MECHANICAL ENGINEERING (MEEN)

MEEN 1201 Intro to Mech Eng as a Career 2 SCH (1-3)
The art and practice of mechanical engineering and its role in society. Promotes critical and analytical thinking; gives basic skills for the engineering approach to problem-solving, engineering design process and reverse engineering; and introduces engineering ethics.
Fee: $5.00

MEEN 1310 Engineering Graphics I 3 SCH (2-3)
Introduction to computer-aided design and analysis; principles of graphics, solid modeling, integrated applications of software in engineering drafting, design and problem solving.

MEEN 1320 Elem Num Meth & Engr Prob Solv 3 SCH (2-3)
Engineering problem-solving using high level programming language and numerical computing software. Programming logic; linear algebra and matrices; solutions to systems of linear equations; interpolation and curve fitting; numerical integration and differentiation.

MEEN 2146 Engineering Measurements 1 SCH (3)
Basic experimental techniques and instrumentation commonly found in industry. Experimental planning and analysis. ASTM methods introduced. Data acquisition means studied. Significance of data and presentation (written and oral). Computer usage and report writing emphasized.
Prerequisites: PHYS 2325/2125.
Fee: $5.00

MEEN 2302 Mechanics II Dynamics 3 SCH (3-0)
Kinematics of particles and rigid bodies; motion relative to translating and rotating reference frames. Kinetics of particles and rigid bodies: Newton's second law, work-energy and impulse and momentum. Introduction to vibrations. Prerequisite: CEEN 2301 with a grade of C or higher.

MEEN 2355 Statics and Dynamics 3 SCH (3)
Resultants of force systems. Equilibrium of rigid bodies. Friction. Centroids and moments of inertia. Kinematics and kinetics of particles and rigid bodies. This course cannot be taken for credit by CEEN and MEEN majors. Prerequisites: PHYS 2325/2125 and MATH 2314.

MEEN 3145 Material Science Laboratory 1 SCH (3)
Tensile, impact, fatigue, hardness and hardenability, creep, phase and microstructure, corrosion testing and microscopic analysis. Ferrous and non-ferrous materials and polymers are studied. ASTM methods are introduced and applied. Introduction to data acquisition and recording. Reporting in both written and oral format. Prerequisite: Credit or registration in MEEN 3344.
Fee: $5.00

MEEN 3344 Materials Science 3 SCH (3)
Atomic and crystal structure of materials. Chemical, mechanical, electrical and thermal properties of engineering materials. Materials selection and design. Prerequisites: CHEM 1311, CHEM 1111 and MATH 2413, and credit or enrollment in PHYS 2326.

MEEN 3347 Thermodynamics 3 SCH (3)
Basic laws governing energy transmission. Thermodynamic properties of liquids and vapors, the ideal gas law and the behavior of ideal gases. Concept of reversible process. Prerequisites: MATH 2414 and PHYS 2325/2125.

MEEN 3348 Heat Transfer 3 SCH (3)
Fundamental laws relating to heat transfer including steady and transient heat conduction, forced, convection, natural convection and radiation. Introduction to heat exchanger design. Prerequisites: MEEN 3347, MEEN 3392, and MATH 3320.

MEEN 3349 Fundamentals of Mfg Processes 3 SCH (2-3)
Selection criteria for manufacturing processes, processing of castings, bulk deformation process, sheet metal working, polymer and polymer-matrix composite production, machining and welding processes. Prerequisites: MEEN 1310 and MEEN 3344.

MEEN 3350 Machine Design I 3 SCH (3-0)
Application of principles of mechanics and physical properties of materials to the design of machine elements such as shafts, springs, power screws and gears. Prerequisites: CEEN 3311, MEEN 2302 and MEEN 3344.

MEEN 3352 Kinematics of Machines 3 SCH (3)
Linkages, mobility analysis, Grashof condition, instant centers, analysis and synthesis of mechanisms, cams, gears and gear trains. Prerequisites: MATH 2414, MEEN 2302.
Fee: $2.00

MEEN 3360 Engineering Design & Sim 3 SCH (3)
Introduction to the engineering design process via team-based projects utilizing commercial Computer Aided Engineering software packages. Engineering design process; problem definition, conceptual design, modeling, analysis, system design and optimization. Communicating the design via drawings, models, verbal and written reports. Prerequisites: MEEN 1310 and MEEN 1320. Corequisites: MEEN 3350 and MEEN 3348.

MEEN 3392 Fluid Mechanics 3 SCH (3)
Basic properties of fluids. Fluid statics. Fluids in motion. Continuity, energy, and linear and angular momentum equations in integral and differential forms. Incompressible viscous flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers and free surface flows. Prerequisites: MATH 3320 and credit or registration in MEEN 2302.
MEEN 3398  Comp App in Nuclear Engr  3 SCH (3)
Applications of computer software to solve nuclear engineering problems; nuclear data and cross-section libraries; deterministic and stochastic
models; single and multi-objective optimization; applied nuclear engineering codes. Prerequisite: junior standing.

MEEN 4131  Mechanical Engineering Lab  1 SCH (3)
Experimental investigation of mechanical engineering systems: engines, fluid flow, and heat transfer systems used in various mechanical engineering
applications. Prerequisites: MEEN 2146 and MEEN 3348.
Fee: $5.00

MEEN 4263  Mech Engr Design Proj I (Wi)  2 SCH (1-3)
Capstone design course emphasizing quantitative, analytical/computer and experimental methods, including optimization and simulation, as applied
to the design process for a broad range of practical problems in mechanical engineering. Integrates knowledge gained from all required mechanical
engineering courses in a major system design project. Prerequisites: senior standing in Mechanical Engineering, MEEN 3350, MEEN 3352, and
MEEN 3360.
Fee: $5.00

MEEN 4264  Mech Eng Design Projects II  2 SCH (1-3)
Capstone design course emphasizing the application of analytical/computer and experimental methods to the solution of a broad range of practical
problems in mechanical engineering. Integrates knowledge gained from all required mechanical engineering courses via the completion of a system
design project. Prerequisite: MEEN 4263. Laboratory fee, $5.
Fee: $5.00

MEEN 4301  Design of Aerospace Structures  3 SCH (3-0)
Advanced strength of materials analysis and design of light-weight elastic structures with aerospace applications. Failure modes and criteria,
Torsion and bending of asymmetrical thin-walled sections. Design project. Prerequisites: senior standing in Mechanical Engineering and credit or
enrollment in MEEN 3360.

MEEN 4303  Aerodynamics  3 SCH (3)
Aerodynamics of airfoils and wings in subsonic, transonic and supersonic flight. Laminar and turbulent boundary layers and effects of viscosity on
aerodynamic performance. Prerequisites: senior standing in Mechanical Engineering, MEEN 3347 and MEEN 3392.

MEEN 4305  Aerospace Flight Dynamics  3 SCH (3-0)
Three-dimensional rigid body dynamics, aircraft equations of motion, static and dynamic stability, manual flight control design, introduction to
aeroelastic phenomena. Attitude and altitude dynamics, interplanetary transfers, altitude coordinates, stability, manual control, and estimation.
Prerequisites: senior standing in Mechanical Engineering and MEEN 2302.

MEEN 4307  Aerospace Systems Design  3 SCH (3)
Aircraft/Spacecraft design of systems and subsystems. Preliminary design or study of a complete flight vehicle. Application of mission and
spacecraft design principles in developing a space flight mission concept. Prerequisites: senior standing in Mechanical Engineering, MEEN 3352,
MEEN 3360, credit or registration in MEEN 3303.

MEEN 4317  Internal Combustion Engines  3 SCH (3)
Thermodynamics of cycles, comparison of characteristics and performance of several forms of internal combustion engines including Otto and Diesel
types of piston engines. Fuels, combustion, injection and supercharging. Prerequisites: senior standing in Engineering, MEEN 3392 and MEEN 4341.

MEEN 4335  Special Problems  1-3 SCH (1-3)
Individual solution of selected problems in mechanical engineering conducted under direct supervision of a faculty member. May be repeated for up to
6 semester hours. Prerequisite: senior standing.

MEEN 4336  Selected Topics  1-3 SCH (1-3)
One or more topics of mechanical engineering. May be repeated when topic changes. Prerequisite: senior standing.

MEEN 4341  Appl of Thermodynamics  3 SCH (3)
Design of power and refrigeration systems, mixing (or separation), multiphase, air conditioning and energy conversion processes. Prerequisites:
MEEN 3347 and MATH 3415.

MEEN 4343  Dynamics of Systems  3 SCH (3)
Analysis of dynamic-mechanical, electrical, fluid and thermal system elements; modeling, analysis and design of physical, dynamic systems
composed of these elements. Prerequisites: senior standing in Mechanical Engineering, MATH 3320, MEEN 1320 and MEEN 2302.

MEEN 4344  Control of Systems  3 SCH (2-3)
Analysis and design of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability,
controllability, observability and to discrete time; sampled data control systems; optimal control systems and nonlinear control theory. Prerequisite:
senior standing in Engineering.
Fee: $5.00

MEEN 4345  Engineering Vibrations  3 SCH (3)
Free and forced vibrations, degrees of freedom, energy methods, transients, harmonic analysis, damping. Prerequisites: senior standing in Mechanical
Engineering, MATH 3320 and MEEN 2302.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>MEEN 4346</td>
<td>Computational Methods in Mech Eng</td>
<td>3 SCH</td>
<td>senior standing in Mechanical Engineering, MEEN 1320 and credit or registration in MEEN 3348 or MEEN 3350.</td>
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<tr>
<td>MEEN 4347</td>
<td>Hydraulics of Pipeline Systems</td>
<td>3 SCH</td>
<td>senior standing in Mechanical Engineering, MEEN 3350 and MEEN 3392.</td>
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<td>MEEN 4348</td>
<td>Gas Dynamics</td>
<td>3 SCH</td>
<td>senior standing in Mechanical Engineering, MATH 3320 and credit or registration in MEEN 3348.</td>
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<td>MEEN 4349</td>
<td>Air Conditioning</td>
<td>3 SCH</td>
<td>senior standing in Mechanical Engineering, MEEN 3392 and MEEN 4341.</td>
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<tr>
<td>MEEN 4351</td>
<td>Machine Design II</td>
<td>3 SCH</td>
<td>Design techniques of brakes, clutches, bevel, worm and helical gears, thick cylinders, flywheels, impact and elastic bodies, curved beams, flat plates and cams. Prerequisite: MEEN 3350. Fee: $2.00</td>
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<tr>
<td>MEEN 4352</td>
<td>Design of Turbomachinery</td>
<td>3 SCH</td>
<td>Design and application of centrifugal and axial flow pumps and turbines, consideration of similarity parameters, real machine performance characteristics, materials and methods of construction, selection process for various applications. Prerequisites: senior standing in Mechanical Engineering, MEEN 3392 and MEEN 4341.</td>
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<tr>
<td>MEEN 4354</td>
<td>Intro to Finite Elem Method</td>
<td>3 SCH</td>
<td>Principles and applications of the finite element method. Matrix and vector operations, structure and organization of finite element computer programs. Structural and nonstructural elements and applications. Prerequisites: MEEN 1320, MATH 3320, CEEN 3311 and senior standing.</td>
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<tr>
<td>MEEN 4355</td>
<td>Robotics I</td>
<td>3 SCH</td>
<td>Multidisciplinary introduction to robotics, combining concepts from the fields of electrical engineering, mechanical engineering and computer science. Topics include locomotion, maneuverability, actuating, trajectory planning, motion control, and sensing. Prerequisite: senior standing.</td>
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<tr>
<td>MEEN 4371</td>
<td>Introduction to UAVs</td>
<td>3 SCH</td>
<td>Foundations and basic components of Unmanned Aerial Vehicles (UAVs) from a system point of view, design considerations, payloads, communications, control and stability, navigation, UAV system roles and operations, control stations. Prerequisite: senior standing.</td>
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<tr>
<td>MEEN 4373</td>
<td>Info Anal. &amp; Mod. in Sec Eng</td>
<td>3 SCH</td>
<td>Fundamental methods and tools used for information analysis and modeling related to homeland security. It will also introduce engineering and technical challenges of homeland security, including modeling and analysis, technological issues, command, control and situational awareness and data integration requirements. Prerequisite: senior standing in Mechanical Engineering, Electrical Engineering, or Computer Science, or approval from instructor.</td>
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<tr>
<td>MEEN 4385</td>
<td>Manufacturing of Composites</td>
<td>3 SCH</td>
<td>Introduction to composites materials and manufacturing processes; hand lay-up, air and oven curing, filament winding and compression molding. Materials selection and fabrication of marine, aerospace, chemical, and civil structures. Practical case studies and projects. Prerequisites: senior standing in Mechanical Engineering, CEEN 3311, and MEEN 3344.</td>
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<td>MEEN 4395</td>
<td>Therm Hydr of Nuclear Reactors</td>
<td>3 SCH</td>
<td>Thermal hydraulics of nuclear reactor cores; two-phase flow regimes, the boiling curve, dry-out phenomena, natural circulation in reactor core, transients and instabilities of two-phase flow. Prerequisites: senior standing in Mechanical Engineering, MATH 3320, PHYS 2325, and MEEN 3392.</td>
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<td>MEEN 4397</td>
<td>Intro to Power Plants</td>
<td>3 SCH</td>
<td>Introduction to basic topics in the analysis and design of nuclear power plants. Prerequisites: senior standing in Mechanical Engineering, MATH 3320 and PHYS 2326.</td>
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<td>MEEN 4399</td>
<td>Internship in MEEN</td>
<td>1-3 SCH</td>
<td>Internships in industry, government or consulting companies, designed to broaden the skills obtained through curricular education. Prerequisites: senior standing.</td>
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