

# MACHINE SHOP (MACH)

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## MACH 101 BEGINNING METALWORKING SKILLS

### 3 unit

Beginning machine shop course focusing on operation, inspection, safety, and developing process plans for optimal metal removal. Introductory mill and lathe operations with layout work. Total 36 hours lecture and 72 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 102 INTERMEDIATE METALWORKING SKILLS

### 3 unit

**Prerequisite(s):** MACH 101

Intermediate machine shop course focusing on operation, inspection, safety, and developing process plans for optimal metal removal. Intermediate mill and lathe operations with basic Computer Numerical Control and Computer-Aided Manufacturing. Total 36 hours lecture and 72 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 110 BLUEPRINT READING

### 1 unit

Analysis of engineering and manufacturing technical drawings. Emphasis on visualizing and interpreting detailed drawings for mechanical components. Focus on generating, modifying, and interpreting key elements of blueprints, including; view representation, titleblocks, symbols, dimensions, geometric fits and tolerances. Total of 18 hours lecture.

**Grade Mode:** *Audit, Letter Grade*

## MACH 111 GEOMETRIC DIMENSIONING AND TOLERANCING

### 2 unit

Analysis of functions and mating relationships in determining geometric dimensioning and tolerance. Continuation of the design of mechanical components using three-dimensional attributes of the component. Application of industry standards such as American Society of Mechanical Engineers (ASME) in solving engineering problems. Total of 18 hours lecture and 54 hours of laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 120 COMPUTER-AIDED MANUFACTURING (CAM)

### 3 unit

Basics of the MasterCam program including three MasterCam projects: mill, lathe, and solids. Part creation, toolpath construction and verification of g-code, drilling, tapping, contouring, pocketing, circle milling, and slot milling. Total of 36 hours lecture and 72 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 121 COMPUTER-AIDED MANUFACTURING (CAD) ADVANCED

### 3 unit

**Prerequisite(s):** MACH 120

Advanced use of Mastercam as it relates to machinability and fixtures and tool setups. Covers 3D wireframe, surface geometry creation and solid creation, surface finish and roughing toolpaths, advanced surface high speed toolpaths, STL Stock creation and its use in solid model verification. Machine simulation is used to verify G-Code for collisions between the part, the tool and machine components. Total of 36 hours lecture and 72 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 130 CNC MILL MACHINING

### 3 unit

**Prerequisite(s):** MACH 101

Production of machining operations on CAM software to produce numerical control programming (GCode) in order to automate numerically controlled machinery (CNC). Topics include CAD, solid modeling, work piece set-up, toolpath generation, GM Codes, machine set-up, contour, pocket and surface machining. Total of 27 hours lecture and 81 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 131 CNC MILL MACHINING ADVANCED

### 3 unit

**Prerequisite(s):** MACH 130

Production of machining operations on CAM software to produce numerical control programming (GCode) in order to automate numerically controlled machinery (CNC). Topics include advanced CNC milling techniques, faster production speeds, higher level of precision, fabrication of complex components, and 4th-axis rotary indexing. Total of 27 hours lecture and 81 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

## MACH 135 CNC LATHE MACHINING

### 3 unit

**Prerequisite(s):** MACH 101

Setup and operation of Computer Numerical Control (CNC) Lathes by explaining the components and functions of the CNC lathe. Includes cutting operations, variables in cutting tools used on the CNC lathe and associated toolholders. Toolpaths such as Facing, Roughing, Finishing, Drilling, Grooving, Canned Cycles, and Threading. Total of 27 hours lecture and 81 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*

**MACH 136 CNC LATHE MACHINING ADVANCED**

**3 unit**

**Prerequisite(s):** *MACH 135*

Development of advanced student skills in the setup and operation of Computer Numerical Control (CNC) lathes by determining innovative programming methods, selecting proper work holding setups, using optimal tooling. Topics include CNC lathe manufacturing and practical applications, optimal CAM Code programming, advanced tool selection, and calculate tool motion for threads, tapers, roughing and finishing, and canned cycles. Total of 27 hours lecture and 81 hours laboratory.

**Grade Mode:** *Audit, Letter Grade*