MECHANICAL ENGINEERING (MEEN)

MEEN 301. Engineering Mechanics I- Statics. 3 Hours.
This course covers the principles of engineering mechanics in statics including force systems, moments of inertia, vector mechanics and analysis of structures. Corequisite or Prerequisite: PHYS 2325.

MEEN 302. Engineering Mechanics II- Dynamics. 3 Hours.
This course covers the principles of engineering mechanics in dynamics including Newton's laws, kinetic and potential energy, linear and angular momentum, work, impulse, and inertia properties. Prerequisite: PHYS 2325.

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.
This course examines theory and application of energy methods in engineering, conservation principles to investigate "traditional" thermodynamics, and internal flow fluids. Topics include the Laws of Thermodynamics, entropy, refrigeration, fluid properties, momentum, and head transfer. Prerequisite: PHYS 2325.

MEEN 340. Fluid Mechanics. 3 Hours.
Application of laws of statics, buoyancy, stability, energy and momentum to behavior of ideal and real fluids; dimensional analysis and similitude and their application to flow through ducts and piping; lift and drag related problems. Prerequisite: MEEN 301 or Instructor Permission. Corequisite: MEEN 341.

MEEN 341. Fluid Mechanics Laboratory. 1 Hour.
Introduction to basic fluid mechanics instrumentation; experimental verification and reinforcement of the analytical concepts introduced in the Fluid Mechanics lecture. Corequisite: MEEN 340.

MEEN 343. Mechanics of Materials. 3 Hours.
Stress analysis of deformable bodies and mechanical elements; stress transformation; combined loading; failure modes; material failure theories; fracture and fatigue; deflections and instabilities; thick cylinders; curved beams; design of structural/mechanical members; design processes. Prerequisite: MEEN 301.

MEEN 357. Engineering Analysis for Mechanical Engineers. 3 Hours.
Practical foundation for the use of numerical methods to solve engineering problems. Introduction to Matlab, error estimation, Taylor series, solution of non-linear algebraic equations and linear simultaneous equations; numerical integration and differentiation; initial value and boundary value problems; finite difference methods for parabolic and elliptic partial differential equations. 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; microstrcture production and control; manufacturing processes for producing various shapes for components and structures. Corequisite: MEEN 360.

MEEN 363. Dynamics and Vibrations. 3 Hours.
Application of Newtonian and energy methods to model dynamic systems (particles and rigid bodies) with ordinary differential equations; solution of models using analytical and numerical approaches; interpreting solutions; linear vibrations with specific application in the forest products processing industry. Generalizations used to study other industrial applications. Prerequisite: MEEN 357.

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. Prerequisite: EE 325 or MATH 2320.

MEEN 368. Solid Mechanics in Mechanical Design. 3 Hours.
Stress analysis of deformable bodies and mechanical elements; stress transformation; combined loading; failure modes; material failure theories; fracture and fatigue; deflections and instabilities; thick cylinders; curved beams; design of structural/mechanical members; design processes. Prerequisite: MEEN 343.

MEEN 404. Project Management and Engineering Operations. 3 Hours.
Basic project management for engineering; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers. Prerequisite: Junior or 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; boiling and condensation; heat exchangers. Prerequisite: MEEN 340 or instructors permission. Corequisite: MEEN 462.

MEEN 462. Heat Transfer Laboratory. 1 Hour.
Basic measurement techniques in conduction, convection, and radiation heat transfer; experimental verification of theoretical and semi-empirical results; uncertainty analysis. 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. Taken in last 30 hours. Cross-listed with EE 490, CS 490 and MGT 490. Credit can only be awarded for one course. Open only to Mechanical Engineering majors.

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, CS 491 and MGT 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.