

WEISBERG DEPARTMENT OF MECHANICAL ENGINEERING

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Website: <http://www.marshall.edu/cecs> (<http://www.marshall.edu/cecs/>)

Mechanical Engineering integrates in-depth knowledge of core areas in mechanical engineering such as mechanics, thermal science, materials and manufacturing, control systems, and product design and development with advanced study in computing and physical sciences. This integration is critical for multidisciplinary areas such as bio and manufacturing engineering, robotics, nanotechnologies, and energy systems. Tools ranging from computer simulation and systems modeling to advanced experimental techniques are developed and applied in order to provide a profound understanding of fundamental phenomena, processes, and system characteristics in these areas.

Programs

- Mechanical Engineering, Accelerated Master's Degree (<http://catalog.marshall.edu/undergraduate/programs-az/engineering-computer-sciences/mechanical-engineering/mechanical-engineering-accelerated-masters/>)
- Mechanical Engineering, B.S.M.E. (<http://catalog.marshall.edu/undergraduate/programs-az/engineering-computer-sciences/mechanical-engineering/mechanical-engineering-bsme/>)

Courses

 - General Education Course

Mechanical Engineering

ME 111 Mech Engineering Computations 3 Credit hours

Introduction to effective problem-solving techniques used in various engineering applications. Computational tools including C and MATLAB will be covered.

Pre-req: MTH 132 (may be taken concurrently) with a minimum grade of D or MTH 229 (may be taken concurrently) with a minimum grade of D or MTH 229H (may be taken concurrently) with a minimum grade of D.

Concurrent PR: MTH 132 or MTH 229 or MTH 229H

Grade Mode: Normal Grading Mode

ME 240 Manufacturing Processes 3 Credit hours

An introduction to manufacturing systems and strategy. A study of manufacturing processes. Measurement and quality assurance machining, welding, and casting processes. Hot and cold forming and joining processes. 1 lec and 6 lab

Pre-req: ENGR 215 with a minimum grade of D.

Grade Mode: Normal Grading Mode

ME 245 Circuits and Instrumentation 3 Credit hours

This course provides basic concepts of DC and AC circuit analysis, an overview of the instrument characteristics and measurement principles, and description and evaluation of sensors commonly used with instrumentation.

Pre-req: MTH 230 with a minimum grade of D and PHY 213 with a minimum grade of D.

Grade Mode: Normal Grading Mode

ME 310 Thermodynamics II 3 Credit hours

Gas, vapor, combined power cycles, co-generation, entropy, combustion, fuel cells, and equations of state.

Pre-req: ENGR 219.

Grade Mode: Normal Grading Mode

ME 320 Fluid Power 3 Credit hours

This course covers physical principles of fluid power cylinders, control valves, fluid power components: compressors, pumps, valves, cylinders, and motors, fluid power circuits, troubleshooting: hydraulic, symptoms, procedures, pneumatics.

Pre-req: ENGR 214 and ENGR 216.

Grade Mode: Normal Grading Mode

ME 325 Experimental Design and Thermo 2 Credit hours

Experimental analysis and design; probability and statistical, uncertainty, and error analysis; Experiments in fluid, heat and thermodynamics; principles and performance of measuring systems; Laboratory experience. 1 Hour for lecture and 3 hours for lab.

Pre-req: ENGR 318 with a minimum grade of D and ME 310 with a minimum grade of D and ME 350 (may be taken concurrently) with a minimum grade of D.

Concurrent PR: ME 350

Attributes: No Textbook Required

Grade Mode: Normal Grading Mode

ME 330 Manufacturing Methods/Design 3 Credit hours

This course covers economical production by understanding the capabilities of different manufacturing processes, candidate manufacturing processes for a given part, performing manufacturability evaluation at the design stage, automation, IMS.

Pre-req: ENGR 102 and ENGR 215.

Grade Mode: Normal Grading Mode

ME 335 Mech Engineering Analysis 3 Credit hours

Covers the mathematical methods available for analysis of engineering problems, and how to apply them effectively for analytically mechanical and thermal systems.

Pre-req: MTH 231 (may be taken concurrently) with a minimum grade of D.

Concurrent PR: MTH 231

Grade Mode: Normal Grading Mode

ME 340 Machine Element Design 3 Credit hours

Mechanical design of machine elements, static and fatigue failures, shaft systems, bearings, gears, springs, screws and fasteners.

Pre-req: ENGR 216 with a minimum grade of D.

Grade Mode: Normal Grading Mode

ME 350 Heat Transfer 3 Credit hours

Analysis and solutions of conduction, free and forced convection, radiation heat transfer and design of heat exchangers.

Pre-req: ME 310 with a minimum grade of D and ENGR 318 with a minimum grade of D.

Grade Mode: Normal Grading Mode

- ME 360 Fluid Dynamics** **4 Credit hours**
 Fluid statics, fluid kinematics, Bernoulli equation, momentum analysis, dimensional analysis, internal flows, fluid machinery, power and efficiency, external flows, compressible flows, differential analysis and Navier-Stokes equation, computational fluid dynamics.
Pre-req: ENGR 318 with a minimum grade of D.
Grade Mode: Normal Grading Mode
- ME 410 Kinematics & Design of Machine** **3 Credit hours**
 The determination of the motion and forces of machines and mechanisms including rotating machinery, cams and gears. Analyze position, velocity, accelerations, static loads, and dynamic loads.
Pre-req: ENGR 214 with a minimum grade of D and ENGR 216 with a minimum grade of D.
Grade Mode: Normal Grading Mode
- ME 420 Control Systems** **3 Credit hours**
 This course provides basic concepts of control; open and closed-loop control systems; and PLC Programming.
Pre-req: ENGR 245 with a minimum grade of D and ENGR 335 with a minimum grade of D.
Grade Mode: Normal Grading Mode
- ME 425 Mechanical Engineering Lab-II** **1 Credit hour**
 Engineering measurements and experimentations. Hands-on labs and data analyses in several major topics of the Mechanics of Materials theory and Theory of Machines.
Pre-req: ME 340.
Grade Mode: Normal Grading Mode
- ME 430 Design of Thermal Systems** **3 Credit hours**
 Design and analysis of thermal systems including components selection and integrations.
Pre-req: ME 350.
Grade Mode: Normal Grading Mode
- ME 435 Design of Mechanical System** **3 Credit hours**
 Problem solving methodology in the design, analysis, and synthesis of mechanical systems. Engineering design process involving modeling, computer simulation, concepts of optimization, robustness, reliability, sustainability.
Pre-req: ME 410.
Attributes: No Textbook Required
Grade Mode: Normal Grading Mode
- ME 440 Design & Analysis Energy Sys** **3 Credit hours**
 Design characteristics and operational performance of energy systems.
Pre-req: ME 350.
Attributes: No Textbook Required
Grade Mode: Normal Grading Mode
- ME 445 Hydraulic & Pneumatic Control** **3 Credit hours**
 This course covers standard symbols, pumps, control valves, assemblies, actuators, filter regulator lubricator (FRL), maintenance procedures, switching, control devices, fluid power circuits including design, application, and troubleshooting.
Pre-req: ENGR 240 and ME 320.
Grade Mode: Normal Grading Mode
- ME 447 Engineering Analysis** **4 Credit hours**
 Experimental laboratory mainly from within the thermo-fluids area, concerned with fluid statics, flow, heat transfer, internal combustion engines, data acquisition, analysis, including use of computers. Principles of good experimental design.
Pre-req: MTH 335.
Grade Mode: Normal Grading Mode
- ME 450 CNC and Rapid Prototyping** **3 Credit hours**
 This course covers CNC CAD/CAM, CNC tools, coordinate systems, CNC programming Language, CNC operation, CNC tool paths, CNC turning, G/M code reference, CNC milling work-holding, rapid prototyping, 3D printing.
Pre-req: ENGR 240.
Grade Mode: Normal Grading Mode
- ME 452 Capstone Design I** **1 Credit hour**
 Prepares mechanical engineering students for ME 453 Capstone Design II, professional responsibility, development of effective communication skills, and learning strategies. Students begin to work on a capstone design project. (PR: ME 325, ME 350, ME 410)
Pre-req: ME 325 with a minimum grade of D and ME 350 with a minimum grade of D and ME 410 with a minimum grade of D.
Grade Mode: Normal Grading Mode
- ME 453 Capstone Design II** **3 Credit hours**
 Students utilize the engineering design process to complete a comprehensive project that addresses a real-world problem with realistic constraints in a collaborative environment.
Pre-req: ME 452 with a minimum grade of D.
Attributes: Capstone Course
Grade Mode: Normal Grading Mode
- ME 455 Metallurgy** **3 Credit hours**
 Covers material properties and behavior of pure metals and common metal alloys. Discuss various aspects of extractive, mechanical, physical metallurgy, theory and practice of identification, selection, processing, conditioning, and testing.
Pre-req: ENGR 215.
Grade Mode: Normal Grading Mode
- ME 460 Vibrations** **3 Credit hours**
 Modeling of vibratory motion of single and multiple degree of freedom systems; free and forced response; modal summation method for response predictions; simulation of the vibration by using Matlab.
Pre-req: ENGR 214 and MTH 335.
Grade Mode: Normal Grading Mode
- ME 465 Mechatronics** **3 Credit hours**
 Dynamic analysis of mechatronic systems, sensors, transducers, and electric circuits and control.
Pre-req: ENGR 245 and MTH 345.
Grade Mode: Normal Grading Mode
- ME 480 Special Topics** **1-4 Credit hours**
 Subject matter to be selected from topics of current interest.
Grade Mode: Normal Grading Mode
- ME 481 Special Topics** **1-4 Credit hours**
 Subject matter to be selected from topics of current interest.
Grade Mode: Normal Grading Mode
- ME 482 Special Topics** **1-4 Credit hours**
 Subject matter to be selected from topics of current interest.
Grade Mode: Normal Grading Mode
- ME 483 Special Topics** **1-4 Credit hours**
 Subject matter to be selected from topics of current interest.
Grade Mode: Normal Grading Mode
- ME 485 Independent Study** **1-4 Credit hours**
 Individual study of advanced mechanical engineering areas.
Grade Mode: Normal Grading Mode

ME 486 Independent Study **1-4 Credit hours**

Individual study of advanced mechanical engineering areas.

Grade Mode: Normal Grading Mode

ME 487 Independent Study **1-4 Credit hours**

Individual study of advanced mechanical engineering areas.

Grade Mode: Normal Grading Mode

ME 488 Independent Study **1-4 Credit hours**

Individual study of advanced mechanical engineering areas.

Grade Mode: Normal Grading Mode