



Western Technical College

31442302 Welding - Fabrication 1

Course Outcome Summary

Course Information

Description	A course of instruction to include the use of rulers/scales, layout and hand tools, power tools and large shop equipment, welding joint designs, and assembly projects by various welding processes.
Career Cluster	Manufacturing
Instructional Level	Technical Diploma Courses
Total Credits	2
Total Hours	72

Pre/Corequisites

Pre/Corequisite	31442306 Wirefeed Welding 1
Pre/Corequisite	31442303 Welding - SMAW 1

Textbooks

Modern Metalworking. 11th Edition. Copyright 2023. Walker, John R. Publisher: Goodheart-Wilcox Co. **ISBN-13:** 978-1-64925-983-7. Required.

Learner Supplies

Welding sateen jacket, welding work gloves (long leather gauntlet, short leather work gloves), welding helmet, leather cape and sleeves. **Vendor:** To be discussed in class. Required.

Tools: 25' steel tape measure, metal combination square, and scribe. **Vendor:** To be discussed in class. Required.

Six-inch leather steel toed work boots - \$75.00-150.00. **Vendor:** To be discussed in class. Required.

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

Experiential Learning

1. Community Based Learning Project: a key learning outcome of this course is to connect academic learning and civic development while simultaneously addressing a community partner's needs, interests, or problems.
2. Work-Based Learning: this course applies your learning to your desired profession by working in industry placements such as internships, practicums, clinicals, or co-ops.

Program Outcomes

1. Demonstrate industry recognized safety practices
2. Interpret welding drawings
3. Produce shielded metal arc welds (SMAW)
4. Produce gas metal arc welds (GMAW)
5. Produce gas tungsten arc welds (GTAW)
6. Perform thermal cutting

Course Competencies

1. Use measuring devices

Assessment Strategies

- 1.1. On-the-job Performance

Criteria

You will know you are successful when

- 1.1. you read the correct measurement to the smallest divisions of measuring device.
- 1.2. you identify the appropriate measuring tool for the task

Learning Objectives

- 1.a. Read divisions of standard tape measure.
- 1.b. Operate dial caliper
- 1.c. Determine differences between push pull tape measure and flexible tape measure.
- 1.d. Find angles between two lines or surfaces with angle gauge and protractor.
- 1.e. Select appropriate device for a job.

2. Identify basic materials of the industry.

Assessment Strategies

- 2.1. Skill Demonstration

Criteria

You will know you are successful when

- 2.1. you identify various stock materials and fasteners.
- 2.2. you classify materials and fasteners.
- 2.3. you use a catalog to aid in identification.
- 2.4. you use measuring devices to aid in identification.

Learning Objectives

- 2.a. Apply technical reading for material catalog
- 2.b. Read specialized material gauges.
- 2.c. Classify materials and fasteners.
- 2.d. Discern identifying variables.

3. Shear steel.

Assessment Strategies

- 3.1. Skill Demonstration

Criteria

You will know you are successful when

- 3.1. you set rake for material thickness, power up machine, set backstop distance, and cut material in the large 8' shear.
- 3.2. you are able to set the backstop, power up, and cut material in the small 4' shear.
- 3.3. you use measuring devices, marking devices, clamping devices, and features of the machine(s) to produce correctly sized and shaped parts.
- 3.4. you identify the limitations of the shears.

Learning Objectives

- 3.a. Use safety equipment.
- 3.b. Locate material of proper thickness.
- 3.c. Set up shear.
- 3.d. Use back gauge when applicable.
- 3.e. Shear material to proper size.
- 3.f. Use square to check for squareness.
- 3.g. Clean up and put scrap in correct area.
- 3.h. Use geometric principles to layout and check parts.

4. Operate pedestal and hand grinders.

Assessment Strategies

- 4.1. Skill Demonstration

Criteria

You will know you are successful when

- 4.1. you grind mild steel on pedestal grinder.
- 4.2. you grind in correct direction using hand grinder.
- 4.3. you change grinding wheels and wire cups.

Learning Objectives

- 4.a. Use safety equipment.
- 4.b. Change wheels and cups with and without wrenches.
- 4.c. Control sparks.
- 4.d. Grind to proper depth.
- 4.e. Change distance of rest on pedestal grinder.
- 4.f. Analyze different finishes produced by various shapes and types of abrasives
- 4.g. Explore what effect different material type has on the method of grinding and polishing.

5. Operate hole-making devices.

Assessment Strategies

- 5.1. Skill Demonstration

Criteria

You will know you are successful when

- 5.1. you load correct tooling into punch tool and punch holes properly.
- 5.2. you center punch hole locations.
- 5.3. you load correct tooling into drill press, hand drill or mag drill and produce hole properly.
- 5.4. you cut holes properly for tapping.

Learning Objectives

- 5.a. Apply safe practices around rotational and piercing machines.

- 5.b. Examine layout of hole locations.
- 5.c. Explore center punching technique and tapping technique.
- 5.d. Examine pilot hole, step drilling, and hydraulic punch usage.
- 5.e. Identify rotational tool classifications.

6. Cut material using saws or grinders.

Assessment Strategies

- 6.1. Skill Demonstration

Criteria

You will know you are successful when

- 6.1. you identify and operate the various saws and grinders available in the lab.
- 6.2. you recognize how size and type of material will impact which tool will work best.
- 6.3. you know the strengths and limitations of the various cutting tools available.
- 6.4. you are able to select the best cutting tool for the job.
- 6.5. you position and clamp or otherwise steady material for cutting.
- 6.6. you cut a piece of material to the correct size without damaging the material or the machine.

Learning Objectives

- 6.a. Use safety equipment.
- 6.b. Select proper blade for the material being cut.
- 6.c. Measure correctly accounting for kerf and any miters.
- 6.d. Clamp material correctly.
- 6.e. Tilt saw for mitre cuts.
- 6.f. Adjust blade speed and feed speed appropriate to the material being cut.
- 6.g. Clean up area.
- 6.h. Examine processes of cutting aluminum and stainless steel.

7. Apply manual bending processes.

Assessment Strategies

- 7.1. Skill Demonstration

Criteria

You will know you are successful when

- 7.1. you select the appropriate machine to produce the desired bend.
- 7.2. you apply the correct process for the chosen material.
- 7.3. you are able to produce a correctly shaped bent part that in which the finish dimensions are +/- .06".
- 7.4. you are able to produce a correctly sized bent part that in which the finish dimensions are +/- .06".

Learning Objectives

- 7.a. Cut stock to correct blank size and shape.
- 7.b. Layout bend lines.
- 7.c. Load material into machine properly.
- 7.d. Operate the machine correctly to produce the desired bend.
- 7.e. Examine processes of forming aluminum and stainless steel.

8. Operate plate/sheet roller.

Assessment Strategies

- 8.1. Activity

Criteria

You will know you are successful when

- 8.1. you calculate a blank size
- 8.2. you roll a part to the correct size and shape within tolerance
- 8.3. you account for blank end flat spots appropriately

Learning Objectives

- 8.a. Calculate blank size utilizing radius or diameter and circle math, accounting for material stretch and compression.
- 8.b. Use the machine to form the material.

- 8.c. Identify blank end flat spots.
- 8.d. Examine methods for eliminating blank end flat spot.

9. Assemble and weld fabrication projects.

Assessment Strategies

- 9.1. Skill Demonstration

Criteria

You will know you are successful when

- 9.1. you use PPE.
- 9.2. you make quality welds of the correct size.
- 9.3. you make quality welds in the correct location.
- 9.4. you layout and tack parts in the correct location.
- 9.5. you interpret blueprints and measuring devices correctly.
- 9.6. you sketch weld joints from given weld symbols or visualization.

Learning Objectives

- 9.a. Use safety equipment.
- 9.b. Determine correct weld size, location, and appropriate process.
- 9.c. Control warpage and distortion through welding methods.
- 9.d. Visualize the appearance of welds.
- 9.e. Repair and correct defects found in visual self inspection.
- 9.f. Interpret shop drawings.
- 9.g. Tacking techniques.
- 9.h. Layout techniques.
- 9.i. Clean up area.