



Western Technical College

10420201 Fundamentals of Machining (CBE)

Course Outcome Summary

Course Information

Description	Requires the learner to apply safety requirements in the machining environment, identify the principles of machining theory, and operate basic machining equipment. Students are encouraged to take this course concurrently with Blueprint Reading and Measurement and Inspection.
Career Cluster	Manufacturing
Instructional Level	One-Year Technical Diploma
Total Credits	1
Total Hours	36

Textbooks

No textbook required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Proper footwear - \$35.00-75.00. **Vendor:** To be discussed in class. Required.

Scientific calculator (recommend T1-36x Solar). **Vendor:** Campus Shop. Required.

Three-ring binder. **Vendor:** Campus Shop. Required.

Clipboard. **Vendor:** Campus Shop. Required.

Pens/Pencils/Black Sharpie Marker. **Vendor:** Campus Shop. Required.

Minimum 4GB USB Flash Drive. **Vendor:** Campus Shop. Required.

Success Abilities

1. Cultivate Passion: Increase Self-Awareness
2. Live Responsibly: Foster Accountability
3. Refine Professionalism: Improve Critical Thinking

Program Outcomes

1. Apply basic safety practices in the machine shop.
2. Interpret industrial/engineering drawings.
3. Apply precision measuring methods to part inspection.
4. Perform basic machine tool equipment set-up and operation.

Course Competencies

1. Identify safety regulations and hazards in the machining environment.

Assessment Strategies

- 1.1. Demonstration
- 1.2. Written Objective Test

Criteria

You will know you are successful when

- 1.1. you identify and describe ways to minimize common hazards in the machining environment.
- 1.2. you wear proper clothing and all PPE per posted regulations 100% of the time when in the shop.
- 1.3. you follow safety regulations and housekeeping practices per industry standard and Western policies and procedures 100% of the time.

Learning Objectives

- 1.a. Identify emergency exits and describe procedures for various emergency situations.
- 1.b. Locate Emergency Procedure Guides and describe their purpose.
- 1.c. Describe safe dress for an industrial setting.
- 1.d. Examine common practices for maintaining work station/area that reinforces safety practices.
- 1.e. Identify proper personal protective equipment for a given situation/process.
- 1.f. Locate the storage area for SDS(MSDS) information and describe its purpose.
- 1.g. Identify first aid actions for various common work related injuries.

2. Relate machining theory principles to machining applications.

Assessment Strategies

- 2.1. Written Objective Test

Criteria

You will know you are successful when

- 2.1. you summarize aspects of cutting tool geometry, its purpose, and its function.
- 2.2. you calculate correct speeds and feeds for various types of machining operations.
- 2.3. you compare the use of high-speed steel and carbide cutting tools in machining applications.
- 2.4. you use proper cutting fluid recommendations for various work piece materials and machining operations.

Learning Objectives

- 2.a. Calculate correct spindle speeds for various types of machining operations.
- 2.b. Calculate and/or determine correct feed rates for various types of machines and operations.
- 2.c. Calculate or determine infeed amounts for various machines and operations.
- 2.d. Recognize the differences in application of various tool materials.
- 2.e. Recognize various types of tool wear and recommend ways to minimize the wear.
- 2.f. Recognize the applications of various tool holding devices on various machines.
- 2.g. Utilize proper cutting fluid recommendations for various work piece materials and machining operations.
- 2.h. Calculate the amount of water and concentrate in a cutting fluid solution.
- 2.i. Select the proper work holding device for various machines and operations.

3. Characterize metals based on properties as they relate to their use.

Assessment Strategies

- 3.1. Written Objective Test

Criteria

You will know you are successful when

- 3.1. you describe the properties and uses of various types of iron and steel.
- 3.2. you describe the properties and uses of various non-ferrous metals.
- 3.3. you identify critical temperatures for various heat treating processes.
- 3.4. you perform hardness testing on a Rockwell hardness tester.

Learning Objectives

- 3.a. Identify the properties and uses of various types of iron and steel.
- 3.b. Identify the properties and uses of various non-ferrous metals.
- 3.c. Determine critical temperatures for various heat treating processes for steel.
- 3.d. Perform hardness testing on a Rockwell hardness tester.

4. Create a production plan for a machining product.

Assessment Strategies

- 4.1. Written Objective Test
- 4.2. Skill Demonstration

Criteria

You will know you are successful when

- 4.1. you create a process plan list with all the processes required to make one part.
- 4.2. you create a process plan that includes the size and quantity of material required and any other required parts.
- 4.3. you select feeds and speeds and document it on the production plan.
- 4.4. you determine tool selection for the workpiece and document it on the production plan.
- 4.5. you create a process plan for one part that includes a written description and diagram of the fixture(s) or work holding devices required for manufacture.

Learning Objectives

- 4.a. Determine overall size of part for stock selection.
- 4.b. Determine processes needed to make a part.
- 4.c. Select tools needed to produce part.
- 4.d. Determine critical dimensions for inspection.

5. Apply reference markings to a workpiece.

Assessment Strategies

- 5.1. Written Objective Test
- 5.2. Skill Demonstration

Criteria

You will know you are successful when

- 5.1. you summarize procedures for laying out a workpiece.
- 5.2. you determine datums(edges) that reference markings must be associated with.
- 5.3. you select the layout tools needed for the situation.
- 5.4. you apply machining reference marks with sample project work pieces.

Learning Objectives

- 5.a. Identify the proper preparation procedures for laying out a workpiece.
- 5.b. Determine datums(edges) that reference markings must be associated with.
- 5.c. Determine layout tools needed for the situation.
- 5.d. Practice application of machining reference marks with sample project work pieces.

6. Operate a drill press and a horizontal band saw.

Assessment Strategies

- 6.1. Skill Demonstration
- 6.2. Written Objective Test

Criteria

You will know you are successful when

- 6.1. you describe ways to minimize/eliminate the hazards.
- 6.2. you select proper tooling for various common drill press operations.
- 6.3. you demonstrate semi-precision hole location techniques.
- 6.4. you select proper cutting fluids for various sawing and drill press operations.
- 6.5. 6 you demonstrate proper use of workholding and tool holding devices commonly used on said machines.

Learning Objectives

- 6.a. Recognize potential safety hazards associated with drilling machines and horizontal saws and describe ways to minimize/eliminate the hazards.
- 6.b. Identify proper tooling for various common drill press operations.
- 6.c. Practice semi-precision hole location techniques.
- 6.d. Identify proper cutting fluids for various sawing and drill press operations.
- 6.e. Practice proper use of workholding and tool holding devices for various machines.