

# MACHINIST TECHNOLOGY (MACH)

---

## MACH 010 1 Unit

### Fundamentals of Industrial Maintenance

**Lecture:** 18 contact hours

This course covers orientation to the trade and tools of the trade for industrial maintenance mechanics.

**Associate Degree Applicable**

## MACH 014 1 Unit

### Craft Related Quantitative Skills

**Lecture:** 18 contact hours

This course is designed to give students the fundamental quantitative skills commonly used by industrial maintenance mechanics.

**Associate Degree Applicable**

## MACH 016 1 Unit

### Construction Print Reading

**Lecture:** 18 contact hours

This course is designed to give students the fundamental skills to read commonly used prints in construction by industrial maintenance mechanics.

**Associate Degree Applicable**

## MACH 018 1.5 Units

### Gaskets, Pumps, and Valves

**Lecture:** 27 contact hours

This course is designed to give students the fundamental skills in gaskets, packing, pumps, drivers, valves and lubrication used for industrial maintenance mechanics.

**Associate Degree Applicable**

## MACH 020 1.5 Units

### Material Handling, and Support Equipment

**Lecture:** 27 contact hours

This course is designed to give students the fundamental skills in material handling, hand rigging, mobile and support equipment used for industrial maintenance mechanics.

**Associate Degree Applicable**

## MACH 021 4 Units

### Machine Shop I

**Lecture:** 18 contact hours

**Lab:** 162 contact hours

**Advisory:** MACH 090 and MACH 120

This course includes basic machine shop practices, with an emphasis on Occupational Safety and Health Act (OSHA), basic shop mathematics, measurements, the correct use of basic machine tools, mills, lathes, saws, drill presses, and provides an introduction to National Institute for Metalworking Skills (NIMS) Standards Level I, Bench and Layout.

**Associate Degree Applicable**

## MACH 022 4 Units

### Machine Shop II

**Lecture:** 18 contact hours

**Lab:** 162 contact hours

**Advisory:** MACH 021

This course includes machine shop practices for students with a machining background. Emphasis is placed on mathematical speeds and feed formulas, boring processes on mills and lathes, tool grinding, National Institute for Metalworking Skills (NIMS) Standards. At the completion of this course, students will have completed certain NIMS certification competencies.

**Associate Degree Applicable**

## MACH 024 1 Unit

### Introduction to Piping

**Lecture:** 18 contact hours

This course is designed to give students the fundamental skills necessary to work with various types of piping on the job site. The material covered in this course is copper and plastic piping and an introduction to ferrous metal piping practices.

**Associate Degree Applicable**

## MACH 025 3 Units

### General Machine Shop

**Lecture:** 18 contact hours

**Lab:** 108 contact hours

This introductory course instructs students in the basic set up and operating of the lathe, mill, saw, drill press, and grinder. Students will also learn safety, blueprint reading, measurement, shop math, tool grinding, and speed and feed calculations needed in machine shops.

**Associate Degree Applicable**

## MACH 026 1 Unit

### Valve Maintenance and Testing

**Lecture:** 18 contact hours

This course is designed to give students the fundamental maintenance knowledge necessary to work with various types of valves and perform basic hydrostatic and pneumatic testing on the jobsite.

**Associate Degree Applicable**

## MACH 028 1 Unit

### Introduction to Bearings

**Lecture:** 18 contact hours

This course is designed to give students the fundamental knowledge necessary to work with various types of bearings on the jobsite.

**Associate Degree Applicable**

## MACH 029 1 Unit

### Basic Layout for Industrial Maintenance

**Lab:** 54 contact hours

This course is designed to give students the fundamental skills necessary to do basic on-the-job layout for machinery repair and installation.

**Associate Degree Applicable**

## MACH 030 2 Units

### Introduction to Steam Systems

**Lecture:** 36 contact hours

This course is designed to give students the fundamental knowledge necessary to work with various types of steam systems commonly found on the jobsite.

**Associate Degree Applicable**

**MACH 032 1 Unit**

**Distillation Towers and Vessels**

**Lecture:** 18 contact hours

This course is designed to give students the fundamental knowledge necessary to work with various types of distillation towers and vessels commonly found on the jobsite.

**Associate Degree Applicable**

**MACH 034 1 Unit**

**Heaters and Cooling Towers**

**Lecture:** 18 contact hours

This course is designed to give students the fundamental knowledge necessary to work with various types of heaters, furnaces, heat exchanges, cooling towers and fin fans commonly found on the jobsite.

**Associate Degree Applicable**

**MACH 040 3 Units**

**Intermediate Three-Dimensional Computer Modeling**

**Lecture:** 18 contact hours

**Lab:** 108 contact hours

**Prerequisite:** MACH 075

This course covers intermediate concepts and development of three-dimensional solid modeling and solid assembly modeling using a Computer Aided Drafting (CAD) solid modeling program.

**Associate Degree Applicable**

**MACH 041 4 Units**

**Advanced Mechanical Design Applications**

**Lecture:** 36 contact hours

**Lab:** 108 contact hours

**Prerequisite:** ARCH 130 and MACH 075 and MACH 040

This course covers advanced modeling of machine parts in the various stages of manufacturing with required back-up items such as jigs, fixtures, weldments, tooling, molds and dies.

**Associate Degree Applicable**

**MACH 042 3 Units**

**Mechanical Design and Drafting I**

**Lecture:** 18 contact hours

**Lab:** 108 contact hours

**Prerequisite:** ARCH 130 and MACH 075

This course covers the production of engineering drawings with primary orthographic views, section views, detail views and auxiliary views. Students will also become familiar with detailing of drawing views including dimensions, notes/labels and drawing formats.

**Associate Degree Applicable**

**MACH 043 4 Units**

**Mechanical Design and Drafting II**

**Lecture:** 36 contact hours

**Lab:** 108 contact hours

**Prerequisite:** ARCH 130 and MACH 075 and MACH 042

This course covers advanced drawing techniques with a focus on mechanical applications. Advanced documentation/design practices including ASME Y14.5 tolerancing, symbol libraries, bills of material, and interface automation will be covered.

**Associate Degree Applicable**

**MACH 050 1 Unit**

**Electrical Safety and Hand Bending**

**Lecture:** 18 contact hours

This course covers safety rules as applied to handling and working with electrical systems and circuits including methods and procedures used in cutting, bending, and reaming conduit.

**Associate Degree Applicable**

**MACH 052 1 Unit**

**Fasteners and Electrical Theory**

**Lecture:** 18 contact hours

This course covers basic electrical theory and applications and installation procedures for various types of fasteners and anchors used in electrical systems and circuits.

**Associate Degree Applicable**

**MACH 054 2 Units**

**National Electrical Code (NEC) and Electrical Test Equipment**

**Lecture:** 36 contact hours

The course covers the application of electrical test equipment, the National Electrical Code (NEC), and raceway-fittings and accessories.

**Associate Degree Applicable**

**MACH 058 1 Unit**

**Electrical Print Reading and Wiring**

**Lecture:** 18 contact hours

This course covers the application of electrical print reading and the wiring of switches and receptacles used in residential, and commercial electricity.

**Associate Degree Applicable**

**MACH 060 1 Unit**

**Electrical Performance Testing**

**Lab:** 54 contact hours

**Prerequisite:** MACH 050 and MACH 052 and MACH 054 and MACH 058

In this course students will have the opportunity to demonstrate the skills learned in the classroom under the guidance of journeyman and/or qualified personnel on the jobsite.

**Associate Degree Applicable**

**MACH 061 4 Units**

**Jig and Fixture Machining**

**Lecture:** 54 contact hours

**Lab:** 54 contact hours

**Advisory:** MACH 021 and MACH 090

This course includes the study of jig and fixture, design, and machining. Techniques to support conventional and computer numerical control (CNC) machining processes to improve manufacturing efficiency and productivity are explored.

**Associate Degree Applicable**

**MACH 062 3 Units**

**Computer Numerical Control Wire Electric Discharge Machine Set Up**

**Lecture:** 18 contact hours

**Lab:** 108 contact hours

**Prerequisite:** MACH 160

This course provides the student with instruction in the concepts and practices associated with the set up, operation, and programming of Computer Numerical Control (CNC) Wire Electrical Discharge Machines (EDM).

**Associate Degree Applicable**

**MACH 070 3 Units**

**Computer Numerical Control Programming (CNC) I**

**Lecture:** 18 contact hours

**Lab:** 108 contact hours

**Advisory:** TECALC 087 and MACH 090

This course focuses on basic numerical control programming and emphasizes math used for toolpath geometry, and the use of a computer CNC Software simulator for verifying toolpath geometry calculations.

**Associate Degree Applicable**

**MACH 071 3 Units****Computer Numerical Control Programming II****Lecture:** 18 contact hours**Lab:** 108 contact hours**Prerequisite:** MACH 070

This is an intermediate Computer Numerical Control (CNC) programming course which focuses on manual coding of various machine tool control languages. It includes programming concepts, and hands on manual programming to manufacture parts using Fanuc, Haas, and Mazak CNC machine tools.

**Associate Degree Applicable****MACH 072 3 Units****Computer Aided Design and Manufacturing Programming I****Lecture:** 18 contact hours**Lab:** 108 contact hours

This course includes the study and use of Mastercam software with emphasis on drawing 2-D models, construction and part design basics related to 2-D models, and part programming for Computer Numerical Control (CNC) lathes and mills.

**Associate Degree Applicable****MACH 073 3 Units****Computer Aided Design and Manufacturing Programming II****Lecture:** 18 contact hours**Lab:** 108 contact hours**Prerequisite:** MACH 072

This course includes the study and use of Mastercam software, 3-D mill, solids, and lathe programming. Speeds, feeds, and tool path programming for generating G- code of complex surfaces are explored.

**Associate Degree Applicable****MACH 074 3 Units****Computer Numerical Control (CNC) Machining Setup and Operation****Lecture:** 18 contact hours**Lab:** 108 contact hours

This is an introductory course designed to teach the fundamental skills related to the setup and operation of Computer Numerically Controlled (CNC) machine tools. Safety, tool selection, speeds and feeds, machine and controller functions, and calculation and input of offsets, are also included.

**Associate Degree Applicable****MACH 075 3 Units****Introduction to Three-Dimensional Computer-Aided Design (3D-CAD)****Lecture:** 18 contact hours**Lab:** 108 contact hours

This course is an introduction to Computer Aided Design/SolidWorks (CAD) with emphasis on industry standards in preparation for certification in SolidWorks Associates (CSWA) Exam. Students will be introduced to 2-D drafting practices and techniques as well as 3-D solid modeling, using SolidWorks and its application in design and rapid prototyping.

**Associate Degree Applicable****MACH 076 3 Units****Computer Numerical Control (CNC) Parts Programming and Machining****Lecture:** 18 contact hours**Lab:** 108 contact hours**Prerequisite:** MACH 074

This course covers manual programming techniques, calculations, and program development for Computer Numerical Control (CNC) mills, machining centers, and lathes. Up to three axis of control will be discussed. Students will test part programs on Computer Numerical Control (CNC) machines during laboratory hours.

**Associate Degree Applicable****MACH 077 3 Units****Advanced Computer Numerical Control (CNC) Machining****Lecture:** 18 contact hours**Lab:** 108 contact hours**Prerequisite:** MACH 076

This course provides students with advanced instruction and practice in the concepts and practices associated with programming and set up of Computer Numerical Control (CNC) mills and lathes. Students will build upon prior experience with CNC machines to complete finished parts on Computer Numerical Control (CNC) mills and lathes having various control types. Students will run programs and practice set-up processes during lab time.

**Associate Degree Applicable****MACH 078 3 Units****Multiple Axis Computer Numerical Control (CNC) Set-Up and Operation Machining****Lecture:** 18 contact hours**Lab:** 108 contact hours**Prerequisite:** MACH 077

This course provides students with instruction associated with the programming and set up of Computer Numerical Control (CNC) mills with four and five axis of control. Students will build upon prior experience with Computer Numerical Control (CNC) machines to complete finished parts on Computer Numerical Control (CNC) mills with four and five axis of control. Students will run programs and practice set-up processes during the laboratory.

**Associate Degree Applicable****MACH 090 3 Units****Mechanical Print Reading****Lecture:** 36 contact hours**Lab:** 54 contact hours

This course is a study in print interpretation with an emphasis on terminology. It also includes sketching, precision metrology, and concepts related to mechanical drawing standards, language of the American Society of Mechanical Engineers (ASME) Y14 series 2014, and how these apply to the mechanical print inspection processes.

**Associate Degree Applicable****MACH 091 2 Units****Geometric Dimensioning & Tolerancing****Lecture:** 36 contact hours**Prerequisite:** MACH 090

This course covers Geometric Dimensioning and Tolerancing interpretation and use of ANSI Y14.5M standards applied to prints regarding industry and government standards.

**Associate Degree Applicable****MACH 098 1-4 Units****Machinist Technology Work Experience****WRKEX:** 300 contact hours

This course involves supervised training, in the form of on the job employment that will enhance the student's knowledge in the selected field of study. The student's major and job must match. Students work 5-20 hours per week to earn units using the following formula: For paid work, 75 hours = 1 unit; for volunteer work, 60 hours = 1 unit. Students may earn a total of 16 units toward graduation in Work Experience 098 courses. Students MUST be working for pay or volunteer before registering for a Work Experience class. NOTE: Only one section of Work Experience may be taken during a semester.

**MACH 120 2 Units**

**Machine Shop Theory**

**Lecture:** 36 contact hours

This is a lecture course with instruction in the fundamentals of industrial processes and machines that are required of the machinist. Shop safety practices, job planning, feeds and speeds, layout tools, hand tools, bench work, and metal-cutting machines are covered.

**Associate Degree Applicable**

**Transfers to CSU only**

**MACH 123 4 Units**

**Machine Shop III**

**Lecture:** 18 contact hours

**Lab:** 162 contact hours

**Advisory:** MACH 022

This course includes intermediate machine shop practices. Emphasis is placed on set up of machine tool accessories: steady rests, vises, rotary tables, indexers, and precision grinding accessories: precision vice, punch former, surface grinder radius dresser. At the completion of the course, students may qualify for National Institute for Metalworking Skills (NIMS).

**Associate Degree Applicable**

**Transfers to CSU only**

**MACH 124 4 Units**

**Machine Shop IV**

**Lecture:** 18 contact hours

**Lab:** 162 contact hours

**Advisory:** MACH 123

This course includes advanced machine shop practices. Emphasis is placed on high precision with low tolerance manufacturing, advanced math applications, special tool grinding, part indexing, and carbide applications. At the completion of the course, students should have completed the National Institute for Metalworking Skills (NIMS) certification competency tests in Manual Milling and Grinding Skills I.

**Associate Degree Applicable**

**Transfers to CSU only**

**MACH 129 3 Units**

**Manufacturing Processes**

**Lecture:** 54 contact hours

The course is designed to provide a basic understanding of the manufacturing process: need, scope, advantages, limitation, economics, application, materials, and manufacturing. An overview of different methods for industrial materials manufacturing processes including casting, imaging and coating, molding, forming, machining, joining, and additive manufacturing will be covered.

**Associate Degree Applicable**

**Transfers to CSU only**

**MACH 160 4 Units**

**Tool and Die**

**Lecture:** 18 contact hours

**Lab:** 162 contact hours

**Advisory:** MACH 075 and MACH 120 and MACH 123

This course includes the study and design of tool and die making processes; die cutting and forming; power presses dies for stamping and forming metal parts; and standards as outlined in the National Institute for Metalworking Skills (NIMS) standards.

**Associate Degree Applicable**

**Transfers to CSU only**

**MACH 600 Noncredit**

**Conventional Machine Lab**

**Lecture:** 54 contact hours

This noncredit laboratory course provides practice on machine shop equipment. Students will work on individual projects which they will retain for their use. Training received in this course develops an ability to visualize and perform various functions necessary in the machine trade.

**MACH 601 Noncredit**

**Computer Numerical Control (CNC) Lab**

**Lecture:** 9 contact hours

This noncredit laboratory course provides practice on CNC machine shop equipment. Students will work on individual projects which they will retain for their use. Training received in this course develops an ability to visualize and perform various functions necessary in the machine trade.