

# MANUFACTURING (MFG)

## MFG-103 Applied Metallurgy (3)

Covers the different structures of metals and alloys and the resulting mechanical, electrical and magnetic properties; phase diagrams; kinetics of phase transformation; materials failure; thermal process; materials in engineering design/safety, applications and processing of metal alloys. Aligns with SENSE II, Units 1 through 3. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture, 4.0 lab

## MFG-120 Machine Trade Printreading I (1)

Introduces students to the importance of prints in industry. Covers the alphabet of lines and principles of sketching. Continues with an introduction to orthographic projection, auxiliary views, detail and assembly drawings, dimensions and tolerances, and sectional views. Title block information is covered along with materials lists, drawing notes and drawing change systems. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture

## MFG-128 Measurement, Materials, and Safety (NIMS) (2)

Explores basics of machining, raw materials, use of hand tools, safety, and maintenance. Includes measurement techniques, materials, safety, machine tool math, quality control, and maintenance. Emphasizes teamwork, critical thinking, and problem-solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 2.0 lecture

## MFG-129 Job Planning, Benchwork, and Layout (NIMS) (2)

Introduces the basics of hand tools, understanding drawings, manual machines, and layout. Focuses on interpretation of drawing information, description of basic symbols, and notation, and interpretation of basic GD&T feature control frames. Emphasizes teamwork, critical thinking, and problem-solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture, 2.0 lab

## MFG-130 Machine Trade Printreading II (1)

Continues Machinist Trade Printreading I. Covers geometric dimensioning and tolerancing and the interpretation of advanced prints, including numerical control programming and documents. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture

*Prerequisite:* Take MFG-120.

## MFG-145 Light Machining for Maintenance Trades (4)

Provides an introduction to industrial maintenance-specific machining and metal-working technologies and processes. Concepts including basic part design, layout, replication, and repair are emphasized through lecture, reading and hands-on labs. Arts & Sciences Elective Code: B  
*Hours per week:* 2.0 lecture, 4.0 lab

## MFG-173 CNC Mill Operator (NIMS) (2)

Introduces basic milling operations. Covers manual and CNC milling practices, tooling, machining practices and applied mathematics. Emphasizes teamwork, critical thinking and problem-solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture, 2.0 lab

## MFG-174 CNC Lathe Operator (NIMS) (2)

Introduces basic lathe operations. Covers manual and CNC lathe turning practices, tooling, machining practices and applied mathematics. Emphasizes teamwork, critical thinking and problem-solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture, 2.0 lab

## MFG-202 Manufacturing Processes (2)

Focuses on producing a part on a CNC mill and lathe. Covers engineering parts to be cost effective as well as well-produced. Arts & Sciences Elective Code: B  
*Hours per week:* 4.0 lab

*Prerequisite:* Take DRF-142. Take DRF-143.

## MFG-297 Milling Machine Operations (NIMS) (3)

Introduces basic and advanced manual milling operations. Covers manual milling machine practices, tooling, machining principles and applied mathematics. Emphasizes teamwork, critical thinking and problem solving through hands-on experience and practical applications. This course aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 2.0 lecture, 2.0 lab

## MFG-298 Surface Grinding Operations (NIMS) (2)

Introduces basic surface grinding operations. Covers precision surface grinding practices, grinding wheel identification, proper grinding techniques and grinding safety. Emphasizes teamwork, critical thinking and problem solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 1.0 lecture, 2.0 lab

*Prerequisite:* Take MFG-128. Take MFG-129.

## MFG-332 CNC Mill Program and Setup (NIMS) (3)

Introduces basic CNC vertical milling operations. Focuses on setup and operation practices pertaining to CNC milling and programming language using G&M codes. Emphasizes teamwork, critical thinking and problem solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B  
*Hours per week:* 2.0 lecture, 2.0 lab

*Prerequisite:* Take MFG-297.

*Pre/corequisite:* Take MFG-173.

**MFG-334 CNC Lathe Program & Setup (NIMS) (3)**

Introduces basic CNC horizontal lathe turning operations. Covers setup and operation practices pertaining to CNC turning and programming language using G&M codes. Emphasizes teamwork, critical thinking and problem solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards.

Arts & Sciences Elective Code: B  
Hours per week: 1.0 lecture, 4.0 lab

*Prerequisite:* Take MFG-385.

*Pre/corequisite:* Take MFG-174.

**MFG-367 Advanced CNC Programming (3)**

Introduces advanced concepts in CNC programming as it relates to milling and turning operations. Utilizes G&M codes for machine operation and demonstrates an applied knowledge of geometric dimensioning and tolerancing (GD&T), quality control and basic machining practices. Arts & Sciences Elective Code: B

Hours per week: 1.0 lecture, 4.0 lab

*Prerequisite:* Take MFG-173. Take MFG-174. Take MFG-332. Take MFG-334.

**MFG-373 Computer Aided Manufacturing I (4)**

Introduces concepts in Computer Aided Manufacturing (CAM). Emphasizes CAM as applied to Turning and Milling centers, and teaches concepts in model generation, applied toolpaths, and tooling selection along with calculation of proper RPM and feedrates. Arts & Sciences Elective Code: B

Hours per week: 1.0 lecture, 6.0 lab

**MFG-374 Computer Aided Manufacturing II (4)**

Introduces advanced concepts in Computer Aided Manufacturing (CAM). Emphasizes CAM as applied to horizontal and vertical milling centers, 3 and 4 axis turning centers and other types of manufacturing equipment. Arts & Sciences Elective Code: B

Hours per week: 1.0 lecture, 6.0 lab

*Prerequisite:* Take MFG-373.

**MFG-378 Manufacturing Production Methods (3)**

Introduces a simulated manufacturing production environment where a product's design, production, and evaluation will occur. Will demonstrate an understanding of how modern manufacturing facilities work to produce functional products used by consumers. Arts & Sciences Elective Code: B

Hours per week: 1.0 lecture, 4.0 lab

*Prerequisite:* Take CAD-300. Take MFG-173. Take MFG-174. Take MFG-332. Take MFG-334.

*Pre/corequisite:* Take MFG-374.

**MFG-385 Engine Lathe Operations (NIMS) (5)**

Introduces basic and advanced lathe operations dealing with turning parts in various workholding devices. Focuses on general lathe practices, lathe tool grinding, lathe nomenclature, proper use of lathe tooling and lathe safety. Emphasizes teamwork, critical thinking and problem-solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B

Hours per week: 2.0 lecture, 6.0 lab

**MFG-388 Manufacturing Sheetmetal Practices (5)**

Introduces basic setup and operation of press brakes and other manufacturing equipment related to precision sheetmetal fabrication. Covers basic concepts in tooling, bending principles and applied mathematics dealing with various forms of sheetmetal press brake and punch technology. Emphasizes teamwork, critical thinking and problem solving through hands-on experience and practical applications. Aligns with NIMS (National Institute of Metalworking Skills) standards. Arts & Sciences Elective Code: B

Hours per week: 2.0 lecture, 6.0 lab

**MFG-396 Alternative Manufacturing Processes (3)**

Introduces basic theories and practices of machine operation, shop procedures, material properties and material handling. Covers programming, editing and adjusting parameters. Incorporates hands-on inspections and routine machine maintenance. Arts & Sciences Elective Code: B

Hours per week: 1.0 lecture, 4.0 lab

**MFG-420 Jig and Fixture Design (2)**

Covers theory of design and machining practices as they relate to jigs and fixtures used in manufacturing facilities. Introduces students to the importance of jig and fixture classification and to their uses in modern machine tools. Arts & Sciences Elective Code: B

Hours per week: 2.0 lecture

**MFG-924 Honors Project (1)**

Allows a qualified honors student to pursue a special concentration of study under the guidance of a faculty member. Requires completion of an honors project contract. May be taken more than once. Arts & Sciences Elective Code: B; Comments: Requires approval of supervising professor and dean

Hours per week: 1.0 lecture

**MFG-928 Independent Study (1-3)**

Provides readings, papers and basic research or other projects under the individual guidance of a staff member. Arts & Sciences Elective Code: B; Comments: Permission of instructor, dean

Hours per week: 1.0 lecture