MECHANICAL
ENGINEERING (MENG)

MENG 8066 AIR CONDITIONING SYSTEM DESIGN (3 credits)
Application of theromodynamic principles to the design of air conditioning systems. A comprehensive design project will be an integral part of the course. (Cross-listed with MENG4060)
Prerequisite(s)/Corequisite(s): MENG3000

MENG 8076 POWER PLANT SYSTEM DESIGN (3 credits)
Application of the thermodynamic and fluid dynamic principles to the design of power plants. A comprehensive design project will be an integral part of the course. (Cross-listed with MENG4070)
Prerequisite(s)/Corequisite(s): MENG3000

MENG 8086 HEAT EXCHANGER DESIGN (3 credits)
Design methodology for various heat exchangers employed in mechanical engineering. Introduction to computer-aided design as applied to heat exchangers. Hands-on exercises in actual design tasks. (Cross-listed with MENG4080)
Prerequisite(s)/Corequisite(s): MENG3000

MENG 8206 HEAT TRANSFER (3 credits)
Heat Transfer by conduction, convection, and radiation. Correlation of theory with experimental data and engineering design. (Cross-listed with MENG4200)
Prerequisite(s)/Corequisite(s): (CIVE310 or MENG3100), not open to nondegree students

MENG 8226 INDUSTRIAL QUALITY CONTROL (3 credits)
Statistical process control and quality assurance techniques in manufacturing. Control charts, acceptance sampling, and analyses and design of quality control systems. (Cross-listed with MENG4220)
Prerequisite(s)/Corequisite(s): MENG 3210 or STAT 3800

MENG 8386 MECHANICS OF BIOMATERIALS (3 credits)
Theory, application, simulation, and design of biomaterials that apply mechanical principles for solving medical problems (case studies in artery, brain, bone, etc.). Tentative topics include Mechanical characterization of biomaterials; Bio-manufacturing a tissue; Function-structure relationship; Design and analysis of medical implants; Active response of biomaterials; growth and remodeling mechanism; Cellular behavior and measurements, etc. (Cross-listed with MENG 4380)
Prerequisite(s)/Corequisite(s): MENG 3430. Not open to non-degree graduate students.

MENG 8456 MECHANICAL ENGINEERING DESIGN CONCEPTS (3 credits)
Development of design concepts. Introduction to synthesis techniques and mathematical analysis methods. Application of these techniques to mechanical engineering design projects. (Cross-listed with MENG 4450)
Prerequisite(s)/Corequisite(s): MENG 2000, MENG 3420, MENG 3500, and MENG 3100 or CIVE 310. Not open to non-degree graduate students.

MENG 8476 MECHANICAL ENGINEERING DESIGN II (2 credits)
Definition, scope, analysis, synthesis, and the design for the solution of a comprehensive engineering problem in any major area of mechanical engineering. (Cross-listed with MENG 4470)
Prerequisite(s)/Corequisite(s): MENG4460, not open to nondegree students

MENG 8486 ADVANCED MECHANICS OF MATERIALS (3 credits)
Prerequisite(s)/Corequisite(s): MENG 3250 or EMEC3250; and MENG 3730 or EMEC3730.

MENG 8496 ADVANCED DYNAMICS (3 credits)
Particle dynamics using Newton’s laws, energy principles, momentum principles. Rigid body dynamics using Euler’s equations and Lagrange’s equations. Variable mass systems. Gyroscopic motion. (Cross-listed with MENG 4470)
Prerequisite(s)/Corequisite(s): MENG 3730 or EMEC 3730; and MATH 2350. Not open to non-degree graduate students.

MENG 8506 MECHANICAL ENGINEERING CONTROL SYSTEMS DESIGN (3 credits)
Applications of control systems analysis and synthesis for mechanical engineering equipment. Control systems for pneumatic, hydraulic, kinematic, electromechanical, and thermal systems. (Cross-listed with MENG 4500)
Prerequisite(s)/Corequisite(s): MENG 3500. Not open to non-degree graduate students.

MENG 8510 INTRODUCTION TO FINITE ELEMENT ANALYSIS (3 credits)
Prerequisite(s)/Corequisite(s): MENG 3250 and MENG 8806 or permission

MENG 8526 EXPERIMENTAL STRESS ANALYSIS I (3 credits)
Investigation of the basic theories and techniques associated with the analysis of stress using mechanical strain gages, electric strain gages, brittle lacquer, photoelasticity and membrane analogy. (Cross-listed with MENG 4520)
Prerequisite(s)/Corequisite(s): MENG 3250 or EMEC 3250.

MENG 8546 INTRODUCTION TO CONTINUUM MODELING (3 credits)
Basic concepts of continuum modeling. Development of models and solutions to various mechanical, thermal and electrical systems. Thermomechanical and electro-mechanical coupling effects. Differential equations, dimensional methods and similarity. (Cross-listed with MENG 4540)
Prerequisite(s)/Corequisite(s): MATH 2350; MENG 3250 or EMEC 3250; MENG 3730 or EMEC 3730. Not open to non-degree graduate students.

MENG 8556 VEHICLE DYNAMICS (3 credits)
Introduction to basic mechanics governing automotive vehicle dynamic acceleration, braking, ride, handling and stability. Analytical methods, including computer simulation, in vehicle dynamics. The different components and subsystems of a vehicle that influence vehicle dynamic performance. (Cross-listed with MENG 4550)
Prerequisite(s)/Corequisite(s): MENG 3430, MENG 3500. Not open to non-degree graduate students.

MENG 8586 DIGITAL CONTROL OF MECHANICAL SYSTEMS (3 credits)
Introduction to digital measurement and control of mechanical systems. Applications of analysis and synthesis of discrete time systems. (Cross-listed with MENG 4580)
Prerequisite(s)/Corequisite(s): MENG 4500. Not open to non-degree graduate students.

MENG 8706 THEORY AND PRACTICE OF MATERIALS PROCESSING (3 credits)
Theory, practice and application of conventional machining, forming, and non-traditional machining processes with emphasis on tool life, dynamics of machine tools and adaptive control. (Cross-listed with MENG 4700)

MENG 8746 MANUFACTURING SYSTEMS I (3 credits)
Principles of automated production lines; analysis of transfer lines; group technology; flexible manufacturing systems; and just-in-time; and optimization strategies for discrete parts manufacturing. (Cross-listed with MENG 4740)
MENG 8750 VIBRATION THEORY AND APPLICATIONS (3 credits)
Prerequisite(s)/Corequisite(s): MENG 3730; and MATH 3350 or MATH 8355

MENG 8766 MANUFACTURING INFORMATION SYSTEMS (3 credits)
An exploration of information systems and their impact in a manufacturing environment. Software, hardware, database systems, enterprise resource planning, networking, and the internet. (Cross-listed with MENG 4760)
Prerequisite(s)/Corequisite(s): Senior standing, and CIST 1400 or CSCI 1620 or CSCI 2240.

MENG 8806 NUMERICAL METHODS IN ENGINEERING (3 credits)
Numerical algorithms and their convergence properties in: solving nonlinear equations; direct and iterative schemes for linear systems of equations; eigenvalue problems; polynomial and spline interpolation; curve fitting; numerical integration and differentiation; initial and boundary value problems for Ordinary Differential Equations (ODE’s) and systems of ODE’s with applications to engineering; finite difference methods for partial differential equations (potential problems, heat-equation, wave-equation). (Cross-listed with MENG 4800)
Prerequisite(s)/Corequisite(s): MATH2350 or MATH8355

MENG 8836 ENGINEERING ANALYSIS WITH FINITE ELEMENTS (3 credits)
Analysis of engineering systems using finite elements; a critical and challenging task performed during the design process for many engineering systems. Four very distinct domains are studied: Structural stress analysis, heat transfer, fluid flow, and modal analysis. (Cross-listed with MENG 4830)
Prerequisite(s)/Corequisite(s): MENG 3100, MENG 3430, MENG 3500; Pre/Coreq: MENG4200. Not open to non-degree graduate students.

MENG 8916 SPECIAL TOPICS IN ENGINEERING MECHANICS (1-6 credits)
Treatment of special topics in engineering mechanics by experimental, computational and/or theoretical methods. Topics will vary from term to term. (Cross-listed with MENG 4910)

MENG 8986 LABORATORY AND ANALYTICAL INVESTIGATIONS (0-6 credits)
Investigation and written report of research into specific problem in any major area of mechanical engineering (Cross-listed with MENG 4980)

MENG 9180 FUNDAMENTALS IN FINITE ELEMENTS (3 credits)
Prerequisite(s)/Corequisite(s): MENG 8486, MENG 8806, or CIVE 851

MENG 9210 QUALITY ENGINEERING: USE OF EXPER DESIGN & TECHNIQUES (3 credits)
Extension of industrial quality control methods and techniques. Off-line and on-line quality control methods. Development of quality at the design state through planned experiments and analyses. Experimental design methods will include factorial, 2k, 3k, and factional factorials designs. The course will include an applied project in design of quality.

MENG 9250 MANUFACTURING AND DYNAMIC SYSTEMS MODELING (3 credits)
Prerequisite(s)/Corequisite(s): MATH 8356.

MENG 9300 MECHANICS OF COMPOSITE MATERIALS (3 credits)
Prerequisite(s)/Corequisite(s): MENG 4480 or MENG 8486

MENG 9330 THEORY OF ELASTICITY I (3 credits)
Prerequisite(s)/Corequisite(s): MENG 4480 or MENG 8486, MATH 2350.

MENG 9370 THEORY OF PLATES AND SHELLS (3 credits)
Basic equations for the bending and stretching of thin plates with small deformations. General theory of deformation of thin shells with small deflections. Large deformations theories of plates and shells. Effect of edge conditions.
Prerequisite(s)/Corequisite(s): MENG 8486, MATH 8336

MENG 9420 THEORY OF PLASTICITY (3 credits)
Prerequisite(s)/Corequisite(s): MENG 9330

MENG 9700 ADVANCED MANUFACTURING PROCESSING (3 credits)
Theory, practice and technology of advanced manufacturing processes, with emphasis on process mechanism, surface integrity, tool and machine design, adaptive control and expert systems.
Prerequisite(s)/Corequisite(s): Permission.