

Courses taught by the Mechanical Engineering Program at UW-Platteville. Please select all that you could teach.

GENENG 1030 Introduction to Engineering Projects

1 Credit

An introductory course which will provide the opportunity for new engineering students to explore the UWP engineering programs through seven hands-on engineering modules, representing the seven engineering disciplines at UW-Platteville. Emphasis will be placed on written and oral communication skills, data collection and analysis, computer application skills and group work. Additional topics include: university requirements; time management; introduction to computer skills; engineering ethics; and introduction to engineering methods.

GENENG 2030 Engineering Modeling and Design

3 Credits

An introduction to design tools and practices associated with the design and development of engineering systems. Students will gain experience with solid modeling tools, including part modeling, assembly modeling and the reading and creation of layout drawings. The project portion of the course will focus on "reverse engineering". Reverse engineering will be used to examine the design of existing systems (objects such as: a fishing reel, a small refrigerator, a hair dryer, and similar), their assembly, and the engineering principles that form the foundation for the product. Students will model these systems and suggest possible design changes that might lead to improvements in form, function, and/or assembly.

Components: Laboratory, Class

Prereqs/Coreqs: P: MATH 1530 or MATH 2530 or MATH 2450 with a grade of "C-" or better, or mathematics proficiency level of 30 or above.

Typically Offered: Fall/Spring

GENENG 2130 Engineering Mechanics-Statics

3 Credits

Composition, resolution and equilibrium of forces and force systems; analysis of structures; friction; centroids; moment of inertia.

Components: Class

Prereqs/Coreqs: P: MATH 2640 with a C- or better or GENENG 1500 with a C- or better and (C: GENENG 1030 or P: MSNT 1010).

Typically Offered: Fall/Spring/Summer

GENENG 2230 Engineering Mechanics-Dynamics

3 Credits

Kinematics and kinetics of particles and rigid bodies in translation; rotation and general plane motion; Newton's law, work-energy and impulse methods; linear and angular momentum; impacts; systems of particles and introduction to 3-D kinetics.

Components: Class

Prereqs/Coreqs: P: GENENG 2130 with a C- or better and PHYSICS 2240 with a C- or better and MATH 2740 with a grade of C- or better

Typically Offered: Fall/Spring/Summer

GENENG 2340 Mechanics of Materials**4 Credits**

Simple stress and strain; design and investigation of joints, beams, torsion members and columns; evaluation of shear, moment, slope and deflection of beams and combined stresses.

Components: Laboratory, Class

Prereqs/Coreqs: P: GENENG 2130 with a grade of "C-" or better

Typically Offered: Fall/Spring

GENENG 2630 Basic Thermoscience for Engineers**3 Credits**

Thermodynamic properties; first and second laws of thermodynamics; ideal gas equation of state; steam properties; properties of incompressible substances; refrigerants; Carnot cycle; Rankine cycle; Otto and diesel cycles; refrigeration; conduction and convection heat transfer. Not open to Mechanical Engineering majors.

Components: Class

Prereqs/Coreqs: P: MATH 2740 and PHYSICS 2240

Typically Offered: Fall/Spring/Summer

MECHENG 2630 Thermodynamics**3 Credits**

First and second laws of thermodynamics; thermodynamic properties of pure substances; applications of thermodynamic systems operating in steady state and transient processes; energy-systems analysis including vapor refrigeration and heat pump cycles.

Components: Class

Prereqs/Coreqs: P: "C-" or better in CHEMISTRY 1450 or CHEMISTRY 1240 and MATH 2740

Typically Offered: Fall/Spring

MECHENG 3030 Dynamical Systems**3 Credits**

Apply fundamental scientific principles (such as Newtonian and Lagrangian dynamics) to develop models of planar dynamic systems. Apply differential equation solution methods, such as Laplace transforms, to solve and analyze models of dynamic systems. Effectively incorporate software to enhance modeling and analysis skills. Utilize state-space and transfer function approaches as well as time frequency responses for modeling and analyzing systems. Includes a semester-long project that incorporates course principles to model and analyze a practical dynamic system.

Components: Discussion, Class

Prereqs/Coreqs: P: "C-" or better in MATH 3630, MECHENG 3430, and GENENG 2230

Typically Offered: Fall/Spring

MECHENG 3040 Engineering Materials**3 Credits**

A study of materials and their crystal structures, microstructures, molecular structures, and imperfections focusing on metals and their alloys. The relationship between structures, properties, and performance. Material failure. Laboratory work reinforces concepts through hands-on experience with several materials.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in CHEMISTRY 1450 or 1240, and ENGLISH 1230; C: GENENG 2340 Typically

Offered: Fall/Spring

MECHENG 3230 Manufacturing Processes

3 Credits

Introduction to polymers. Shaping processes for thermoplastics, thermosets, and elastomeric materials. Primary metal manufacturing processes such as casting, forging, rolling and extrusion. Secondary processes such as forming, bending, drawing, and swaging. Mechanics and economics of metal cutting. Special processes such as powder metallurgy. Design and manufacturing. Manufacturing systems.

Components: Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3040 and GENENG 2340

Typically Offered: Fall/Spring

MECHENG 3300 Fluid Dynamics

3 Credits

Fluid properties; pressure, hydrostatics, and buoyancy; control volume analysis; mass, momentum, and energy conservations for moving fluids; Euler's equation and the Bernoulli's theorem applied to inviscid flows; dimensional analysis and similitude; viscous fluid flows, flow through pipes; boundary layers, and lift and drag on objects; compressible flows.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in (MATH 2840 and MECHENG 2630), and a C- or better in (GENENG 2230 or ENGRPHYS 3240)

Typically Offered: Fall/Spring

MECHENG 3330 Design of Machine Elements

3 Credits

Nonstandard loading, deflection analysis, failure theories for static and cyclic loading followed by safety considerations. Design and selection of a wide range of machine elements such as fasteners, springs, shafts, bearings, and gears. Open-ended design project.

Components: Discussion, Class, Laboratory

Prereqs/Coreqs: P: "C-" or better in MECHENG 3040, GENENG 2030, GENENG 2340, and MATH 2740 Typically

Offered: Fall/Spring

MECHENG 3430 Introduction to Computational Methods

3 Credits

An introduction to structured programming with engineering applications. Fundamental programming concepts, algorithm development, and debugging. Introduce and apply concepts in linear algebra to engineering problems in statics, dynamics and other professional engineering courses. Problems include solving systems of linear equations, root finding, eigenvalues and eigenvectors, and regression.

Components: Laboratory, Class

Prereqs/Coreqs: P: MATH 2740

Typically Offered: Fall/Spring

MECHENG 3640 Heat Transfer

3 Credits

One and two-dimensional steady state heat conduction; transient heat conduction; numerical methods in conduction transfer; forced and free convection; heat exchanger principles; radiation heat exchange.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in (MECHENG 3430 or COMPUTER 1430) and MATH 3630; C: MECHENG 3300

Typically Offered: Fall/Spring

MECHENG 3720 Mechanical Systems Laboratory

3 Credits

Introduction to engineering laboratory equipment, experimental procedures, report writing, automated data acquisition, including computer programming and statistical analysis. Emphasis is on the experimental analysis of mechanical systems, including topics such as vibrations, strain gauges, and DC motors, along with the electronics used to instrument and measure these systems.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MATH 4030 and "C-" or better in GENENG 2930; C: MECHENG 3030 or ELECTENG 3220

Typically Offered: Fall/Spring

MECHENG 3830 Mechanisms and Machines

3 Credits

Design and analysis of mechanisms and machines. A study of simple machines such as linkages, geared systems, and cam-follower systems. Topics include mechanism motion and performance (position, velocity, acceleration, force transmission, etc.), actuators, and design considerations to improve machine performance. The use of a customer-based, systematic design process to design and develop a working mechanism.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P: A grade of "C-" or better in GENENG 2230 or ENGRPHYS 3240 and GENENG 2030 Typically

Offered: Fall/Spring

MECHENG 4230 Design & Control of Manufacturing Systems

3 Credits

Design and implementation of manufacturing processes using the process control model. Uses the evaluation of material removal manufacturing processes to uncover process parameters, then utilizes the manipulation of these characteristics to improve processes. Various manufacturing epistemologies will be reviewed for their strengths and weaknesses. Common industrial methodologies will be used to understand the process as it develops. Methodologies reviewed will include capability studies, poka yoke, 5/6S, GRR, DOE, SPC, Lean, ISO 9000, QS, TQS, DFSS, flow diagrams, cause/effect diagrams, control plans, TRIZ, value engineering, design for X, histograms, pareto charts, and creating test plans for product and process validation. Students will participate in a process design project at an industry location utilizing methodologies acquired in class.

Components: Class

Prereqs/Coreqs: P: "C-" or better in MATH 4030 and MECHENG 3230. Must be in a degree granting program.

Typically Offered: Spring

MECHENG 4330 Automatic Controls

3 Credits

Modeling, characteristics, performance, and stability of feedback control systems including Nyquist stability. Design and analysis of feedback control systems using root locus and frequency response methods. Bode plots, PID controllers, and lead-lag compensators. Laboratory demonstrates the practical application of theoretical concepts.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3030 and GENENG 2930, or ENGRPHYS 3240 and ELECTENG 3220. Must be in a degree granting program.

Typically Offered: Fall/Spring

MECHENG 4340 Noise Control**3 Credits**

This technical elective provides an introduction to acoustics, with an emphasis on noise reduction and hearing conservation. Topics include the wave equation, sound intensity and power, hearing conservation, standing waves, room acoustics, sound instrumentation and measurement, barriers, mufflers and silencers, gear noise, enclosures, and building criteria.

Components: Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3030 or ELECTENG 3220. Must be in a degree granting program.

Typically Offered: EVERY/3RD

MECHENG 4430 Advanced Materials**3 Credits**

Discussion of specialty materials in engineering design and design for manufacture with an emphasis on developing the ability to select materials appropriate for given applications, with due consideration being given to all factors that influence material selection. A wide range of engineering materials including polymers, composites, nanomaterials, smart materials, and biomaterials are discussed along with additional current topics and material advances.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3040. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4440 Failure of Materials**3 Credits**

Various failure modes including fatigue and fracture of materials are covered. Included are stress-life and strain-life analysis, fracture mechanics, stress concentration influences and variable amplitude loading. Exposure to design using commercially available software gives the students experience designing realistic components subjected to variable fluctuating load histories. Mechanical testing principles and principles for recognition of fatigue failure from fracture surfaces are also introduced in the course.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3040 and MECHENG 3330. Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4450 Composite Materials**3 Credits**

This course provides an introduction to composite materials and structures used in engineering applications. Topics covered include the following: properties and microstructure of high-strength fiber materials (glass, carbon, polymer, ceramic fibers) and matrix materials (polymer, metal, ceramic, and carbon matrices); specific strength and stiffness of high-performance composites; rule of mixtures; stress, strain transformations; elastic properties of a single orthotropic ply; laminated plate theory; failure criteria; design of composite structures and components; effects of temperature and moisture.

Components: Class Prereqs/Coreqs: P:

MECHENG 3330 Typically Offered:

EVERY/3RD

MECHENG 4500 Biomedical Engineering

3 Credits

An overview of the human physical system as a context for engineering design. Introduction to the functional basis of physiologic systems. Instrumentation, biomechanics, and design of medical devices. Principles of accessibility, and universal design.

Components: Class, Discussion

Prereqs/Coreqs: P: Senior standing or consent of instructor. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4520 Power Plant Design

3 Credits

Analysis and design of steam power systems. Combustion turbines. Renewable energy. Environmental aspects and economics of power generation. Recent developments, future trends, and societal issues in power industry.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 2630. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4550 Heat Transfer Applications

3 Credits

Review of conduction, convection, and radiation heat transfer. Extension to variable properties and more complex geometries. Current heat transfer problems and applications such as electronic cooling, heat pipes, capillary pumped loops, and cryogenic heat transfer. Survey of currently used correlations and numerical techniques. Application of current state-of-the-art to design problems.

Components: Class, Discussion

Prereqs/Coreqs: P: "C-" or better in MECHENG 3640. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4560 Computational Fluid Dynamics

3 Credits

Introduction to computational fluid dynamics (CFD) with emphasis on using a commercial software package. Concepts of consistency, stability, convergence, scheme order, and turbulence modeling from the practitioner's viewpoint are covered. Simulations of steady and unsteady flows, compressible and incompressible flows, forced and natural convection heat transfer, and internal and external flows are performed. The students will learn to interpret CFD results and validation techniques.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3300, (MECHENG 3430 or COMPUTER 1430), and MATH 3630.

Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4600 Energy Systems Design

3 Credits

Design and analysis of energy generation, conversion, and storage systems with emphasis on renewable energy such as solar, wind, biomass, geothermal and hydroelectric. Solar energy emphases may include electrical power generation, flat plate and concentrating collectors, and/or control systems. Wind energy emphases may include generation, storage and/or grid-connection. Biomass emphases may include primary sources, conversion and upgrading, and/or distribution.

Components: Discussion, Laboratory, Class Prereqs/Coreqs: P: "C-" or better in MECHENG 3640. Must be in a degree granting program. Typically Offered: Occasional

MECHENG 4630 Internal Combustion Engine Design

3 Credits

Design of internal combustion engines for various applications. Gasoline engines, diesel engines, 4 stroke cycles and 2 stroke cycles.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3640. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4640 Mechanical Design of Internal Combustion Engines

3 Credits

Mechanical design and experimental development of internal combustion engines to meet comprehensive design criteria: marketability, thermodynamic performance, dynamic issues, efficiency, lubrication, emissions, economy, drivability, design for manufacture.

Components: Laboratory, Class

Prereqs/Coreqs: P: C-" or better in MECHENG 3330 and MECHENG 3640. Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4650 Environmental Control Design

3 Credits

Theory and design of heating, air conditioning and refrigeration units. Heating and cooling loads for air conditioning, heat pump, psychrometry.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3640 and MECHENG 4730. Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4720 Thermal Systems Laboratory

2 Credits

Instrumentation and measurement techniques in thermal systems; verification of basic principles; laboratory tests on components of thermal systems; experimental approach for solving engineering problems; application of computer to data acquisition and data processing.

Components: Laboratory

Prereqs/Coreqs: P: "C-" or better in MECHENG 3300 and MECHENG 3640. Must be in a degree granting program; C: MECHENG 3720

Typically Offered: Fall/Spring

MECHENG 4730 Thermo-Fluid Systems Design

3 Credits

A course treating the concepts of Thermodynamics, Fluid Mechanics, Heat Transfer, and mechanics in a unified presentation. Particular emphasis will be directed towards applications to actual physical systems including the gas power cycles, refrigeration cycles, heat exchangers, ideal gas mixtures, psychrometrics and 1st law combustion. Some design of devices involved in these applications will also be included.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3300 and MECHENG 3640. Must be in a degree granting program.

Typically Offered: Fall/Spring

MECHENG 4740 Mechanical Systems Design

3 Credits

Advanced topics in the design of machines and mechanical systems. Selection of machine elements implementing the design process and considering factors such as: the environment, manufacturability, assembly, ergonomics, aesthetics, safety, societal impact, reliability and maintainability. Also, economic factors, fits and tolerances, design communication and ethics. Application of fundamental concepts via a project.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3330. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4750 Computational Methods in Engineering

3 Credits

Use of digital computers to solve equations encountered in mechanical engineering problems. Numerical integration and differentiation, solution of linear and nonlinear equations, ordinary and partial differential equations (finite element and finite difference methods), systems of equations (matrix equations). Programming using MATLAB. How to choose the proper numerical method, and pitfalls that lead to bad solutions.

Components: Class

Prereqs/Coreqs: P: "C-" or better in MATH 3630 and [(MECHENG 3430) or (COMPUTER 1430 and ENGRPHYS 3240)]. Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4800 Finite Element Method

3 Credits

Introduction to the finite element method. Emphasis on truss, beam and frame analysis, plane stress, plane strain, axisymmetric and three-dimensional stress analysis. Dynamic analysis and field problems, such as heat transfer. Readily available finite element computer programs utilized to solve stress analysis, heat transfer and other engineering related problems.

Components: Discussion, Class, Laboratory

Prereqs/Coreqs: P: "C-" or better in MATH 3630, MECHENG 3330, and (MECHENG 3430 or COMPUTER 1430).

Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4820 Advanced Manufacturing Processes

3 Credits

The course covers non-traditional manufacturing processes. Additive manufacturing for polymers, metals, ceramics and composite materials. Laser material processes such as laser welding, forming and surface modification. Friction stir welding, electro-chemical machining, and electric discharge machining and wire cutting.

Components: Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3230. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4830 Mechatronics**3 Credits**

Study of electro-mechanical systems and their interfaces. Programming of microcontrollers, fractional-horsepower motors, sensors, programmable logic controllers (PLC's), and control electronics. Binary number systems and logic are introduced. Application of control theory. Project.

Components: Laboratory, Class

Prereqs/Coreqs: P: Must be in a degree granting program; C: MECHENG 4330

Typically Offered: Occasional

MECHENG 4840 Vibration Systems Design**3 Credits**

Modeling and analysis of single and multiple-degree of freedom systems. Free and forced vibrations. Vibrations applications such as balancing, whirling, vibration instruments, vibration isolation, and suspension. Computer applications involving matrices, eigenvalues, eigenvectors, and differential equations. Design of mechanical systems involving vibrations.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P: C-" or better in MECHENG 3030, or ENGRPHYS 3240 and ELECTENG 3220. Must be in a degree granting program.

Typically Offered: Occasional

MECHENG 4850 Computer-Aided Engineering**3 Credits**

Use of current tools in the design, simulation, optimization, representation and manufacture of mechanical systems. Solid modeling and computer assembly of mechanical systems and top down assembly. Presentations by industry experts in technologies enabled by 3D CAD including additive manufacturing, tool path generation, computational fluid dynamics, finite element analysis, virtual reality, and rendering.

Components: Laboratory, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3830. Must be in a degree granting program. Typically

Offered: Occasional

MECHENG 4930 Senior Design Project**3 Credits**

Team based projects, primarily from industry. Rigorous application of design processes and methods. Consideration of real-life technical, economic, social, aesthetic, environmental and other constraints. Consideration of several related topics such as creativity, analysis, synthesis, project management, scheduling, time management, engineering ethics, communication, personality types, product safety and liability, copyrights and patents, design for manufacture, economics, and robust engineering. Integration of technical and management knowledge in an open-ended design environment. Oral and written reports. Open to graduating seniors only.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P: "C-" or better in MECHENG 3230, MECHENG 3330, MECHENG 3830, MECHENG 3720. Must be in a degree granting program.

Typically Offered: Fall/Spring