to engineering systems. Three hours lecture weekly. Fall and spring semesters.

MENG 300 | APPLIED THERMODYNAMICS
Units: 3-4
Prerequisites: MENG 260
Further developments of concepts from classical thermodynamics. Application of laws of thermodynamics to gas and vapor power cycles, mixtures of gases and vapors, and refrigeration cycles. Moist air analysis and chemically reacting systems. Three hours lecture weekly. Fall semester.

MENG 311 | MATERIALS SCIENCE AND ENGINEERING
Units: 3 Repeatability: Yes (Can be repeated for Credit)
Prerequisites: CHEM 151 and CHEM 151L and MATH 151
Basic concepts of material structure and its relation to properties; atomic structure; mechanical properties; engineering applications; introduction to semiconductor materials.

MENG 350 | MANUFACTURING PROCESSES
Units: 3
Prerequisites: ENGR 311 and MENG 210
Corequisites: MENG 350L
Description, classification and analysis of manufacturing processes used in the transformation of metal, polymers, and ceramics into consumer or capital goods. Topics include analysis of variables that affect process operations, performance, quality and cost, and the design of process plans. Three hours lecture and one three-hour laboratory weekly. Spring semester.

MENG 350L | MANUFACTURING PROCESSES LABORATORY
Units: 1
Corequisites: MENG 350
A laboratory course to compliment the lecture material presented in ISYE 350. One three-hour laboratory weekly. Spring Semester.

MENG 351 | MACHINE SHOP PRACTICES
Units: 1 Repeatability: No
Introduction to metal and wood working machines and practices, with emphasis on development of basic competence and safety. Three-hour laboratory weekly. Sophomore standing in Mechanical engineering. Fall semester.

MENG 352 | CAD PRACTICES
Units: 1 Repeatability: No
Introduction to 3D computer-aided design of components and assemblies using modern solid modeling tools. Three-hour laboratory weekly. Sophomore standing in Mechanical engineering. Fall semester.

MENG 355L | MANUFACTURING PROCESSES LABORATORY
Units: 3-4 Repeatability: No
Corequisites: MENG 350
A laboratory course to compliment the lecture material presented in MENG 350. Three-hour laboratory weekly. Fall and spring semesters.

MENG 360 | FLUID MECHANICS
Units: 3 Repeatability: Yes (Can be repeated for Credit)
Prerequisites: MENG 260 or MATH 250 or MATH 310
Corequisites: MENG 360L
Basic laws of fluid mechanics with applications to engineering problems, including dimensional analysis and similitude, boundary layer analysis, internal and external flows, and turbomachinery analysis. Three hours lecture. Spring semester.

MENG 360L | FLUID MECHANICS LABORATORY
Units: 1
Prerequisites: MENG 260 and MATH 310
Corequisites: MENG 360
Laboratory for MENG 360. Three hours laboratory weekly. Spring semester.

MENG 370 | MECHANICS OF MATERIALS
Units: 3-4
Prerequisites: MENG 210
Corequisites: MENG 370L
Analytical methods for determining stress and strain, torsion, bending of beams, shearing stress in beams, combined stresses, principal stresses, and deflection in beams. Three hours lecture weekly. Spring semester.

MENG 370L | MECHANICS OF MATERIALS LABORATORY
Units: 1
Corequisites: MENG 370
Laboratory for MENG 370. Three-hour laboratory weekly. Spring semester.

MENG 375 | DYNAMICS
Units: 3-4 Repeatability: No
Prerequisites: MENG 210
Corequisites: MENG 370L
Analysis of dynamics of particles and rigid bodies using vector methods in two and three dimensions. Topics include kinematics and kinetics of translational and rotational motion, energy and momentum methods. Three hours lecture weekly. Fall semester.

MENG 380 | KINEMATICS AND DESIGN OF MACHINERY
Units: 3
Prerequisites: MENG 375
Corequisites: MENG 380L
Kinematics and dynamic analysis of machinery; mechanism synthesis techniques for function, motion, path generators; and design applications with linkages, cams, and gears. Three hours lecture weekly. Spring semester.

MENG 390 | HEAT TRANSFER
Units: 3
Prerequisites: MENG 360
Corequisites: MENG 390L
Heat transfer by conduction, convection, radiation, and combinations thereof. Introductions to heat exchanger analysis and design, along with other applications. Three hours lecture and three-hour laboratory weekly. Fall semester.

MENG 390L | HEAT TRANSFER LABORATORY
Units: 1
Core Attributes: Lab
Corequisites: MENG 390
Laboratory for MENG 390. Three laboratory weekly. Fall semester.

MENG 410 | ALTERNATIVE ENERGY SYSTYEMS
Units: 3 Repeatability: Yes (Can be repeated for Credit)
Prerequisites: MENG 300
Thermodynamics of traditional fossil fuels and bio fuel combustion. Analysis of solar, wind, wave, and tidal power systems. Introduction to fuel cells and advanced battery technology. Discussion of the current technological limitation of each topic listed above. Three hours of lecture weekly.
MENG 420 | COMPUTER APPLICATIONS IN MECHANICAL ENGINEERING
Units: 3
Prerequisites: MATH 250 and MATH 310 and MENG 370 and MENG 352 and (ENGR 121 or COMP 150)
Mechanical design and analysis using commercially available solid modeling, kinematics, and FEA computer software. Numerical methods and their applications using root solving, optimization, regression analysis, numerical differentiation and integration will be covered. An introduction to finite difference and finite element methods will also be presented. Two hours lecture and one three-hour laboratory weekly. Fall semester.

MENG 430 | DESIGN OF MACHINE ELEMENTS
Units: 3
Prerequisites: MENG 370
Analysis and design of mechanical components against failures under steady and fatigue loads. Design applications of various machine elements, such as shafts, bearings, gears, springs, and fasteners. These are integrated into mini-design projects required of all students. Three hours lecture weekly. Spring semester.

MENG 445 | INTRODUCTION TO ROBOTICS
Units: 3
Prerequisites: MENG 375
This course covers introductory materials related to the subject of robotics. The course is designed to encompass theories as well as practices, intended for both the user and the designer of a robotic system. Topics include modeling and analyses of the mechanics of robots, actuators, sensors, and vision systems.

MENG 460 | SYSTEM DYNAMICS AND VIBRATIONS
Units: 3
Prerequisites: MENG 375
Analysis and design of dynamic systems in various engineering domains; modeling of mechanical and electrical systems, free and forced responses, time and frequency domain analysis, applications in isolation and control of mechanical vibrations, and vibration measuring instruments. Three hours lecture weekly. Spring semester.

MENG 460L | SYSTEM DYNAMICS AND VIBRATIONS LABORATORY
Units: 1
Prerequisites: MENG 460 (Can be taken Concurrently)
Laboratory for MENG 460. Three-hour laboratory weekly. Spring semester.

MENG 462 | TOPICS IN FLUID MECHANICS
Units: 3 Repeatability: Yes (Can be repeated for Credit)
Prerequisites: MENG 360
Additional topics in fluid mechanics, including the differential description of fluid flow, its application to channel flow, pipe flow, and boundary layers, scaling of the equations, methods in computational fluid dynamics, and an introduction to turbulence. Three hours lecture weekly.

MENG 465 | INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS
Units: 3
Prerequisites: MENG 360
Topics in fluid mechanics, including the differential description of fluid flow, its application to channel flow, pipe flow, and boundary layers, scaling of the equations, methods in computational fluid dynamics, and an introduction to turbulence.

MENG 470 | FINITE ELEMENT ANALYSIS
Units: 3 Repeatability: No
Prerequisites: MATH 310 and MENG 351 and MENG 370
Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Modeling and practical applications using commercial finite element codes. Three hours lecture weekly.

MENG 491 | SENIOR DESIGN PROJECT I
Units: 3 Repeatability: No
Core Attributes: Writing-Pre F17 CORE
Prerequisites: (MENG 311 or ENGR 311) and ENGL 304 and MENG 351 and MENG 352 (Can be taken Concurrently) and MENG 400 (Can be taken Concurrently) and MENG 400L (Can be taken Concurrently) and MENG 430 (Can be taken Concurrently) and COMM 203 (Can be taken Concurrently)
Mechanical engineering capstone design experience in a simulated industrial environment. Students work in teams, in collaboration with an engineering faculty and/or an engineering professional from industry, on an open-ended design project. This involves designing, construction, testing, and evaluation as well as consideration of issues related to ethics, economics, safety and professional practice. Two-hour lecture and four-hour laboratory weekly.

MENG 491W | SENIOR DESIGN PROJECT I
Units: 4 Repeatability: No
Core Attributes: Writing-Pre F17 CORE
Prerequisites: COMM 203 and ENGR 311 and MENG 351 and MENG 352 and MENG 400 (Can be taken Concurrently) and MENG 430 (Can be taken Concurrently)
This course prepares students to approach an engineering design project in a small team. Topics include project selection, research methods on chosen project, a review of the design process, including concept generation, concept selection, construction, testing, and evaluation, as well written and oral presentation skills. Three-hour lecture recitation and one three-hour laboratory weekly. Fall semester.

MENG 492 | SENIOR DESIGN PROJECT II
Units: 3 Repeatability: No
Prerequisites: MENG 491W
Mechanical engineering capstone design experience in a simulated industrial environment. Students work in teams, in collaboration with an engineering faculty and/or an engineering professional from industry, on an open-ended design project. This involves designing, construction, testing and evaluation as well as consideration of issues related to ethics, economics, safety and professional practice. Two hours of lecture and four hours of laboratory weekly. Fall semester.

MENG 494 | SPECIAL TOPICS IN MECHANICAL ENGINEERING
Units: 1-4 Repeatability: Yes (Can be repeated for Credit)
Special topics seminar in areas of special interest to current engineering practice in Mechanical Engineering. May be repeated for credit.

MENG 496 | UNDERGRADUATE RESEARCH
Units: 1-3 Repeatability: Yes (Can be repeated for Credit)
Faculty-directed undergraduate research in engineering. Problem proposal must be submitted and approved prior to enrollment. Written report required.

MENG 498 | INTERNSHIP/CO-OP EXPERIENCE
Units: 1-3
Directed upper division level internship/co-operative experience in engineering research, design, development, manufacturing, or the engineering activity. Written report required. Credit not applicable to minimum program graduation requirement. Placement contingent upon approval of participating organization. May be repeated for credit.
MENG 499 | INDEPENDENT STUDY
Units: 1-3  Repeatability: Yes (Can be repeated for Credit)
Individual design or research project under the general supervision of participating professor. Project proposal must be submitted and approved prior to enrollment.