

MFG - COMPUTER INTEGRATED MANUFACTURING

MFG 101 2 credit hours (lecture: 2 | lab: 1)

Occupational Safety

Course provides an overview of safe practices and work-related hazards with a focus on the Occupational Safety and Health Administration (OSHA) safety guidelines. The main content covers general workplace safety, hazardous materials including the Safety Data Sheet (SDS), Lock-Out/Tag-Out (LOTO) procedures, fire and electrical safety, Personal Protective Equipment (PPE), and safe industrial equipment operation.

Instruction Type: In-Person | Online | Hybrid

Term Typically Offered: Spring

MFG 102 3 credit hours (lecture: 2 | lab: 2)

Industrial Drafting and Design

Course provides a comprehensive overview of industrial drafting and design. It covers major components of technical drawing including geometry, dimensions, and annotations to create part/assembly per specifications. Additional topics include detail and assembly drawings, metric versus standard projections and dimensioning, and advanced drawing views. The course concludes with an overview of Geometric Dimensioning and Tolerancing (GD&T). Introduction to 3D Computer Aided Design (CAD) software is integrated throughout the course.

Instruction Type: In-Person | Online | Hybrid

Term Typically Offered: Fall

MFG 110 3 credit hours (lecture: 2 | lab: 2)

Introduction to Machining

Intended for students with no experience in precision metalworking, the course starts with industrial safety and OSHA policies. The main content examines principles and operations of a drill press, a lathe, and a mill. Students will learn about common machining operations along with related tooling and fixtures. Additional topics include an overview of precision measurements and basic technical math including speeds and feeds calculations. The course concludes with an introduction to Computer Numerical Control (CNC).

Instruction Type: In-Person | Online | Hybrid

Term Typically Offered: Fall | Spring

MFG 111 3 credit hours (lecture: 3 | lab: 1)

Introduction to Computer Integrated Manufacturing (CIM)

Directed towards new students interested in careers in Manufacturing and CNC, the course introduces students to Computer Integrated Manufacturing (CIM). The main content introduces advanced manufacturing, industrial safety, print reading, ferrous and non-ferrous materials, precision measurements, fundamentals of CNC, and welding. Additional topics include an overview of fluid power principles, automation fundamentals, robotics and vision systems, and basics of logic controllers (PLC).

Instruction Type: In-Person | Online

Term Typically Offered: Fall

MFG 112 3 credit hours (lecture: 3 | lab: 1)

Introduction to Automation

Directed towards new students interested in careers in Mechatronics and Automation, the course provides students with a broad exploration of systems used in production automation. The main content provides an overview of automation concepts, fluid power, basic electricity, barcode and RFID product tracking, sensors and vision systems, and electric motors. The course concludes with an introduction to industrial robotics and programmable logic/automation controllers used to control advanced manufacturing equipment.

Instruction Type: In-Person | Online

Fee: \$50

Term Typically Offered: Spring

MFG 120 3 credit hours (lecture: 2 | lab: 3)

Introduction to Welding

Course covers fundamental skills, including oxy-fuel (OFW), manual metal arc (stick), gas metal arc (MIG), and gas tungsten arc (TIG) welding. It starts with safety procedures required to set up and shut down welding equipment for various processes. The main content includes hands-on welding assignments with different welding systems using various thickness materials. The course follows American Welding Society industrial standards and prepares students for taking the AWS welding certification test.

Recommended: MFG 102 and MFG 111.

Instruction Type: In-Person | Hybrid

Fee: \$50

Term Typically Offered: Fall

MFG 125 3 credit hours (lecture: 2 | lab: 3)

Advanced Welding

Course teaches advanced electric arc welding techniques including American Welding Society (AWS) safety requirements related to welding. Students will learn about different welding methods such as Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW), and Gas Tungsten Arc Welding (GTAW). Hands-on welding experience is integrated throughout the course. The course follows AWS industrial standards and prepares students for taking the AWS welding certification test.

Recommended: MFG 120 or previous welding experience.

Instruction Type: In-Person | Hybrid

Fee: \$50

Term Typically Offered: Spring

MFG 130 3 credit hours (lecture: 2 | lab: 2)

TagNet Middleware

Course covers TagNet RFID middleware; specifically on how to install, configure, and implement various use cases found in the supply chain. Topics include an understanding of the capabilities of TagNet and how various use case factors influence read rates and reliability.

Prerequisite: ELT 120 or concurrent enrollment in ELT 120.

Instruction Type: In-Person | Online

Fee: \$40

MFG 135 4 credit hours (lecture: 2 | lab: 5)

Fluid Power and Controls

Course teaches the principles of industrial hydraulics and pneumatics, emphasizing the concepts of fluid pressure, flow rate, and controls. The main content includes power units, hydraulic pumps, pneumatic compressors, linear and rotary actuators, and control valves. Additional topics cover fluid power circuit design, system maintenance, and basic troubleshooting. Hands-on lab assignments with equipment setup and operation are integrated throughout the course to better illustrate fluid power principles.

Recommended: MFG 111 or MFG 112.

Instruction Type: In-Person | Online | Hybrid

Fee: \$50

Term Typically Offered: Spring

<p>MFG 220 3 credit hours (lecture: 2 lab: 3) Automation Vision Systems Course covers various sensors and modern machine vision used in industrial automation. Using sensors and machine vision, students will design and set up systems used for a variety of applications including measurement and gauging, presence/absence sensing, identification, and machine vision guidance. Hands-on lab assignments, including sensors and vision systems integration with programmable controllers are built in throughout the course to better illustrate machine vision applications in equipment automation. Recommended: MFG 112. <i>Instruction Type: In-Person Online Hybrid</i> Fee: \$50 <i>Term Typically Offered: Fall</i></p>	<p>MFG 245 4 credit hours (lecture: 2 lab: 4) Programmable Automation Controllers (PAC) Intermediate course offers a practical study of Programmable Automation Controllers (PAC). It starts with a tag addressing scheme and a project structure including tasks, programs, and routines. Students will learn how to develop and program automation projects utilizing Ladder Diagram (LD), Function Block Diagram (FBD), and Sequential Function Chart (SFC) languages. Practical applications of programming and troubleshooting skills utilizing Allen-Bradley based trainers are integrated throughout the course. Recommended: MFG 240 or previous PLC experience. <i>Instruction Type: In-Person Online Hybrid</i> Fee: \$50 <i>Term Typically Offered: Spring</i></p>
<p>MFG 225 3 credit hours (lecture: 2 lab: 3) Motors and Controls Course delivers theoretical and practical applications of electrical motors along with control circuits and electrical safety. The main content covers various Direct Current (DC) and Alternating Current (AC) motors. Students will learn about different type of motors and controls including step motors, servo motors, and variable frequency drives (VFD). Lab assignments associated with diverse motor applications in the automated industry are integrated throughout the course. Recommended: MFG 112. <i>Instruction Type: In-Person Hybrid</i> Fee: \$50 <i>Term Typically Offered: Spring</i></p>	<p>MFG 250 4 credit hours (lecture: 2 lab: 4) Advanced Automation Controllers Advanced topics of programmable controllers used to manage several output devices based on the input of various sensors, including analog devices, are covered in the course. Students will learn to program, edit, download, and run a sequence of events utilizing Allen-Bradley based trainers. In addition, FactoryTalk View Studio software is used to develop screen layouts for Human Machine Interface (HMI) devices. Extensive troubleshooting of automation systems is integrated in the course. Prerequisite: MFG 245 or consent of instructor. <i>Instruction Type: In-Person Online Hybrid</i> Fee: \$50 <i>Term Typically Offered: Fall</i></p>
<p>MFG 230 4 credit hours (lecture: 2 lab: 5) Automation Equipment Repair Intermediate course based on a program established by Supply Chain Automation (SCA) for an automation equipment repair technician. The main content revolves around installing, modifying, and repairing automation equipment and is delivered mostly through online interactive modules and virtual simulators developed by Amatrol. Students will learn about reading technical drawings, basic concepts of industrial panel wiring, electric motors, and troubleshooting and repairing industrial hydraulics and pneumatics. Recommended: MFG 102, MFG 135, and MFG 225. <i>Instruction Type: In-Person</i></p>	<p>MFG 270 4 credit hours (lecture: 2 lab: 5) Automation Equipment Controls Advanced course based on a program established by Supply Chain Automation (SCA) for an automation equipment controls technician. The main content includes installing, programming, and troubleshooting of automation controllers and is delivered mostly through online interactive modules and virtual simulators developed by Amatrol. Students will learn the fundamental concepts of wiring, programming, and troubleshooting of Programmable Logic Controller (PLC), Variable Frequency Drive (VFD), and Human Machine Interface (HMI) devices. Recommended: MFG 225, MFG 240, and MFG 245. <i>Instruction Type: In-Person</i></p>
<p>MFG 240 4 credit hours (lecture: 3 lab: 3) Programmable Logic Controllers (PLC) Based on Allen-Bradley, the course teaches the basic concepts of Programmable Logic Controllers (PLC). It starts with basic terminology, common input and output devices, and an overview of various PLC controllers. Students will learn how to address PLC Inputs and Outputs (I/O) and program sequences of events to control electrical motors, pneumatic actuators, and lights. Hands-on Ladder Logic programming and troubleshooting utilizing Allen-Bradley based PLC trainers is integrated throughout the course. Recommended: MFG 112. <i>Instruction Type: In-Person Online Hybrid</i> Fee: \$50 <i>Term Typically Offered: Fall</i></p>	<p>MFG 290 1-4 credit hours (lecture: 1-4 lab: 1-4) Topics in CNC and Manufacturing Course explores a variety of current topics related to Computer Numerical Control (CNC) and Computer Integrated Manufacturing (CIM). Possible contents include new software or software updates, new technologies, or new high-tech advances in the field of advanced machining and manufacturing. The course can be repeated up to three times using different topics. Fee Varies. Prerequisite may vary by topic. <i>Instruction Type: In-Person</i></p> <p>MFG 292 1-4 credit hours (lecture: 1-4 lab: 1-4) Topics and Mechatronics and Automation Course explores a variety of current topics related to Mechatronics and Industrial Automation. Possible contents include new software or software updates, new technologies, or new high-tech advances in the field of fluid power, industrial robotics, automation vision, and programmable controllers (PLC/PAC). The course can be repeated up to three times using different topics. Fee Varies. Prerequisite may vary by topic. <i>Instruction Type: In-Person Online Hybrid</i></p>