MACHINE TECHNOLOGIES (MAC)

MAC 1000 | Machine Shop Safety
Lecture Credit: 1

Covers the hazards of a machine shop including health and safety, locating essential safety information from a code or other standard, location and use of safety and emergency equipment, and identifying and applying shop safety procedures.

MAC 1001 | Introduction to Machine Shop
Lecture/Lab Credit: 3

Covers safety procedures, use of bench tools, layout tools, power saws, drill presses, precision measurement tools, and various hand tools related to the machine shop. Also included are sharpening drill bits and general purpose turning tools for the lathe and determining speeds and feeds for both the lathe and the milling machine.

MAC 1002 | Print Reading for Machinists
Lecture Credit: 3

Instructs students in reading and understanding industrial prints. This course covers basic drafting and print standards, fundamentals of shape description, fundamentals of size description and annotation, industrial drawing types, and specialized parts and prints. Symbol interpretation, tolerancing and dimensioning standards are also covered.

MAC 1010 | Introduction to Engine Lathe
Lecture/Lab Credit: 3

Introduces basic lathe applications which will consist of identifying lathe components and controls, understanding turning safety, calculating speeds, and feeds, using various tools and tool holders, identifying basic tool geometry, and the use of common lathe spindle tooling. Students will perform basic lathe operations, which will consist of facing, center-drilling, chuck turning, turning between centers, boring, grooving, tapers, knurling, and single point threading. Students will be required to produce specified parts to a tolerance of +/- .004 inches and perform competencies set by manufacturing standards.

MAC 1011 | Intermediate Engine Lathe
Lecture/Lab Credit: 3

Teaches students to prepare single point external and internal unified screw threads to a Class 3 fit, generate angles with the compound rest within one degree, ream holes concentric within .001 inches, determine cutting speeds, and perform facing and turning operations.

MAC 1020 | Introduction to Milling Machine
Lecture/Lab Credit: 3

Teaches students to identify the major parts of the vertical mill, align a vise, use an indicator, edge finder, and boring head, determine speeds and feeds perform simple indexing, mill flat, square surfaces and slots, drill, bore, and tap holes, and work within a plus or minus .002 inch tolerance.

MAC 1021 | Intermediate Milling Machine
Lecture/Lab Credit: 3

Prepares students to determine hole locations by coordinates and degrees, use a rotary table, use a jig bore to drill holes by the coordinate method, and work within plus or minus .001 inch tolerance.

MAC 1041 | Advanced Machining Operations
Lecture/Lab Credit: 4

Provides the student the use of various conventional machine tools used in a machine shop environment. The use of engine lathes, horizontal and vertical milling machines, surface grinders, drill presses, pedestal grinders, power cut-off saws and other machine tools commonly used to produce quality machined parts in today ¿s manufacturing environments. Machining competencies will stressed and students will be required to produce parts manufactured by local manufacturing companies with the consideration of ISO quality standards.

MAC 1045 | Production Manufacturing Concepts
Lecture/Lab Credit: 3

Familiarizes the student to concepts related to manufacturing environments. Topics will consist of, but not be limited to Material Identification, Shop Floor Management, Just-In Time Manufacturing, Kan-Ban Systems, Statistical Quality Control, Total Quality Management. Various lectures and demonstrations of these processes will be delivered. Students may be required to re-search, explore, and report on particular manufacturing processes or topics.

MAC 1078 | Machining Workshop
Lab Credit: 1-6

Provides students with an experiential learning opportunity.

MAC 2001 | Introduction to CNC Turning Operations
Lecture/Lab Credit: 3

Covers computer numerical control (CNC) lathe operations, control functions, the letter address system, the program format, and machine setup. G & M codes, control functions, the letter address system, and math issues related to CNC are included. This class is NOT offered on an open-entry, open-exit basis.

MAC 2002 | CNC Turning Operations II
Lecture/Lab Credit: 3

Prepares students to write basic computer numerical control (CNC) lathe part programs. G and M codes, math related to CNC, setups, speeds and feeds, straight turning, spherical turning, threading, chamfering, tapering, drilling, tapping, boring, and grooving will be covered. Cutter compensations, sub-programming techniques, repetitive cycles, and both absolute and incremental will be incorporated into programs. Students will also proof and edit the programs to make them valid. This class is NOT offered on an open-entry, open-exit basis.

MAC 2003 | Introduction to CNC Operations
Lecture/Lab Credit: 6

Introduces basic writing and editing of CNC programs. G&M codes, math, speeds feeds, production processes including basic process controls, simple fixturing, and documentation associated with manufacturing will be covered.

MAC 2005 | Introduction to CNC Milling Operations
Lecture/Lab Credit: 3

Provides transitional information between conventional machining applications and the typical applications found in Computer Numerical Control Machining. Topics may consist of Numerical Control Systems, The Cartesian Coordinate System, High Efficiency Tooling Applications, Objectives of Numerical Control, Calculating Speed and Feed Rates, Defining and Calculating Tool Motion, Fixturing Requirements, Basic Program Structure, Programming Codes, and Basic Conversational Programming. Operations of NC machines will be required.

MAC 2006 | CNC Milling Operations II
Lecture/Lab Credit: 3

Exposes the student to the principle operations of both vertical and horizontal CNC milling machines via lecture instruction methods, multi-media instruction methods, and manufacturing hands-on methods. The student will be exposed to the basic CNC machining center, principle operations, manual controls, programming methods, tool-offsets, G54-G59 work offsets, cutter radius compensation and tool selection methods. General operator skills and basic setup skills will be stressed.

MAC 2040 | CAD/CAM 2D
Lecture/Lab Credit: 3

Provides the student with the essential concepts and techniques that are required to successfully create part geometry, generate tool path, verify tool path models, and post process the NC codes. The student will be exposed to a 2-axis machining, 3-axis machining wire frame and surface modeling, lathe programming, and DNC systems. Programming projects and models will be demonstrated in the CNC manufacturing lab.

MAC 2045 | CAD/CAM 3D
Lecture/Lab Credit: 3

Covers both the production and surfacing of three-dimensional geometry in a self-paced setting. Issues will be covered related to the production of wire frames, solids, surfaces, the joining of surfaces, joining of solids, managing construction planes, sweeping, rotating, and controlling parameter settings. A familiarity with Mastercam, CNC programming techniques, and CNC operations is recommended.

MAC 2050 | Advanced Inspection Techniques
Lecture/Lab Credit: 3

Exposes the student to the principles of dimensional metrology. Students will learn how to use common measuring instruments relating to state-of-the-art manufacturing environments. Students will also learn the importance of Quality Control, TQM, and SPC processes as they relate to manufacturing environments. Use of a coordinate measuring machine will be delivered.

MAC 2051 | Introduction to Wire EDM
Lecture/Lab Credit: 2

Covers the basic operation and theory of the Computer Numerical Controlled wire Electrical Discharge Machine (the CNC wire EDM machine).

MAC 2052 | Practical Metallurgy
Lecture/Lab Credit: 3

Offers a study of metallurgical terms and definitions in an effort to understand both the behavior of metals and their service to industry. Characteristics during heating, cooling, shaping, forming, and the stresses related to their mechanical properties are covered. The theory behind the alloys, heat treatment processes, and the impact they have on strength, toughness, hardness, elasticity, ductility, malleability, wear resistance and fatigue resistances is investigated.

MAC 2053 | Wire EDM Operation
Lecture/Lab Credit: 3

Covers the preparation, operation, and maintenance the Computer Numerical Controlled wire Electric Discharge Machine (the CNC wire EDM machine).

MAC 2057 | Wire EDM Programming
Lecture/Lab Credit: 3

Covers how to create a G language program (G-code) for a Computer Numerical Controlled wire Electrical Discharge Machine (CNC wire EDM Machine) using Computer-aided Design and Computer-aided Manufacturing (CAD/CAM) software.

MAC 2059 | Introduction to the 5-Axis Milling Machine
Lecture/Lab Credit: 2

Covers knowledge, basic operation and theory of the 5-axis milling machine.

MAC 2060 | 5-Axis Milling Machine Operation
Lecture/Lab Credit: 3

Covers preparation, operation and maintenance of the 5-axis milling machine.

MAC 2061 | 5-Axis Milling Machine Programming
Lecture/Lab Credit: 3

Covers how to create a 5-axis milling machine program using Computer-aided Design and Computer-aided Manufacturing (CAD/CAM) software.

MAC 2062 | Introduction to Multi-Axis Lathe
Lecture/Lab Credit: 2

Covers basic operation and theory of the multi-axis lathe.

MAC 2063 | Multi-Axis Lathe Operation
Lecture/Lab Credit: 3

Covers preparation, operation and maintenance for the multi-axis lathe.

MAC 2064 | Multi-Axis Lathe Programming
Lecture/Lab Credit: 3

Covers the creation of a Multi-axis lathe program using Computer-aided Design and Computer-aided Manufacturing (CAD/CAM) software.

MAC 2078 | Machining Workshop
Lab Credit: 3

Provides students with an experiential learning opportunity.

MAC 2080 | Machining Internship
Internship Credit: 3

Provides students with the opportunity to supplement coursework with practical work experience related to their educational program. Students work under the immediate supervision of experienced personnel at the business location and with the direct guidance of the instructor.