

EASTERN ARIZONA COLLEGE

Fundamentals of Machine Shop

Course Design
2018-2019

Course Information

Division Industrial Technology Education
Course Number MSP 101
Title Fundamentals of Machine Shop
Credits 2
Developed by Dorian R. Nelson
Lecture/Lab Ratio 1 Lecture/3 Lab
Transfer Status

ASU	NAU	UA
Non Transferable	CTE Departmental Elective also satisfies: CTE Departmental Elective	Non Transferable

Activity Course Yes
CIP Code 48.0500
Assessment Mode Pre/Post Test (25 Questions/25 Points)
Semester Taught Fall and Spring
GE Category None
Separate Lab No
Awareness Course No
Intensive Writing Course No

Prerequisites

None

Educational Value

Drafting and Automotive majors will find this course helpful in their chosen field. Machine shop majors will gain basic knowledge of machine shop operations which will prepare them for future courses. This course will also provide opportunities for hobby type operations for community members.

Description

This course teaches the principles of machining and metal cutting using modern machine tools, hand tools, and precision measuring tools. Students will learn to use all of the five basic machine tools, lathe, milling machine, drilling machines, shaper, and precision grinders. Identical to AMT 101.

Supplies

Safety glasses

Competencies and Performance Standards

1. Demonstrate safe and proven methods of shop procedures.

Learning objectives

What you will learn as you master the competency:

- a. Identify the causes of accidents in the machine shop environment.
- b. List the safety equipment required in shop operations.
- c. List the safety rules for each piece of machine shop equipment.
- d. Identify the conditions in the shop which could be considered hazardous.

Performance Standards

Competence will be demonstrated:

- o in completion of assigned projects
- o in using correct tools for each task and using them correctly

Criteria - Performance will be satisfactory when:

- o learner practices recognized safety procedures in the shop at all times and always uses the prescribed safety equipment
- o learner demonstrates an ability and willingness to follow designated procedures

2. Operate all of the lathes correctly.

Learning objectives

What you will learn as you master the competency:

- a. Set and adjust the lathe according to the desired outcome.
- b. Calculate speeds and feeds correctly.
- c. Complete 8 different assigned operations on a lathe.
- d. Clean, lubricate, and maintain the lathe in accordance with operations sheet.

Performance Standards

Competence will be demonstrated:

- o in completing assigned projects using the lathe and the necessary tools and measuring instruments

Criteria - Performance will be satisfactory when:

- o learner operates the lathe correctly
- o learner makes all of the lathe adjustments for speeds and feeds according to the requirement for each task
- o learner performs 8 standard lathe operations accurately and efficiently

3. Operate all of the milling machines correctly.

Learning objectives

What you will learn as you master the competency:

- a. Set up and adjust the settings on the milling machine for the desired outcome.
- b. Show the correct use of machine locks for various milling operations.
- c. Demonstrate conventional and climb milling on vertical and horizontal milling operations.
- d. Calculate spindle speeds and table feeds for a variety of machining conditions.

- e. Mount different types of work holding devices to the machine table and align correctly.
- f. Clean, lubricate, and maintain the milling machine in accordance with the operation sheet.

Performance Standards

Competence will be demonstrated:

- o in setting up and operating the milling machines in the machine shop
- o in machining assigned projects to specifications

Criteria - Performance will be satisfactory when:

- o learner makes setups on the milling machine correctly
- o learner operates the milling machine correctly
- o learner performs all of the basic milling machine operations correctly

4. Operate the drill press and other drilling equipment correctly.

Learning objectives

What you will learn as you master the competency:

- a. Set and adjust spindle speeds and feed rates for the requirements of the different drill press operations.
- b. Perform 5 different drill press operations in fabricating assigned projects.
- c. Identify all of the tools which are commonly used on the drill press.
- d. Identify the parts of a drill.
- e. Specify the different cutting fluids which should be used in drilling different materials.

Performance Standards

Competence will be demonstrated:

- o in using the drilling machines in the machine shop.
- o in completing assigned projects to specifications.

Criteria - Performance will be satisfactory when:

- o learner correctly chooses cutting tools
- o learner makes proper machine set-ups
- o learner operates the machines safely and properly
- o learner performs all of the basic drilling machine operations satisfactorily

5. Operate the precision surface grinders correctly.

Learning objectives

What you will learn as you master the competency:

- a. Interpret the numerical code on a grinding wheel and choose the correct wheel for the requirements of the job.
- b. Describe the advantages and limitations of the different types of grinding coolants which are used on precision grinding machines.
- c. Discuss the primary purpose and advantage of the different types of precision grinding machines.
- d. Identify all of the controls on precision grinding machines and describe their use.
- e. Demonstrate the correct use of the magnetic chuck for different grinding conditions.
- f. Demonstrate the correct procedures for dressing a wheel on a surface grinder.

- g. Clean, lubricate, and maintain the precision grinders correctly.

Performance Standards

Competence will be demonstrated:

- o in correctly installing and dressing grinding wheels on the surface grinder
- o in using the surface grinder to complete assigned projects

Criteria - Performance will be satisfactory when:

- o learner sets up and operates the surface grinders correctly
- o learner installs and dresses grinding wheels correctly
- o learner produces 16 rms finishes and holds dimensional tolerances to within .0004 inches

6. Operate the shaper correctly.

Learning objectives

What you will learn as you master the competency:

- a. Describe the different types of shapers.
- b. Identify the major components of the metal working shaper.
- c. Demonstrate the proper settings and adjustments on the shaper.
- d. Prepare cutting tools for shaper operations.
- e. Clean, lubricate, and maintain the shaper correctly.

Performance Standards

Competence will be demonstrated:

- o in completing assigned projects on the shaper

Criteria - Performance will be satisfactory when:

- o learner sets and operates the shaper correctly

7. Demonstrate the ability to use layout instruments and do layout work by completing assigned projects.

Learning objectives

What you will learn as you master the competency:

- a. Describe the different types of surface plates and list their advantages.
- b. Demonstrate the correct use of the height gage and surface gage.
- c. Adjust the sliding vernier scale on a height gage to set the scribe.
- d. Scribe layout lines on a machined part to print specifications.
- e. Use Vee blocks and bevel protractor to produce accurate scribe lines on machined surfaces.

Performance Standards

Competence will be demonstrated:

- o in using layout dye, surface plate, height gage, dividers, protractors, and angle blocks to produce a correct layout

Criteria - Performance will be satisfactory when:

- o learner does a completed layout of the assigned project

Types of Instruction

Classroom lecture and discussion

Instructor demonstration of procedures

Lab work on assigned projects

Grading Information***Grading Rationale***

30% of final grade is chapter tests

30% of final grade is project grades

30% of final grade is final exam

10% of final grade is attendance

Grading Scale

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F Below 60%

Learning Plan 1

Overview

The purpose of this plan is to help students learn about shop hazards and safety procedures. Students will learn correct procedures to work in the shop safely and efficiently.

1. Demonstrate safe and proven methods of shop procedures.

Learning Activities

____1. Participate in a demonstration of shop procedures.

____2. List the five most hazardous conditions for each machine tool.

Assessment Activities

____1. Turn in the machine tool hazard list to the instructor.

____2. Pass the machine shop safety test with a score of 90% or better.

Learning Plan 2

Overview

Students will learn the principles of the lathe and lathe operations and will perform eight basic lathe operations.

2. Operate all of the lathes correctly.

Learning Activities

- ____1. Complete assigned projects which include turning, boring, facing, groove cutting, knurling, internal and external threading.

Assessment Activities

- ____1. Turn in assigned projects for a grade.
____2. Take a test on lathes and lathe operations.

Learning Plan 3

Overview

The purpose of this learning plan is to help students learn about the milling machine and the operations that can be done on the milling machine.

3. Operate all of the milling machines correctly.

Learning Activities

____1. Identify all of the basic milling cutters and explain their use.

____2. Complete the assigned milling projects.

Assessment Activities

____1. Complete the test on milling machines and milling operations.

____2. Turn in completed milling projects for evaluation.

Learning Plan 4

Overview

Students will learn the fundamentals of drilling and drilling machinery.

4. Operate the drill press and other drilling equipment correctly.

Learning Activities

- ____ 1. Identify the parts of the standard drill press.

- ____ 2. Identify the parts of a drill bit.

- ____ 3. Use drills and other drill press cutting tools to complete assigned projects.

Assessment Activities

- ____ 1. Take a test on the material presented in class on drilling machine operations.
- ____ 2. Turn in completed assigned projects for a grade.

Learning Plan 5

Overview

Students will learn the principles of precision grinding. Students will learn the procedures for wheel dressing diamond truing, coolant usage, and accurate grinding feeds.

5. Operate the precision surface grinders correctly.

Learning Activities

____1. Complete assigned projects to specifications using precision grinding methods.

Assessment Activities

____1. Take a test on grinding principles and procedures.

____2. Turn in assigned grinding projects for evaluation.

Learning Plan 6

Overview

Students will learn the principles of shaper construction, design, and operation.

6. Operate the shaper correctly.

Learning Activities

- ____ 1. Complete a list of planing tools and planing tool operations.

- ____ 2. Make a complete set up on the shaper.

- ____ 3. Machine assigned projects using the shaper.

Assessment Activities

- ____ 1. Take a test on planing machines and planing operations.
- ____ 2. Turn in completed projects for a grade.

Learning Plan 7

Overview

Students will learn to use the surface plate, height gage, vernier bevel protractor, angle plates, vee blocks, and other layout instruments to produce accurate part markings for machining.

- 7. Demonstrate the ability to use layout instruments and do layout work by completing assigned projects.**

Learning Activities

- ____ 1. Submit the step block project with all of the layout lines in place to the instructor, for a grade.

Assessment Activities

- ____ 1. Take the written test on layout.
- ____ 2. Submit the exercise on machine part layout for a grade.
- ____ 3. Submit the step block project with all layout lines in place for a grade.