

MECHANICAL ENGINEERING (MEEN)

MEEN 305. Materials Science & Engineering. 3 Hours.

The present course introduces the basic principles behind materials science and engineering. It provides the scientific foundation for an understanding of the relationships among material properties, structure, and performance in metals and alloys, polymers, composites, ceramics, semiconductors, etc. Throughout the classes, students are expected to gain an understanding of these materials, processing techniques, their properties, and how they are applied in the industry. Prerequisite: CHEM 1311 or CHEM 1307 and PHYS 2325.

MEEN 333. Principles of Thermodynamics. 3 Hours.

Theory and application of energy methods in engineering; conservation of mass and energy; energy transfer by heat, work, and mass; thermodynamic properties; analysis of open and closed systems; the second law of thermodynamics and entropy; gas, vapor, and refrigeration cycles. Prerequisite: PHYS 2325.

MEEN 357. Engineering Analysis for Mechanical Engineers. 3 Hours.

This course covers numerical methods and their use for solving computational problems in engineering. The course is devoted to mathematical essentials and software utilization of the following numerical methods: solving nonlinear equations, solving systems of linear algebraic equations, interpolation, curve fitting, numerical differentiation, numerical integration, and optimization. Engineering applications of the numerical techniques are also considered. Cross-listed with ENGR 315 Engineering Computations. Prerequisite: MATH 2413.

MEEN 360. Manufacturing and Materials Selection in Design. 3 Hours.

Selecting materials and manufacturing processes in design; emphasis on material mechanical properties; microstructure production and control; manufacturing processes for producing various shapes for components and structures; use of design methodology. Prerequisite: MEEN 343 or MEEN 305. Co-requisite: MEEN 361.

MEEN 361. Manufacturing and Materials in Design Laboratory. 1 Hour.

Experiments in materials characterization and manufacturing processes; emphasis on material mechanical properties; microstructure production and control; manufacturing processes for producing various shapes for components and structures. Corequisite: MEEN 360.

MEEN 363. Dynamics and Vibrations. 3 Hours.

This course offers comprehensive knowledge of the fundamentals of free and forced vibrations. It explores the application of vibration principles in analyzing engineering systems and devices. The course also addresses various aspects of vibration measurement and techniques for minimizing or eliminating unwanted vibrations. Students will tackle vibration-related problems and gain insights into systems with two or more degrees of freedom. Prerequisite: MATH 2320 and ENGR 2302.

MEEN 364. Control Systems. 3 Hours.

This course is a review of the relations among transient responses, systems transfer functions, and methods of specifying system performance. It will include classical and modern feedback control system analysis and design methods, such as transfer functions, state variables, stability, root locus, Bode plot, and computer analysis. Course is cross-listed with and is equivalent to EE 432. Credit cannot be granted for both MEEN 364 and EE 432. Prerequisite: (MATH 2320, ENGR 2305, and MEEN 357), or EE 325.

MEEN 368. Solid Mechanics in Mechanical Design. 3 Hours.

Design of structural/mechanical members for stiffness, strength and stability under a variety of loading conditions; use of Static and Fatigue Failure Theories to estimate life of components. Prerequisite: MEEN 343 or ENGR 343.

MEEN 401. Finite Element Analysis in Mechanical Design. 3 Hours.

Introduction to Finite Element Method and its application for one, two, and three-dimensional structural and thermal Problems. Prerequisite: Senior Standing or Instructor permission.

MEEN 461. Heat Transfer. 3 Hours.

Heat transfer by conduction, convection and radiation. Steady and transient conduction, forced and natural convection, and blackbody and gray body radiation; multi-mode heat transfer; heat exchangers. Prerequisite: ENGR 340. Corequisite: MEEN 462.

MEEN 462. Heat Transfer Laboratory. 1 Hour.

Basic measurement techniques in conduction, convection, and radiation heat transfer, boiling and condensation, and heat exchangers. Corequisite: MEEN 461.

MEEN 465. Introduction to Nanotechnology. 3 Hours.

This course introduces the basic principles behind nanotechnology and associate technologies. The lectures mainly focus on processing techniques of nanoparticles, nanofibers/wires, nanotubes, nanofilms, and nanocomposites using physical, chemical, and physicochemical techniques, as well as the characterizations and potential commercial applications. Throughout the classes, students are expected to gain an understanding of these materials and fabrication techniques, and how they are applied in nanomaterials and nanodevice fabrication. Prerequisite: MEEN 343 or Instructors permission.

MEEN 490. Senior Design I. 3 Hours.

This course is taken by seniors as the first part of the senior design experience in the semester before MEEN 491. Projects may involve the design of a device, circuit system, process, or algorithm and topics covered may include the design process, project planning and management, and project costs, and includes aspects of ethics in engineering design, safety, environmental considerations, economic constraints, liability, manufacturing, and marketing. Projects are carried out using a team-based approach and selection and analysis of a design project to be continued in MEEN 491. Written progress reports, a proposal, a final report, and oral presentations are required. Open only to Mechanical Engineering majors Taken in last 30 hours. Cross-listed with EE 490. Credit can only be awarded for one course Prerequisites: Taken in last 30 hours of the degree and MEEN 368.

MEEN 491. Senior Design II. 3 Hours.

Projects involving the design of a device, circuit system, process, or algorithm that have started in the previous semester will be completed. Team solution to an engineering design problem as formulated and initiated in MEEN 490 will continue to take place. Written progress reports, a final report, design manuals, and oral presentations are required. Cross-listed with EE 491. Credit can only be awarded for one course. Open only to Mechanical Engineering majors. Prerequisite: MEEN 490.

MEEN 497. Special Topics. 3 Hours.

Instructors will provide an organized class designed to cover areas of specific interest. Students may repeat the course when topics vary.