MECHANICAL ENGINEERING (MENG)

MENG 1001 - Introduction to Aerospace & Mechanical Engineering
Credit(s): 1 Credit
This course will introduce aerospace and mechanical engineering. Through hands-on activities, students will learn the basics of engineering design and entrepreneurship. Working in teams, students will build aerospace and mechanical systems, practice entrepreneurial thinking, and develop the personal and professional skills needed to engage in lifelong learning. This course is open to non-majors.

MENG 1002 - Computer-Aided Engineering Design
Credit(s): 1 Credit
This course is an introduction to engineering drawing and computer aided design (CAD) and 3D solid modeling. Students will learn to interpret engineering drawings, create engineering drawings, and create 3D models of mechanical systems.

MENG 2000 - Foundation to Engineering Design
Credit(s): 3 Credits
Introduction to engineering, design philosophy, design methodology, design process, human factors, ethics, and economics. Various case studies will be presented to understand the principles of engineering. This course would prepare a student to think creatively in other engineering courses. Aided Eng. Design.
Prerequisite(s): (PHYS 1610* and MENG 1002*)
* Concurrent enrollment allowed.

MENG 2011 - Engineering Shop Practice
Credit(s): 1 Credit

MENG 2300 - Applied Thermodynamics
Credit(s): 3 Credits
This course is an extension of the course on Thermodynamics. A detailed study on cycle analysis is included. Applications to compressors, turbines, heat pump, refrigeration and air-conditioning are emphasized. A design, comparison and evaluation of several design cycles is included.
Prerequisite(s): ESCI 2300

MENG 2600 - Manufacturing Process
Credit(s): 3 Credits
This course provides detailed discussion on various manufacturing processes: netshape, material removal, and joining and assembly processes. Students learn the fundamental principles and the tools-of-the-trade by working hand-on with the machine tools. The current manufacturing techniques such as rapid prototyping, manufacturing cells, and lean-manufacturing are discussed.
Prerequisite(s): MENG 2011

MENG 2910 - Co-Op with Industry
Credit(s): 0 Credits (Repeatable for credit)
A full-time supervised work experience with an agency, firm or organization that employs persons in this degree field. This course is used for the first experiential learning session. Grading system is determined by department offering course.
Restrictions:
Students with a classification of Freshman may not enroll.

MENG 2913 - Co-Op in Mechanical Engineering
Credit(s): 0 Credits (Repeatable for credit)
An optional supervised work experience with an agency, firm, or organization which employs engineers. The student receives a Pass or No Pass grade.

MENG 2930 - Special Topics
Credit(s): 3 Credits (Repeatable for credit)

MENG 2980 - Independent Study
Credit(s): 1 or 3 Credits (Repeatable for credit)

MENG 3001 - Mechanical Engineering Lab
Credit(s): 1 Credit
Prerequisite(s): MENG 3430*; MENG 3510*
* Concurrent enrollment allowed.

MENG 3010 - Machine Design
Credit(s): 3 Credits
Design methodology, optimization, design of various machine elements including shafts, springs, belts, gears, and bearing. Design for strength and rigidity, fatigue and fracture.
Prerequisite(s): MENG 2000; AENG 3100*
* Concurrent enrollment allowed.

MENG 3430 - Measurements
Credit(s): 3 Credits
A study of various measurement techniques in engineering and statistical analysis of experimental data. Applications to the measurement of strain, force, pressure, temperature, and fluid flow. An emphasis is given to design of an experiment and error analysis using statistical data analysis.
Prerequisite(s): ECE 2002; ECE 2001

MENG 3510 - Material Science
Credit(s): 3 Credits
A study of the material properties, atomic structure and bonding, mechanical failure theory, dislocation, phase diagrams, polymer structure, and ceramics.
Prerequisite(s): (CHEM 1070 or CHEM 1110); ESCI 3100

MENG 3901 - Co-Op with industry
Credit(s): 0 Credits (Repeatable for credit)
A full-time supervised work experience with an agency, firm or organization that employs persons in this degree field. This course is used for the second experiential learning session.

MENG 3915 - Internship with Industry
Credit(s): 0-3 Credits (Repeatable for credit)
A work experience with an agency, firm or organization that employs persons in this degree field. This experience may be full time or part-time as required by the industry sponsor. This course is used for the first experiential learning session.
Restrictions:
Enrollment limited to students with a classification of Junior or Senior.

MENG 3930 - Special Topics
Credit(s): 3 Credits (Repeatable for credit)

MENG 3980 - Independent Study
Credit(s): 1 or 3 Credits (Repeatable for credit)
MENG 4004 - Design I  
Credit(s): 3 Credits  
Preliminary design of a mechanical system with emphasis on concurrent 
engineering, human factors, costs analysis, and material selection. The 
design project may be sponsored by industry or department. Also an 
emphasis is given to writing the design proposal and presenting it to a 
committee from the department.  
Prerequisite(s): MENG 3010*; MENG 2600  
*Concurrent enrollment allowed.

MENG 4014 - Design II  
Credit(s): 3 Credits  
Detailed design of a mechanical system, manufacturing the product 
if feasible, cost estimation, testing and demonstration of the product. 
A report on the final design is required and also the design should be 
presented to the faculty and peers from industry.  
Prerequisite(s): MENG 4004

MENG 4300 - Heat Transfer  
Credit(s): 3 Credits  
Prerequisite(s): (CSCI 1060 or CSCI 1300); (ESCI 2300 and ESCI 3200)

MENG 4450 - Principles of Mechatronics  
Credit(s): 3 Credits  
Introduction to basic components: sensors, transducers, microprocessor-
based systems and PLC's. Applications in motion control (AC/DC motors 
& stepper motors). A major project in electro-mechanical system design 
and development.  
Prerequisite(s): ECE 2001

MENG 4910 - Co-Op with Industry  
Credit(s): 0-3 Credits (Repeatable for credit)  
A full-time supervised work experience with an agency, firm or 
organization that employs persons in this degree field. This course is 
used for the third experiential learning session.  
Prerequisite(s): MENG 3910

MENG 4915 - Internship with Industry  
Credit(s): 0-3 Credits (Repeatable for credit)  
A work experience with an agency, firm or organization that employs 
persons in this degree field. This experience may be full time or part-time 
as required by the industry sponsor.  
Prerequisite(s): MENG 3915

MENG 4930 - Special Topics: Mechanical Engineering  
Credit(s): 3 Credits (Repeatable for credit)

MENG 4980 - Independent Study  
Credit(s): 0-3 Credits (Repeatable for credit)  
Credits to be arranged. Independent Study on a topic in Mechanical 
Engineering under the direction of a Faculty member.

MENG 5100 - Advanced Mechanics of Solids  
Credit(s): 3 Credits  
Elasticity relations, linear elasticity assumptions, St. Venant’s principle, 
transformation of stress, principal stresses in 3D, plane elasticity, Airy 
stress function, polynomial solutions, thermal stresses, relations in polar 
coordinates, point load solutions, stress concentration, axisymmetric 
problems, stresses in disks & cylinders, energy methods, Rayleigh Ritz, 
Buckling. Emphasis on advanced applications.

MENG 5110 - Fracture Mechanics and Plasticity  
Credit(s): 3 Credits  
Advanced elasticity topics: plate theory, stress singularities at re-entrant 
corners, intro to fracture mechanics, mechanics of bonded interfaces, 
estatic contact mechanics; Plasticity topics: yield criteria in metal 
plasticity, deformation and incremental plasticity, elastic-plastic stress-
strain relations, strain hardening, small-strain elastoplasticity (bending, 
torsion, buckling, disks and cylinders).  
Prerequisite(s): MENG 5150 with a grade of C or higher; MENG 5100 with 
a grade of C or higher

MENG 5150 - Finite Element Analysis I  
Credit(s): 3 Credits  
Introduction to basic components: sensors, transducers, microprocessor-
based systems and PLC's. Applications in motion control (AC/DC motors 
& stepper motors). A major project in electro-mechanical system design 
and development.  
Prerequisite(s): MENG 4004  
MENG 5150 with a grade of C or higher; MENG 5100 with  
Concurrent enrollment allowed.
MENG 5915 - internship with Industry
Credit(s): 1-3 Credits
A work experience with an agency, firm, organization that employs persons in this degree field. This experience may be full time or part time as required by the industry sponsor.

MENG 5930 - Special Topics
Credit(s): 1-3 Credits (Repeatable for credit)
A one-time course on a particular topic, or a trial course that is expected to become a standard course with its own unique course number.

MENG 5964 - Master's Project
Credit(s): 1-3 Credits (Repeatable for credit)
Theoretical/computational/experimental work that leads to a Project Report and of defense of the Project.

MENG 5974 - Research Topics
Credit(s): 1-3 Credits

MENG 5980 - Independent Study
Credit(s): 1 or 3 Credits (Repeatable for credit)

MENG 5984 - Independent Study
Credit(s): 1-3 Credits (Repeatable for credit)
A non-classroom course in which a student explores a topic that is related to the student’s graduate work and career goals.

MENG 5994 - Master's Thesis Research
Credit(s): 0-6 Credits (Repeatable for credit)
Research that leads to a Master's Thesis and final defense of the Thesis.

MENG 6910 - Co-op with Industry
Credit(s): 1-6 Credits
A full-time supervised work experience with an agency, firm or organization that employs persons in this degree field.

MENG 6915 - Internship with Industry
Credit(s): 1-3 Credits
A work experience with an agency, firm, organization that employs persons in this degree field. This experience may be full time or part time as required by the industry sponsor.

MENG 6930 - Special Topics
Credit(s): 3 Credits (Repeatable for credit)

MENG 6974 - Research Topics
Credit(s): 1-3 Credits
Theoretical or Computational or experimental work that is not part of the Dissertation.

MENG 6980 - Independent Study
Credit(s): 1 or 3 Credits (Repeatable for credit)

MENG 6984 - Independent Study
Credit(s): 1-3 Credits (Repeatable for credit)
A non-classroom course in which a student explores a topic that is related to the student’s doctoral work and career goals.

MENG 6994 - Doctoral Dissertation Research
Credit(s): 0-6 Credits (Repeatable for credit)
A non-classroom course in which a student explores a topic that is related to the student’s doctoral work and career goals.