MECHANICAL ENGINEERING (ME)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (http://louisville.edu/bursar/tuitionfee/).

ME 206. Mechanics II: Dynamics 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGR 102 and CEE 205.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 251. Thermodynamics I 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGR 102 and PHYS 298.
Description: This course covers: fundamental thermodynamic concepts involving heat and work; obtaining properties for typical working fluids, real and ideal gases; first and second laws of thermodynamics; entropy and reversible and irreversible processes; and basic cycles.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 280. Structured Programming for Mechanical Engineering 2 Units
Term Typically Offered: Fall, Spring
Prerequisite(s): CECS 121.
Description: Software development using structured computer programming. Design and implementation of programs with application to mechanical engineering problems such as numerical solution methods and kinematics. Uses a suitable programming language such as MATLAB.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 288. Mechanical Engineering Cooperative Education Seminar 0 Units
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CEE 205, CHEM 201, ENGL 101, ENGR 102, ENGR 110, student must be in Good Standing with GPA of 2.25 or higher.
Description: Discussion of the policies and procedures for cooperative education and instruction in self-directed job search techniques, including interviewing skills, resume preparation, and guidelines for the co-op report. This is a prerequisite for each cooperative education term.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 289. Mechanical Engineering Cooperative Education I 1 Unit
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ME 288.
Fee: An additional $300.00 is charged for this course.
Description: Full-time technical work experience related to the student’s academic program.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 301. Fluid Mechanics I 3 Units
Term Typically Offered: Spring, Summer
Prerequisite(s): ME 206 and ME 251.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 310. Thermodynamics II 3 Units
Term Typically Offered: Spring, Summer
Prerequisite(s): ME 251.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 311. Fluid Mechanics I 3 Units
Term Typically Offered: Fall, Spring
Prerequisite(s): ME 206 and ME 251.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 312. Fluid Mechanics Laboratory 1 Unit
Term Typically Offered: Fall, Spring
Corequisite(s): ME 311.
Fee: An additional $20.00 is charged for this course.
Description: Experimental measurements of static and dynamic fluid properties. Concepts of laboratory testing. Introduction to technical report writing.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
ME 323. Mechanics of Materials
Term Typically Offered: Fall, Summer
Prerequisite(s): CEE 205 and ENGR 201.

ME 324. Mechanics of Materials Laboratory
Term Typically Offered: Fall, Summer
Corequisite(s): ME 323.
Fee: An additional $20.00 is charged for this course.
Description: Experimental measurements of mechanical material properties and experimental verification of solid mechanics theory. Concepts of laboratory testing. Introduction to technical report writing. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 380. Computer Aided Design
Term Typically Offered: Fall, Spring
Prerequisite(s): ENGR 151 and ME 323.
Description: An introduction to the engineering design process emphasizing the use of modern computer-based analysis, design and presentation tools for mechanical engineering applications. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 381. Introduction to Manufacturing
Term Typically Offered: Fall
Prerequisite(s): CHE 253 and ME 251.
Corequisite(s): ME 380.
Description: Introduction to manufacturing processes with an emphasis on considerations for mechanical engineering design. Topics covered include casting, machining, forming, assembly, and modern methods for both polymer and metal materials. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 389. Mechanical Engineering Cooperative Education II
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ME 289.
Fee: An additional $300.00 is charged for this course.
Description: Full-time technical work experience related to the student’s academic program.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 401. Fluid Mechanics II
Term Typically Offered: Fall, Spring
Prerequisite(s): ME 311 and ENGR 205.
Description: Differential analysis of fluid flow, viscous flow in pipes, flow over immersed bodies, compressible flow and turbomachinery. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 414. Mechanical Measurements
Term Typically Offered: Fall, Spring
Prerequisite(s): ENGR 205, ME 312, and ME 324.
Description: General consideration of signals and utilization of instruments to measure physical properties of systems. Review and introduction of useful mathematical concepts such as statistical data analysis. Introduction to digital data acquisition and signal processing. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 415. Senior Mechanical Engineering Laboratory
Term Typically Offered: Fall, Spring
Corequisite(s): ME 414.
Fee: An additional $15.00 is charged for this course.
Description: Experiments in heat transfer, mechanics, acoustics, pumps, electrical circuits, sound dynamics, and HVAC systems. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 422. Machine Design I
Term Typically Offered: Fall, Spring
Prerequisite(s): ME 323 and CHE 253.
Description: Fundamental concepts related to the design of mechanical components and machines. The engineering design process. Design for strength and reliability. Open-ended design projects are assigned. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 432. Intermediate Mechanics of Materials
Prerequisite(s): ME 323.
Description: Principle of virtual work. Principle of minimum potential energy. Matrix formulation of static and dynamic structural mechanics problems with a strong emphasis on computer applications. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 435. System Dynamics
Term Typically Offered: Spring, Summer
Prerequisite(s): ECE 252, ENGR 205 and ME 311.
Description: Modeling of mechanical, fluid, electrical, and mixed systems. Determination of time and frequency domain response of such systems to transient and periodic inputs. Specific applications. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>3 Units</th>
<th>Credits</th>
<th>Term Typically Offered</th>
<th>Description</th>
<th>Prerequisite(s)</th>
<th>Fee</th>
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<tbody>
<tr>
<td>ME 440</td>
<td>Heat Transfer</td>
<td></td>
<td></td>
<td>Fall, Spring</td>
<td>A study of the fundamental laws and applications of heat transfer by conduction, convection, and radiation.</td>
<td>ME 401</td>
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<tr>
<td>ME 442</td>
<td>Machine Design II</td>
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<td>Fall, Spring</td>
<td>Design and application of machine elements such as springs, rolling element bearings, gearing, and journal bearings. Open-ended design projects are assigned.</td>
<td>ME 422</td>
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<tr>
<td>ME 489</td>
<td>Mechanical Engineering Cooperative Education III</td>
<td>1 Unit</td>
<td></td>
<td>Fall, Spring, Summer</td>
<td>Full-time technical work experience related to the student's academic program.</td>
<td>ME 389</td>
<td>$300.00</td>
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<td>ME 497</td>
<td>Mechanical Engineering Capstone Design Project - CUE</td>
<td>3 Units</td>
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<td>Fall, Spring</td>
<td>Team-oriented design of a mechanism, system or process satisfying a set of open-ended requirements. Written reports and oral presentations are required.</td>
<td>ME 422</td>
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<td>ME 510</td>
<td>Thermal Design of Internal Combustion Engines</td>
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<td>Fall, Spring, Summer</td>
<td>Thermodynamics and fluid mechanics of internal combustion engine design. Combustion stoichiometry, thermochemistry, and properties of working fluids. Ideal and real engine cycles. Fluid flow processes, combustion processes, pollutant formation and control. Engine operating characteristics.</td>
<td>ME 310</td>
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<td>ME 512</td>
<td>Finite Element Methods for Mechanical Design I</td>
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<td>Occasional</td>
<td>Matrix analysis of static and dynamic structural systems and steady-state heat transfer. Computer aided design of trusses, frames, plane stress structures, as well as one- and two-dimensional thermal systems including conduction and convection.</td>
<td>ME 422</td>
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<td>ME 513</td>
<td>Energy Conversion</td>
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<td>Fall, Spring, Summer</td>
<td>A study of nuclear and fossil-fueled steam generators, plus internal combustion prime movers and alternate energy sources. A computerized design project will be required.</td>
<td>ME 310</td>
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<td>ME 523</td>
<td>Intermediate Dynamics</td>
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<td>Fall, Spring, Summer</td>
<td>Extension of the concepts in introductory dynamics (ME 206) to three dimensional motion. This includes the kinematics of multiple, rotating reference frames, and Newtonian vector mechanics for particles and rigid bodies (Euler's equations). Lagrangian analytical methods. Stability of motion.</td>
<td>ME 206</td>
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<td>ME 526</td>
<td>Vehicle Dynamics and Handling</td>
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<td>Fall, Spring, Summer</td>
<td>Design of passenger and commercial vehicles for optimal dynamic performance with a focus on architecture layout, characterization of critical subsystems, and CAE-based kinematic and kinetic modeling.</td>
<td>ME 380</td>
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<td>Course Code</td>
<td>Course Title</td>
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<td>Term Typically Offered</td>
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<td>ME 532</td>
<td>Experimental Stress Analysis</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 323, ME 414 and ME 415 or graduate standing in Mechanical Engineering.</td>
<td>Fundamentals of experimental stress analysis. Brittle coating methods, photoelastic coating and electrical strain gage techniques, strain measurements under static and dynamic loading. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 534</td>
<td>Experimental Vibrations</td>
<td>3</td>
<td>Summer Odd Years</td>
<td>ME 435</td>
<td>Experimental techniques for identifying the modal parameters of mechanical and structural systems. Review of multiple degree-of-freedom vibration modeling and analysis. Measurement of frequency response functions. Excitation techniques, instrumentation, Fourier analysis and signal processing. Acoustical modal analysis. Experiments on real mechanical and structural systems. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 535</td>
<td>Control System Design</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 435</td>
<td>Basic concepts and principles of feedback control systems. Formulation of linear control problems by classical methods. Analysis and synthesis techniques as used in the design of automatic, dynamic control systems. Study of transient and steady state response, use of time and frequency domain concepts. System performance specifications. Design applications. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 540</td>
<td>Microfluidics</td>
<td>3</td>
<td>Fall Only</td>
<td>ME 435</td>
<td>Introduction to the basic theory and practical applications of microfluidics. Topics include fluid mechanics at small scales, fabrication of microfluidic devices, methods of inducing and controlling flow, and techniques to measure fluid properties. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 542</td>
<td>Gas Turbines</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 310 and ME 401</td>
<td>Theory and design of various types of gas turbine engines used for power and propulsion. Thermodynamic cycle analysis; design basics of turbomachinery, nozzles, diffusers and combustion chambers; engine performance analysis. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 544</td>
<td>Design of Fluid Power Systems</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 380 and ME 401</td>
<td>Design methodology of hydraulic circuits and fluid power components. Study of rotary/linear actuators, hydrostatic transmissions, temperature control, comaturation control, pneumatics, valves, and control components. Applied design projects and laboratory modules are required. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<tr>
<td>ME 554</td>
<td>Design of Fluid Power Systems</td>
<td>3</td>
<td>Fall Only</td>
<td>ME 380 and ME 401</td>
<td>Course uses broad based engineering knowledge to meld equation driven principles with customer and business driven needs/requirements. The product development process is used to design a mechanical or electro-mechanical product. Topics include: concurrent engineering, project management, voice of customer, quality function deployment, concept generation, concept selection, concept embodiment, robust design methods, design failure mode and effects analysis, design validation plan &amp; report design for X, and value/cost analysis. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 555</td>
<td>Introduction to Micro and Nanotechnology</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 422</td>
<td>Course uses broad based engineering knowledge to meld equation driven principles with customer and business driven needs/requirements. The product development process is used to design a mechanical or electro-mechanical product. Topics include: concurrent engineering, project management, voice of customer, quality function deployment, concept generation, concept selection, concept embodiment, robust design methods, design failure mode and effects analysis, design validation plan &amp; report design for X, and value/cost analysis. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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<td>ME 559</td>
<td>Process Physics &amp; Material Science in Advanced Manufacturing</td>
<td>3</td>
<td>Fall, Spring, Summer</td>
<td>ME 422</td>
<td>Overview of composite materials, stress/strain analysis of a polymer matrix fiber-reinforced composite ply, classical lamination theory, failure criteria, design approaches, manufacturing methods, and applications for structural polymeric composites. For class offerings for a specific term, refer to the Schedule of Classes.</td>
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**Prerequisite(s):**
- ME 232 and ME 381.
- CHE 253 or equivalent; Senior or Graduate standing in an engineering program.
- ME 323, ME 381.
- ME 310 and ME 401.
ME 565. Advanced Engineering Mathematics I 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGR 201 or ENGR 205 or equivalent.
Description: Formulation and solution of mathematical models for mechanical engineering problems leading to ordinary and partial differential equations. Transform solution methods and linear algebra concepts, including real and complex-domain eigenvalue problem solutions.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 566. Advanced Engineering Mathematics II 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ME 565 or equivalent.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 570. Sustainable Energy Systems 3 Units
Term Typically Offered: Fall Only
Prerequisite(s): ME 310 and ME 311.
Description: Analysis and design of sustainable energy systems, and exploration of concepts such as carbon capture storage for making fossil energy systems more environmentally acceptable.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 572. Energy Storage Systems 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ME 440.
Description: Study of the principles and analysis of energy systems. Introduction to energy storage systems and their applications; thermal and mechanical energy storage, storage of organic fuels, hydrogen, and electrochemical energy.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 575. Special Topics in Mechanical Engineering 1-4 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): Faculty consent.
Description: A special topics course in mechanical engineering topics not covered by regularly scheduled courses.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 580. Air Pollution Control 3 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHEM 202, ME 310 or equivalent.
Description: Origin and fate of air pollutants, combustion and pollutant formation processes, control of emissions of gaseous and particulate pollutants and design of various pollution control devices.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 585. Design and Energy Analysis of Consumer Appliances 4.5 Units
Description: Application of classical, computational, and experimental methods and analysis to the design of mechanical and energy systems. Topics include material impacts on design, structural component design, and design and analysis of thermal fluid, and acoustic systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 588. Independent Study in Mechanical Engineering 1-4 Units
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): Faculty consent.
Description: A theoretical or experimental investigation of a problem area related to mechanical engineering.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

ME 595. Measurement, Reliability, and Thermal Design of Electromechanical Systems 4.5 Units
Prerequisite(s): ME 585.
Description: Application of classical, computational, and experimental methods and analyses to the design of electromechanical systems. Topics include reliability and failure analysis, measurement and control of electromechanical systems, and analysis and design optimization of thermal systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)