

## *Machine Tools (MAC)*

### **MAC 150 Machine Tool Operations**

2 Hours

Prerequisites: Concurrent enrollment in MAC 151, 152, 153  
2 hours weekly (2-0)

This course is an introductory study of shop safety, measurement and layout techniques, drills and tapping procedures, materials and fasteners, hand tools, lathes, milling operations, beginning manual CNC part programming operations, and supportive equipment used in the machine tool industry.

### **MAC 151 Machine Tool laboratory**

2 Hours

Prerequisites: MAC 150, IND 121, or consent of instructor  
4 hours weekly (0-4)

This course provides laboratory experiences involved in basic drilling operations, machines, holding devices, taps, tapping, reaming, countersinking, counterboring, boring operations, mechanical hardware, and fastening devices as used by the machinist.

### **MAC 152 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 150, IND 121, or consent of instructor  
4 hours weekly (0-4)

This course is designed to provide laboratory experiences emphasizing conventional turning processes. Turning operations using tapering, external and internal threading, four-jaw chucking procedures, indicating, radius turning, and turning between centers will be emphasized.

### **MAC 153 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 150, IND 121, or consent of instructor  
4 hours weekly (0-4)

This course is designed to provide laboratory experiences using conventional vertical and horizontal milling techniques. The student will complete assignments with emphasis on milling set-ups, feeds and speeds, holding jigs and fixtures, flycutting, end milling, and indicating and alignment procedures necessary to develop skills in milling.

Introductory CNC milling concepts will also be emphasized.

### **MAC 154 Introduction to CNC**

2 Hours

Prerequisites: None  
2 hours weekly (2-0)

An introductory course in the study of numerical control (NC) and computer numerical control (CNC) machine processes. Emphasis will be placed on NC fundamentals, punched tape controls, computer-controlled operations, basic machine codes, and manual part programming.

### **MAC 155 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 152, 153  
4 hours weekly (0-4)

This course is a continuation of the study of precision measuring techniques with emphasis on the use of the surface plate, height gage, sine bar, gage blocks, layout procedures, and thread measurement. Advanced conventional and CNC turning and milling assignments will be used to apply these measuring skills.

### **MAC 156 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 152, 153  
4 hours weekly (0-4)

A continuation study of the turning and milling machines with emphasis on conventional and CNC procedures. Assignments will be used that emphasize the cutting of threads, chucking procedures, holding devices, cutting speeds and feeds, horsepower requirements, offset boring, recessing, grooving, and tapering procedures.

### **MAC 157 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 156  
4 hours weekly (0-4)

A continuation study of the turning and milling machines with emphasis on conventional and CNC procedures. Advanced chucking procedures, mandrel turning, indexing operations, offset boring, angular milling, and CNC machine techniques will be emphasized.

**MAC 158 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 153, 154, 156  
4 hours weekly (0-4)

A continuation study of the turning and milling machines with emphasis on conventional and CNC procedures. Emphasis will be placed on the CNC part program.

**MAC 159 CAM Operations**

2 Hours

Prerequisites: None  
2 hours weekly (2-0)

A continuation of the study of CNC programming with emphasis on advanced milling and turning machine techniques, program set-up, carbide tooling, program editing, ISO/EIA program input, and introductory 3D machining techniques. Students will develop programs through the EZ-CAM 3D software and the EZ-TURN software. CNC machine applications will be applied in the development of projects through laboratory experiences.

**MAC 160 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 157  
4 hours weekly (0-4)

An advanced study of CNC lathe and milling processes with an emphasis on additional thread form turning, turning eccentrics, precision boring, ring grooving, and form tool cutting procedures.

**MAC 161 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 156, 157  
4 hours weekly (0-4)

An advanced study of CNC lathe and milling processes with emphasis on the use of the follow rest, steady rest, faceplate turning, carbide tooling, advanced threading, metric threading, and advanced four-jaw indicating procedures.

**MAC 162 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 159, 160, 161  
4 hours weekly (0-4)

An advanced study of CNC milling and lathe operations with emphasis on the use of the rotary table, sine plate, circular slot cutting, "T" slots, dovetail slots, form tool cuts, keyways, keyseats, and indicating procedures.

**MAC 163 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 159, 160, 161  
4 hours weekly (0-4)

A study of advanced CNC milling and lathe operations with emphasis on the use of indexing head procedures, direct, simple, and angular indexing, milling grooves, slots, locating of holes, precision gear cutting, and computer-aided machining applications.

**MAC 164 Machine Tool Laboratory**

2 Hours

Prerequisites: MAC 159, 160, 161  
4 hours weekly (0-4)

An advanced study of computer numerical control with emphasis placed on the development of part programs using CAM computer programming and wire EDM programming applications. The computer set-up procedures, tool cycle data, geometry, tool path, verification, plotting, editing, up-loading, and down-loading programs will be emphasized.

**MAC 180 Blueprint Reading**

3 Hours

Prerequisites: None  
4 hours weekly (2-2)

This course is designed for technical students, apprentices in the machine trades, and other personnel who must develop the basic skills required for visualizing and interpreting industrial prints in their jobs. Emphasis will be placed on industrial practice, types of drawings, geometric dimensioning, and the impact of computer drafting as related to the machine trades.

**MAC 200 Machine Tool Laboratory**

4 Hours

Prerequisites: None

8 hours weekly (0-8)

This course is designed to provide laboratory experiences in machine tool processes and procedures, and skills necessary for the industrial maintenance students. Emphasis will be placed on precision measuring, drilling processes, turning, milling, grinding, and beginning CNC processes as well as other maintenance and repair procedures.