Department of Mechanical Engineering

The Department of Mechanical Engineering offers students an applied laboratory oriented Bachelor of Science educational experience in Mechanical Engineering. The Mechanical Engineering curriculum is theoretical yet hands-on and career oriented. Students gain expertise and practical knowledge in Mechanical Engineering (ME) in the major areas of Mechanical Devices and Controls, Robotics, Environmental Systems, Mechanical Design and Analysis, Material Science and Processing, Renewable Energy, and Thermal-Fluid Energy Sciences. The ME Program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Faculty members mentor students in research projects, providing personalized opportunities for professional development. Active areas of research include Biofuels Development; Combustion; Engine Design and Testing; Robotics Automation; Tribology; and Sustainable Design.

Mechanical Engineering Majors


MENG 1310 Manufacturing Processes Lab
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
This course covers hands on introduction to various manufacturing, machining and fabrication processes including welding, thread cutting, and machining using lathe and mill.

MENG 2110 Mechanical Engineering Case Studies in Design & Analysis
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
The course includes fundamental techniques for creating, analyzing, synthesizing, and implementing design solutions to open-ended problems through team and individual efforts utilizing flexibility, adaptability, and creativity.
Prerequisite(s): A minimum grade of "C" in ENGR 1133.

MENG 2139 Numerical Methods in Engineering 0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Mathematical modeling and numerical solution of engineering related problems with emphasis on solution of linear and nonlinear equations, matrices, vectors, statistical data analysis, curve fitting, ordinary and partial differential equations.
Prerequisite(s): Completion of MATH 2242 and ENGR 1121 or ENGR 1731 or concurrent enrollment in MFGE 2534.

MENG 2139H Numerical Methods in Engineering 0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Mathematical modeling and numerical solution of engineering related problems with emphasis on solution of linear and nonlinear equations, matrices, vectors, statistical data analysis, curve fitting, ordinary and partial differential equations.
Prerequisite(s): Completion of MATH 2242 and ENGR 1121 or ENGR 1731 or concurrent enrollment in MFGE 2534.

MENG 3130 Mechanism Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course covers detailed concepts, functions and knowledge of the components of mechanisms, machine components and design tools. Analytical, mathematical and computer techniques for kinematic and dynamic analysis of mechanisms and machine components are introduced. A comprehensive project covers the mechanism synthesis and design experience using analytical and computer simulation tools.
Prerequisite(s): A minimum grade of "C" in ENGR 2232 or permission of instructor.
Cross Listing(s): MENG 3130H.

MENG 3130H Mechanism Design Honors
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course covers detailed concepts, functions and knowledge of the components of mechanisms, machine components and design tools. Analytical, mathematical and computer techniques for kinematic and dynamic analysis of mechanisms and machine components are introduced. A comprehensive project covers the mechanism synthesis and design experience using analytical and computer simulation tools.
Prerequisite(s): A minimum grade of "C" in ENGR 2232 or permission of instructor.
Cross Listing(s): MENG 3130.

MENG 3135 Machine Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Modes of failures including both static and dynamic failure theories will be introduced in the course. Detailed design of Machine Components such as transmission shafts, keys, couplings, bearings, springs, gears, clutches, brakes and fasteners will also be discussed.
Prerequisite(s): A minimum grade of "C" in ENGR 3233 and MENG 2110 or permission of instructor.

MENG 3233 Heat Transfer
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will be an introduction to basic energy transport by conduction, convection, and radiation with applications to heat exchanger, extended surfaces etc.
Prerequisite(s): MATH 2243 and MATH 3230 and a minimum grade of "C" in ENGR 3431 and ENGR 3235 or permission of instructor.
Cross Listing(s): 3233H.

MENG 3233H Heat Transfer Honors
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will be an introduction to basic energy transport by conduction, convection, and radiation with applications to heat exchanger, extended surfaces etc.
Prerequisite(s): MATH 2243 and MATH 3230 and a minimum grade of "C" in ENGR 3431 and ENGR 3235 or permission of instructor.
Cross Listing(s): MENG 3233.

MENG 3331 Materials Science Studio
0.3 Credit Hours. 0.2 Lecture Hours. 0.3 Lab Hours.
The study of engineering materials such as metals, alloys, polymers, ceramics, and composites. Atomic structure and arrangement; control of the microstructure and mechanical properties, solidification, cooling curves and phase diagrams, mecanical testing, and strengthening mechanisms. Laboratory includes problem solving sessions and experiments on materials related to strengths, toughness, solidification, and metallography.
Prerequisite(s): A minimum grade of "C" in CHEM 1146 or CHEM 1147 and ENGR 3233.
MENG 3333 Materials Processing Studio  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
The course covers the study of traditional and modern processing  
techniques. The course will cover applications and use of different  
materials and their processing, metal-casting processes end equipment,  
forming and shaping processes and equipment, joining processes  
and equipment, molding, extrusion and fabrication of polymers, and  
composites processing and techniques. Laboratory includes problem  
solving sessions, experiments, and hands-on processing of materials.  
Prerequisite(s): MENG 3331 and MENG 1310 or Permission of  
Instructor.

MENG 3333H Materials Processing Studio  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
The course covers the study of traditional and modern processing  
techniques. The course will cover applications and use of different  
materials and their processing, metal-casting processes end equipment,  
forming and shaping processes and equipment, joining processes  
and equipment, molding, extrusion and fabrication of polymers, and  
composites processing and techniques. Laboratory includes problem  
solving sessions, experiments, and hands-on processing of materials.  
Prerequisite(s): MENG 3331 and MENG 1310 or Permission of  
Instructor.

MENG 3521H Introduction to Mechatronics (Honors)  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
This course is an introduction to the theory and practice of engineering  
measurements, instrumentation, data acquisition, statistical analysis of  
data, controls and mechatronic systems and their applications integrated  
with computing. Topics include measurement fundamentals, applications  
of computing in measurement and mechatronic systems, sensors,  
analog signal processing, data acquisition and analysis, digital circuits,  
microcontroller programming and interfacing, actuators, and mechatronic  
system design.  
Prerequisite(s): A minimum grade of "C" in ENGR 2131.  
Cross Listing(s): MENG 3521.

MENG 3531 Introduction to Mechatronics  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
This course is an introduction to the theory and practice of engineering  
measurements, instrumentation, data acquisition, statistical analysis of  
data, controls and mechatronic systems and their applications integrated  
with computing. Topics include measurement fundamentals, applications  
of computing in measurement and mechatronic systems, sensors,  
analog signal processing, data acquisition and analysis, digital circuits,  
microcontroller programming and interfacing, actuators, and mechatronic  
system design.  
Prerequisite(s): A minimum grade of "C" in ENGR 2131 and ENGR 3233.  
Cross Listing(s): MENG 3521H.

MENG 3531H Introduction to Mechatronics (Honors)  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
This course is an introduction to the theory and practice of engineering  
measurements, instrumentation, data acquisition, statistical analysis of  
data, controls and mechatronic systems and their applications integrated  
with computing. Topics include measurement fundamentals, applications  
of computing in measurement and mechatronic systems, sensors,  
analog signal processing, data acquisition and analysis, digital circuits,  
microcontroller programming and interfacing, actuators, and mechatronic  
system design.  
Prerequisite(s): A minimum grade of "C" in ENGR 2131 and ENGR 3233.  
Cross Listing(s): MENG 3531.

MENG 4210 Energy Science Laboratory  
0.1 Credit Hours. 0 Lecture Hours. 0.2 Lab Hours.  
The course includes laboratory activities in support of instruction in  
Thermodynamics, ethics and heat transfer.  
Prerequisite(s): A minimum grade of "C" in ENGR 3235 and ENGR 3431 and MENG 3233 and MENG 3531 or permission of instructor.  
Cross Listing(s): MENG 4210H.

MENG 4210H Energy Science Lab (Honors)  
0.1 Credit Hours. 0 Lecture Hours. 0.2 Lab Hours.  
The course includes laboratory activities in support of instruction in  
Thermodynamics, ethics and heat transfer.  
Prerequisite(s): A minimum grade of "C" in MENG 3233, ENGR 3431, ENGR 3235, MENG 3531 or permission of instructor.  
Cross Listing(s): MENG 4210.

MENG 4430 Engineering Quality Control and Project Management  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
The course will introduce students to basic tools of engineering economy  
such as; interest rates, cash flow analysis, cost benefit analysis, and  
depreciation analysis that are used in comparing and evaluating multiple  
engineering projects on the basis of quantitative monetary parameters.  
Students will additionally be introduced to basic quality control techniques  
such as quality control charts and Six Sigma techniques for assuring  
product quality.  
Prerequisite(s): MENG 2110, MENG 3135, MENG 3333.  
Cross Listing(s): MENG 4430H.

MENG 4430H Engineering Quality Control and Project Management (Honors)  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
The course will introduce students to basic tools of engineering economy  
such as; interest rates, cash flow analysis, cost benefit analysis, and  
depreciation analysis that are used in comparing and evaluating multiple  
engineering projects on the basis of quantitative monetary parameters.  
Students will additionally be introduced to basic quality control techniques  
such as quality control charts and Six Sigma techniques for assuring  
product quality.  
Prerequisite(s): MENG 2110, MENG 3135, MENG 3333.  
Cross Listing(s): MENG 4430.

MENG 4612 Mechanical Engineering Senior Seminar  
1 Credit Hour. 0 Lecture Hours. 0 Lab Hours.  
Students are introduced to topics essential for improving performance  
on the Fundamentals of Engineering Exam. Topics such as engineering  
economy, ethics, and global citizenship are reinforced, while topics such  
as electrical devices, mechanics, energy science, and numerical methods  
are reviewed.  
Prerequisite(s): MATH 2243 and a minimum grade of "C" in ENGR 2131, ENGR 2232, ENGR 3233, ENGR 3235, MENG 2139, MENG 3233, MENG 3331.

MENG 4811 Mechanical Engineering Research  
1 Credit Hour. 0 Lecture Hours. 0 Lab Hours.  
MENG 4811 is meant to be a research course that is an introduction to  
gineering research topics, experiment design, ethics, laboratory safety,  
data analysis, statistics, technical writing and presentation.  
Prerequisite(s): MATH 2243 and MENG 2139 and prior or concurrent  
enrollment in MENG 3521 and a minimum grade of "C" in ENGR 2112.  
Cross Listing(s): MENG 4811H.

MENG 4811H Mechanical Engineering Research  
1 Credit Hour. 0 Lecture Hours. 0 Lab Hours.  
MENG 4811 is meant to be a research course that is an introduction to  
gineering research topics, experiment design, ethics, laboratory safety,  
data analysis, statistics, technical writing and presentation.  
Prerequisite(s): MATH 2243 and MENG 2139 and prior or concurrent  
enrollment in MENG 3521 and a minimum grade of "C" in ENGR 2112.  
Cross Listing(s): MENG 4811.
MENG 4822 Research Project in Mechanical Engineering  
2 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
MENG 4822 is the supervised research project element of the MechE special topic sequence (including MENG 4811 MechE Research Seminar), which progresses from experiment/project design, implementation, and culminates in a final research report, presentation and/or honors thesis.  
Prerequisite(s): MENG 4811 and MENG 3521 and MENG 3135 and MENG 3233 and MENG 3333 or permission of instructor.  
Cross Listing(s): MENG 4822H.  
MENG 4822H Research Project in Mechanical Engineering  
2 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
MENG 4822 is the supervised research project element of the MechE special topic sequence (including MENG 4811 MechE Research Seminar), which progresses from experiment/project design, implementation, and culminates in a final research report, presentation and/or honors thesis.  
Prerequisite(s): MENG 4811 and MENG 3521 and MENG 3135 and MENG 3233 and MENG 3333 or permission of instructor.  
Cross Listing(s): MENG 4822.  
MENG 4899 Directed Study in Mechanical Engineering  
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.  
An individualized study involving research and applications pertaining to Mechanical Engineering.  
Prerequisite(s): Senior standing, prior identification of a problem or study area, and permission of instructor.  
MENG 5090 Selected Topics in Mechanical Engineering  
1-9 Credit Hours. 1-9 Lecture Hours. 0-6 Lab Hours.  
This course provides for study of Mechanical Engineering course topics not generally offered by the program.  
Prerequisite(s): Senior standing or Permission of instructor.  
Cross Listing(s): MENG 5090G.  
MENG 5135 Vibration and Preventive Maintenance  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
Free and Forced Vibration of one and multi-degree of freedom systems will be covered. Applications of vibration analysis for preventive maintenance of mechanical systems will be introduced. Laboratories include basic vibration analysis and its applications.  
Prerequisite(s): Completion of MATH 3230 and MENG 3130 and MENG 3531 or Permission of instructor.  
Cross Listing(s): MENG 5135G.  
MENG 5136 Introduction to Finite Element Analysis  
0.3 Credit Hours. 0.1 Lecture Hours. 0.4 Lab Hours.  
This course will introduce students to the fundamentals of Finite Element Analysis. The students will develop a working knowledge of a commercial FEA software package and will model and analyze mechanical and thermal engineering systems using that software. The students will additionally develop an ability and competence in interpretation and analysis of FEA results.  
Prerequisite(s): A minimum grade of "C" in MENG 3130, MENG 3233, MENG 3333, and a minimum grade of "C" in ENGR 2112 and ENGR 3235.  
Cross Listing(s): MENG 5136G, MENG 5136H.  
MENG 5136H Intro to FEA Honors  
0.3 Credit Hours. 0.1 Lecture Hours. 0.4 Lab Hours.  
This course will introduce students to the fundamentals of Finite Element Analysis. The students will develop a working knowledge of a commercial FEA software package and will model and analyze mechanical and thermal engineering systems using that software. The students will additionally develop an ability and competence in interpretation and analysis of FEA results.  
Prerequisite(s): A minimum grade of "C" in ENGR 2112, ENGR 3235, MENG 2139, MENG 3135, MENG 3233 or permission of instructor.  
Cross Listing(s): MENG 5136, MENG 5136G.  
MENG 5137 Mechanical System Design  
0.3 Credit Hours. 0 Lecture Hours. 0.6 Lab Hours.  
This is a senior design course requiring that students call upon all of their academic preparations in developing the solution of mechanical system problems.  
Prerequisite(s): Completion of MENG 3130, MENG 3135, MENG 3233, MENG 3333, MENG 3531 and a minimum grade of "C" in ENGR 2112 and ENGR 3235.  
Cross Listing(s): MENG 5137G and MENG 5137H.  
MENG 5137H Mechanical System Design  
3 Credit Hours. 0 Lecture Hours. 6 Lab Hours.  
This is a senior design course requiring that students call upon all of their academic preparations in developing the solution of mechanical system problems.  
Prerequisite(s): Completion of MENG 3130, MENG 3135, MENG 3233, MENG 3333, MENG 3531 or MENG 3531H and a minimum grade of "C" in ENGR 2112 and ENGR 3235.  
Cross Listing(s): MENG 5137 and MENG 5137G.  
MENG 5138 Composite Materials: Manufacturing, Analysis, and Design  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
This course introduces basics of fiber reinforced, and laminated composites, anisotropic theory, stress analysis, design and testing of composite materials. Topics include an overview of structure and processing of composite materials, classification of anisotropy, anisotropic constitutive models, classical laminate theory, failure theories, and test methods. The knowledge will be applied to a design of simple composite structural elements.  
Prerequisite(s): A minimum grade of "C" in MENG 3135, MFGE 3131, MENG 3333, MFGE 3531, permission of instructor.  
Cross Listing(s): MENG 5138G.  
MENG 5233 Wind Energy  
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.  
This course provides an in-depth introduction to modern wind turbine technology and the development of the wind power industry. Students will learn general characteristics of the wind resource and the atmospheric boundary layer. They will also learn how to analyze wind data, estimate wind resources and use statistical techniques to estimate wind turbine energy production. Aerodynamic characteristics of various turbine (HAWT and VAWT) models design, blade design, airfoils design, blade number effect and optimization techniques will be discussed theoretically and computationally for various applications. This course provides the general principles of wind turbine loads, mechanics, rotor dynamics, and methods for modeling turbine structural response. Electrical aspects of wind turbines, turbine control, turbine materials and components will also be studied, as well as, turbine design and testing, wind turbine siting, system design and integration.  
Prerequisite(s): Completion of MATH 2243, MENG 3130, MENG 3135, MENG 3531 and a minimum grade of "C" in ENGR 2112, ENGR 2231, ENGR 3233, ENGR 3235.  
Cross Listing(s): MENG 5233G.  
MENG 5234 Heating, Ventilating, and Air Conditioning  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
This is an introductory course in Heating, Ventilating, and Air Conditioning (HVAC) systems. In this course HVAC processes are analyzed and load calculations are performed in accordance with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) practices.  
Prerequisite(s): A minimum grade of "C" in ENGR 3431, ENGR 3235, MENG 3233 or permission of instructor.  
Cross Listing(s): MENG 5234G.
MENG 5235 Combustion
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course is an introduction to the fundamentals of combustion processes, thermochemistry, chemical kinetics, simple chemical reactors, premixed and nonpremixed combustion, turbulent combustion and its practical applications including pollutant emissions.
Prerequisite(s): ENGR 3235, ENGR 3431, MENG 3233 or Permission of Instructor.
Cross Listing(s): MENG 5235G.

MENG 5237 Applied Combustion
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course is an introduction to the fundamentals of combustion processes, thermochemistry, chemical kinetics, simple chemical reactors, premixed and nonpremixed combustion, turbulent combustion and its practical applications, biofuel combustion, fuel surrogates, and pollutant emissions.
Prerequisite(s): A minimum grade of "C" in MENG 3233.
Cross Listing(s): MENG 5237G.

MENG 5238 Engine Development and Performance
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The design, development, operation, and environmental impact of internal combustion engines will be presented in this course with an engineering emphasis. Additionally, cycle evaluation and analysis of the energy systems, the efficiency and power generation, their benefits and costs will be determined.
Prerequisite(s): Completion of MENG 3531 and MENG 3233.
Cross Listing(s): MENG 5238G.

MENG 5239 Biofuels Testing
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The development of biofuels for engine operation and their environmental impact will be presented with an engineering emphasis. Additionally, life cycle evaluation, analysis of the energy systems and their efficiency with biofuels, together with benefits and costs will be determined.
Prerequisite(s): MENG 3233 and a minimum grade of "C" in ENGR 3431.
Cross Listing(s): MENG 5239G.

MENG 5331 Automation and Computer Integrated Manufacturing Systems
0,3 Credit Hours. 0,2 Lecture Hours. 0,2 Lab Hours.
This course will cover the fundamental concepts in manufacturing, automation, and various topics in production and control systems. These include numerical control, industrial robots, computer integrated manufacturing systems, flexible manufacturing system, and process monitoring and control.
Prerequisite(s): A minimum grade of "C" in ENGR 1133 and ENGR 1721 or MFGE 2534 and MENG 3333 or MFGE 2533 or permission of instructor.
Cross Listing(s): MENG 5331G.

MENG 5333 Robot Dynamics, Design and Analysis
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
An integrated treatment of robot kinematics, dynamics and control is introduced with an emphasis on analysis, design and programming of robots and their applications. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots; forward and inverse kinematics, differential kinematics, manipulability, workspace design; planar and spatial multi-rigid-body-dynamics, dynamic models of robots; introduction to computer vision; robot programming; and robot control. Students will be engaged in laboratory activities to study kinematics, dynamics, programming and real-time control of robotic systems that include manipulators, mobile robots, and unmanned aerial vehicles (UAVs).
Prerequisite(s): Completion of MENG 3531 and MENG 3130.
Cross Listing(s): MENG 5333G.

MENG 5431 Compressible Flow
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course introduces the basic equations and concepts of compressible flow. The generalized equations and solutions are developed and solved for: one-dimensional moving and normal shocks, oblique shocks, expansion fans, compressible flow with friction, and compressible flow with heat transfer. Software will be utilized to solve compressible flow problems.
Prerequisite(s): MENG 3233.
Cross Listing(s): MENG 5431G.

MENG 5432 Applied Computational Fluid Dynamics
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course introduces the numerical techniques applied to the solution of fluid flow and heat transfer problems. The Finite Difference and Finite Volume methods are used to discretize and numerically solve the governing equations of heat transfer and fluid mechanics. Commercial computational fluid dynamics software is utilized for the analysis of heat transfer and fluid mechanics problems.
Prerequisite(s): MENG 3233.
Cross Listing(s): MENG 5432G, MENG 5432H.

MENG 5536 Mechanical Controls
0,3 Credit Hours. 0,2 Lecture Hours. 0,2 Lab Hours.
An understanding of the elements of classical control theory will be developed. Students will be introduced to the concept of feedback and its properties; the concept of stability and stability margins; and the different tools that can be used to analyze these properties. Students will also develop a working knowledge of the basics of linear control techniques.
Prerequisite(s): Completion of MENG 2139 and MENG 3130 and MENG 3531 or permission of instructor.
Cross Listing(s): MENG 5536G, MENG 5536H.

MENG 5536H Mechanical Controls (Honors)
0,3 Credit Hours. 0,2 Lecture Hours. 0,2 Lab Hours.
An understanding of the elements of classical control theory will be developed. Students will be introduced to the concept of feedback and its properties; the concept of stability and stability margins; and the different tools that can be used to analyze these properties. Students will also develop a working knowledge of the basics of linear control techniques.
Prerequisite(s): Completion of MENG 2139 and MENG 3130 and MENG 3531 or permission of instructor.
Cross Listing(s): MENG 5536G, MENG 5536H.

MENG 5891 Special Problems in Mechanical Engineering
1-6 Credit Hours. 0 Learcut Hours. 2-12 Lab Hours.
Individual and specialized study in the areas of mechanical engineering not otherwise covered in the students' curriculum.
Prerequisite(s): Senior standing and identification of a problem or study area and permission of instructor.
Cross Listing(s): MENG 5891G, MENG 5891H.

MENG 5891H Special Problems in Mechanical Engineering (Honors)
1-6 Credit Hours. 0 Learcut Hours. 2-12 Lab Hours.
Individual and specialized study in the areas of mechanical engineering not otherwise covered in the students' curriculum.
Prerequisite(s): Senior standing and identification of a problem or study area and permission of instructor.
Cross Listing(s): MENG 5891, MENG 5891G.
TMAE 5131 Essentials of Applied Mechanical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no mechanical engineering experience. The principles of engineering mechanics are developed from a work/energy point of view. Survey topics include a review of the fundamentals of mechanics, elastic behavior of materials, stress-strain relationships and measurements, elasticity theory, stability, dynamics, and vibration theory.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5131G.

TMAE 5132 Essentials of Applied Electrical Engineering
3 Credit Hours. 2 Lecture Hours. 3 Lab Hours.
This is a course for students with no electrical engineering experience. Survey topics include electrical energy sources, DC circuits, resistive networks, network theorems, inductance, capacitance, natural and step responses of RL, RC, and RLC circuit, sinusoidal steady state analysis, Three-phase circuits, computer circuit analysis, non-linear, active components such as diodes, transistors (both bipolar and MOSFET), and operational amplifiers.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5132G.

TMAE 5133 Production Planning and Facilities Design
3 Credit Hours. 3 Lecture Hours. 1 Lab Hour.
The methods used to plan and control the efficient and effective use of equipment, tooling, people, materials, and other resources to manufacture products. This will lead to the examination of the fundamental theories, practices, and methods for the design of manufacturing and service facilities to enable productive flow of goods and services. Emphasis is placed on applied exercises utilizing spreadsheet and CAD software that culminates in a semester project.
Prerequisite(s): MENG 3333 or Permission of Instructor.
Cross Listing(s): TMAE 5133G.

TMAE 5134 Lean World Class Manufacturing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A comprehensive study of Lean Manufacturing Engineering technology and systems. Topics include key customer-focused, waste-reducing elements of Just-In-Time Production, Total Quality Control, Total Productive Maintenance, and Total Employee Involvement. Traditional manufacturing methods are contrasted with modern lean methods and the tools that facilitate their implementation. Students will study real world examples including quick-change tool designs, kanban systems, and factory layout conversions.
Prerequisite(s): A minimum grade of "C" in MENG 3333 or MFGE 3531.
Cross Listing(s): TMAE 5134G.

TMAE 5139 Renewable Energy
0.3 Credit Hours. 0.2 Lecture Hours. 0.3 Lab Hours.
The design, operation, and environmental and socio-economic impact of renewable energy systems will be presented with an engineering emphasis. Additionally, cycle evaluation and analysis of the renewable energy systems, the efficiency and power output of renewable energy systems, their benefits and costs will be determined.
Prerequisite(s): A minimum grade of "C" in ENGR 3235, ENGR 3431, MENG 3233 or permission of instructor.
Cross Listing(s): TMAE 5139G.

TMAE 5890 Selected Topics in Applied Engineering
1-3 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course is scheduled on an infrequent basis to explore special areas in applied engineering.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): TMAE 5890G.

TMFG 5133 Automated Manufacturing Systems
0,3 Credit Hours. 0,2 Lecture Hours. 0,3 Lab Hours.
Computer Integrated Manufacturing (CIM) concentrating on advanced computer numerical control machining, and the interface of robotics systems in manufacturing. Experiences using programming techniques, production equipment simulations and rapid prototyping are emphasized.
Prerequisite(s): ENGR 1133.
Cross Listing(s): TMFG 5133G.

TMFG 5230 International Manufacturing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study of opportunities, issues, and problems involved in manufacturing products for import and export, and in dealing with global suppliers of materials, parts, and assemblies. Focus is on those aspects unique to the management of technical operations, such as ISO (International Organization for Standardization) quality standards, scheduling, and technology transfer. Additional topics may include transportation, customs documentation, global trends and trade policies, and cultural issues.
Cross Listing(s): TMFG 5230G, TMFG 5230S.

TMFG 5230S International Manufacturing
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A study of opportunities, issues, and problems involved in manufacturing products for import and export, and in dealing with global suppliers of materials, parts, and assemblies. Focus is on those aspects unique to the management of technical operations, such as ISO (International Organization for Standardization) quality standards, scheduling, and technology transfer. Additional topics may include transportation, customs documentation, global trends and trade policies, and cultural issues.
Cross Listing(s): TMFG 5230G, TMFG 5230S.

TMFG 5233 Manufacturing Applications in Information Technology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A senior level seminar emphasizing the application of commercially available software to solve manufacturing production problems. Topics include Theory of Constraints, Failure Mode and Effect Analysis, Flow Charting, and Project Management.
Cross Listing(s): TMFG 5233G.

TSEC 5331 Occupational Safety
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The technical aspects of developing and implementing occupational safety programs in manufacturing industries. Emphasis on hazard identification and control. Topics include: OSHA compliance, accident investigation, fire protection, machine guarding, noise abatement, and electrical safety.
Cross Listing(s): TSEC 5331G.

TSEC 5332 Ergonomics
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The human machine interface in manufacturing industries as it relates to the well-being of workers and efficiency of production systems. The application of human factors from both physiological and psychological perspectives are examined. Emphasis is placed on regulatory compliance.
Cross Listing(s): TSEC 5332G.

TSEC 5333 Industrial Hygiene and Ergonomics
0,3 Credit Hours. 0,3 Lecture Hours. 0,1 Lab Hours.
A study of the techniques used by health and safety professionals to anticipate, recognize, evaluate, and control those environmental factors or stresses arising in or from the workplace that adversely affect an employees' health, comfort, and performance. Ergonomic tool and work area design and work procedures are emphasized. Regulatory agencies, compliance, and program management issues are discussed.
Cross Listing(s): TSEC 5333G.
TSEC 5334  Hazardous Waste Management
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A study of hazardous waste substances as they are created by various industries and their proper management by combining planning, organizing, and controlling techniques with a knowledge of generating, storing, transporting, treating, recycling and disposing of hazardous materials. Issues of environmental impact, regulatory compliance, ethics, and program management are discussed from a technical management perspective.
Cross Listing(s): TSEC 5334G.

TSEC 5335  Systems Safety in Manufacturing
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A study of the application of systems safety concepts to manufacturing and production systems. Emphasis is placed on the critical analysis of systems through modeling and the development of control strategies to reduce the frequency and severity of industrial accidents.
Cross Listing(s): TSEC 5335G.

TSEC 5336  Environmental Law
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A course designed to provide an introduction and overview (for those without legal or specific scientific training) of the system through which our nation attempts to preserve the environment. The U.S. legal system, national, and international environmental policy is reviewed. Emphasis is placed on the control of air quality, water quality, toxic substances, and hazardous releases as it relates to environmental regulation of industry.
Cross Listing(s): TSEC 5336G.