

ENGINEERING - AUTOMATED MANUFACTURING TECHNOLOGY (ENGT)

101 Machine Tool Applications, Material Handling/ Fluid Power & Metallurgy **3 credit hours**

Offered fall semester. Three hours of lecture with practicum applications. Fee: \$75.00. Testing/Subscription Fee: \$125.00.

This course will provide the theory and practical applications of projects using fundamental shop equipment such as manual mills, manual lathes, drill presses, surface grinders and Computer Numeric Control (CNC) mills and lathes. Emphasis will be on shop safety, quality control, and safety. Students will also be introduced to the science of physical metallurgy, the physical properties of metals and their application to modern manufacturing and selection of metals. Students will be eligible for the NIMS I - Measurement, Materials, & Safety industry certification assessment.

Prerequisite: Minimum high school GPA of 3.0 or appropriate assessment scores.

102 Quality Control with Geometric Dimensions & Tolerances **3 credit hours**

Offered fall semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide the proper use of modern precision measurement tools such as micrometers/calipers, surface plate work, laser micrometers, digital height gages, coordinate measuring machines (CMM) and the interpretation of the data obtained from their use. Use of these tools will ensure that machined parts are acceptable as defined by the GD&T documents. Hands-on skills competencies include the areas of reaming, sawing, threading, and safety. Students will learn how to read and interpret blueprints and study different views of an object, including dimensioning techniques, tolerance methods and drawing notes. Students will be eligible for NIMS I - Job Planning, Benchwork & Layout industry certification assessment.

Prerequisite: Minimum high school GPA of 3.0 or appropriate assessment scores.

Corequisite: Engineering-Automated Manufacturing Technology 101.

103 Mill Applications **3 credit hours**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide the basic theory and practical applications of basic metalworking. The class will emphasize manual mill applications, shop safety, and continue with material selection, job planning, benchwork, and layout. Tools used will include: Manual and Computer Numeric Control (CNC) milling machines, drill presses, pedestal grinders, band saws, hand tools, and measuring tools. Students will be eligible for NIMS I Drill Press and Milling industry certification assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 101 and 102.

104 Lathe Applications **3 credit hours**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide instruction on the theory and practical applications used to safely set up and operate manual metal turning engine lathes as well as an introduction into Computer Numeric Control (CNC) lathes. Students will be eligible for the NIMS I Turning (Between Centers) and Turning (Chucking) industry credential assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 101 and 102.

110 Introduction to Computer-Aided Design/ Computer-Aided Manufacturing **3 credit hours**

Offered fall semester. Three hours of lecture with practicum applications. Fee: \$75.00. Testing/Subscription Fee: \$110.00.

This course will provide students with the knowledge and skill to create and interpret of basic mechanical drawings using computer-aided design (CAD) software. Emphasis will be on standard and Geometric Dimensioning and Tolerancing (GD&T) drawing techniques based on the American Society of Mechanical Engineers (ASME) industry-recognized standards. Coursework will include the use of computer-aided manufacturing (CAM) software to generate programs for conversion to Computer Numerical Control (CNC) G-code. Students will eligible for the Autodesk Associate in CAM 2.5 Axis Milling and Turning for Machinists industry credential assessment.

Corequisite: Computer Technology 103.

120 Introduction to Computerized Numeric Control Programming and Machining **3 credit hours**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide an introduction to Computer Numerical Control (CNC) machining practices and programming. Students will demonstrate ability to set and operate both a CNC milling center, as well as CNC turning center, maintain quality and safety standards, keep records, and maintain equipment and supplies. Students will be eligible for the NIMS I CNC Mill Programming Set-up & Operations and CNC Lathe Programming and Set-up industry certification assessments.

Prerequisite: Engineering-Automated Manufacturing Technology 102 and Computer Technology 103.

201 Fixture Design and Fabrication **4 credit hours**

Offered fall semester. Four hours of lecture with practicum applications. Fee: \$75.00. Testing/Subscription Fee: \$100.00.

This course will provide hands-on design and fabrication techniques utilized to work holding fixtures and jigs to support and locate parts for various manufacturing processes such as machining, welding, painting, forming, inspection, and assembling. Machine tools and equipment will be used to produce fixturing on manual and Computer Numeric Control (CNC) mills/lathes, 3D printers, and a variety of other machines. Students will receive training in Gas Tungsten Arc Welding (GTAW) and utilize previously acquired skills in CAD/CAM to design projects and simulations for 3D-Printing. Students will be eligible for the NIMS I Metalforming and the Stratasys Additive Manufacturing Certification assessments.

Prerequisite: Engineering-Automated Manufacturing Technology 210.

Corequisite: Engineering-Automated Manufacturing Technology 220.

210 Advanced Computer-Aided Design/Computer-Aided Manufacturing **3 credit hours**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide the study of the design of part geometry and the generation of computer numerical control (CNC) code. Students will learn translation of part geometry to and from computer aided design (CAD)/ computer aided manufacturing (CAM) systems. Manufacturing applications using CAM software to generate part programs for manufacturing. Applications include two-, three- and four-axis machining on vertical machining centers. Multi-axis turning, electrical discharge machining (EDM), and fabrication machinery will be also be studied. Students will be eligible for the Autodesk Associate in AutoCAD for Design and Drafting industry credential assessment (upon completion of required hours).

Prerequisite: Engineering-Automated Manufacturing Technology 110.

212 Electrical Discharge Machining **3 credit hours**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00. Testing/Subscription Fee: \$175.00.

This course will provide programming and operation of wire and ram-type Electrical Discharge Machines (EDM) for both milling precision and to produce specified surface finishes. EDM processes will include: small hole boring, fine wire, two- and four-axis ram and wire operations. Given a blueprint and machining process plan, students will select proper electrode material, work holding devices, and EDM fluids. Students will be eligible for the NIMS II EDM Plunge and EDM Wire industry credential assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 220.

215 Abrasive Machining and Heat Treatment 3 credit hours

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$75.00.

This course will provide the theory and application of precision abrasive machining, including surface, form, cylindrical (ID/OD), and cutter grinding. Students will demonstrate heat treatment processes such as carburizing, hardening, tempering, and annealing on both carbon and steel projects. Aluminum oxide, silicon carbide, cubic boron nitride, and diamond wheels will be utilized in the grinding process. Students will be eligible for the NIMS I - Grinding industry credential assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 101 and 102.

**220 Advanced Computerized Numeric Control 4 credit hours
Programming and Machining**

Offered fall semester. Four hours of lecture with practicum applications. Fee: \$75.00. Testing/Subscription Fee: \$125.00.

This course will provide theory and practice in Computer Numeric Control (CNC) programming using G Code, Conversational, and Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) programming for two, three, and four-axis millings and turning Centers. Students will be eligible for the NIMS I - CNC Mill Operations and CNC Lathe Operations industry certification assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 120.

**225 Robotics Material Handling and Automation or 4 credit hours
Manufacturing Capstone**

Offered spring semester. Three hours of lecture with practicum applications. Fee: \$25.00. Testing/Subscription Fee: \$225.00.

This course will provide theory and practice in Computer Numeric Control (CNC) programming using G Code, Conversational, and Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) programming for two, three, and four-axis millings and turning Centers. Students will be eligible for the NIMS I - CNC Mill Operations and CNC Lathe Operations industry certification assessment.

Prerequisite: Engineering-Automated Manufacturing Technology 210, 220, and 201.