

MANUFACTURING ENGINEERING (MFE)

MFE 150. Manufacturing Engineering: Design, Processes, and Impacts. (3 Credits)

I, II. This course explores the fundamental principles of manufacturing engineering, emphasizing the relationships between design, processes, materials, and broader societal and environmental impacts (including ethics, sustainability, public health, safety, and welfare). 2 Lec/2 Lab.

View Course Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.,
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.,
3. An ability to communicate effectively with a range of audiences.,
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.,
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

MFE 195. Engineering Graphics and Design. (3 Credits)

A. This course Introduces fundamental principles of engineering design and graphical communication, developing skills in sketching, CAD software, and engineering drawing standards. Topics include multi-view projection, dimensioning, tolerancing, geometric constructions, and applying these skills to create, analyze, and communicate designs effectively. 2 Lec/2 Lab.

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1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.,
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.,
3. An ability to communicate effectively with a range of audiences.

MFE 202. Statistical Quality Control. (3 Credits)

I, II. Prerequisite: MAT 234 and STA 270. Introduces statistical methods for monitoring, controlling, and improving quality in manufacturing processes. Covers data analysis, control charts, process capability, and continuous improvement techniques.

View Course Learning Outcomes

1. {}

MFE 308. Lean Manufacturing Systems. (3 Credits)

I, II. Prerequisite: MAT 234 and STA 270. Principles and practices of lean manufacturing for optimizing production systems. Topics include value stream mapping, 5S, standardized work, Kaizen (continuous improvement), Kanban (pull systems), and waste elimination techniques. Credit will not be awarded for both MFE 308 and AEM 308.

View Course Learning Outcomes

1. {}

MFE 330. Materials Testing and Measurement. (3 Credits)

A. Prerequisites: MFE 195, AEM 201, and MAT 234. Fundamentals of materials testing and measurement techniques for manufacturing. Covers mechanical testing (tensile, impact, hardness, fatigue), principles of metrology, precision measurement, and GD&T. 2 Lec/2 Lab.

View Course Learning Outcomes

1. {}

MFE 332. Statistical Process Control and Quality Auditing. (3 Credits)

A. Prerequisite: MFE 202. Advanced Statistical Process Control (SPC) techniques and quality auditing methods for manufacturing. Covers SPC implementation, process monitoring, capability analysis, and quality system audits (e.g., ISO 9001).

View Course Learning Outcomes

1. {}

MFE 349. Manufacturing Engineering Internship/Co-op. (1-3 Credits)

I, II. Prerequisite: Departmental approval, successful completion of 30 semester hours of coursework including 6 hours of Manufacturing Engineering courses and minimum of 2.25 GPA. Supervised work experience in a manufacturing engineering role, applying classroom knowledge to real-world problems. Transfer students must have completed at least 12 hours of coursework at EKU. A minimum of 80 hours of employment is required for each semester hour of academic credit. Credit may only be awarded in the semester in which the work is completed.

View Course Learning Outcomes

1. {}

MFE 352. Industrial Robotics and Automation. (3 Credits)

A. Prerequisite: PHY 315. Focuses on the design and integration of industrial robotic and automated systems, including electrical control and interfacing. Covers robot programming, control system design, safety, end of arm tooling (EOAT) specification, programmable logic controllers (PLCs), and sensor systems. 2 Lec/2 Lab

View Course Learning Outcomes

1. {}

MFE 382. Advanced Manufacturing Processes. (3 Credits)

A. Prerequisites: AEM 201 and 301. Project-based learning in advanced manufacturing processes. Students plan, execute, and manage projects involving CNC machining (milling and turning), multi-process welding (e.g., GMAW, GTAW), and precision layout and measurement techniques. 2 Lec/2 Lab

View Course Learning Outcomes

1. {}

MFE 390. Computer-Aided Design and Analysis. (3 Credits)

A. Prerequisite: MFE 195. This course integrates advanced computer-aided design (CAD) and engineering (CAE) tools for product development. Topics include parametric modeling, surface modeling, FEA (stress, thermal, modal analysis), rendering, and design for manufacturability (DFM). 2 Lec/2 Lab

View Course Learning Outcomes

1. {}

MFE 406. Lean Six Sigma for Manufacturing. (3 Credits)

A. Prerequisite: MFE 202. Covers the principles and application of Lean Six Sigma methodology to improve manufacturing processes. Topics include DMAIC, value stream mapping, 5S, Kaizen, statistical process control (SPC), design of experiments (DOE), and root cause analysis.

View Course Learning Outcomes

1. {}

MFE 407. Engineering Project Management. (3 Credits)

I, II. Prerequisite: MFE 202. Covers the principles and practices of managing engineering projects throughout their lifecycle, including selecting and adapting appropriate project management methodologies. Topics include project initiation, scope definition, WBS, CPM, Gantt charts, resource allocation, risk management, execution, monitoring, control, and closing.

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1. {}

MFE 453. Additive Manufacturing. (3 Credits)

A. Prerequisite: MFE 195 and MFE 382. Introduction to additive manufacturing (3D printing) technologies, materials, processes, and applications. Covers design for additive manufacturing (DfAM), process selection (e.g., material extrusion, powder bed fusion), and post-processing techniques. 2 Lec/2 Lab

View Course Learning Outcomes

1. {}

MFE 498. Senior Capstone Design Project I. (3 Credits)

I. (3). Co-requisite: MFE 407, Prerequisite: MAT 353, and Senior Standing. First part of a two-semester capstone design experience. Teams apply engineering principles to solve a complex, real-world manufacturing problem, considering sustainability, ethics, and economic factors. Focus on project definition, planning, and initial design. 1 Lec/ 3 Lab.

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1. {}

MFE 499. Senior Capstone Design Project II. (3 Credits)

II. Prerequisite: MFE 498. Second part of a two-semester capstone design experience. Teams refine their design, conduct detailed analysis, and develop a prototype/simulation. Culminates in a final report and presentation. 1 Lec/3 Lab.

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1. {}

MFE 506. Six Sigma Quality. (3 Credits)

A. Prerequisite: MFE 202. A study of six sigma methodology and current practices with an emphasis on key quality drivers and statistical methods for worldclass products and companies.

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1. {}