**Western Technical College**

# 31442301 Welding-Oxy Fuel Metals Joining

## Course Outcome Summary

### Course Information

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| **Description** | Introduction of gas welding and brazing techniques used to join metal pieces together. |
| **Career Cluster** | Manufacturing |
| **Instructional Level** | Technical Diploma Courses |
| **Total Credits** | 1 |
| **Total Hours** | 36 |

#### Textbooks

No textbook 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.

## Success Abilities

1. Cultivate Passion: Increase Self-Awareness
2. Live Responsibly: Embrace Sustainability
3. Refine Professionalism: Act Ethically
4. Refine Professionalism: Participate Collaboratively

## Program Outcomes

1. Demonstrate industry recognized safety practices
2. Interpret welding drawings
3. Produce gas metal arc welds (GMAW)

## Course Competencies

### 1. Light and adjust the oxy-acetylene torch to a neutral flame.

**Assessment Strategies**

1.1. Skill Demonstration

**Criteria**

*You will know you are successful when:*

1.1. you adjust a neutral flame while joining.
1.2. you maintain a neutral flame while joining.
1.3. you wear PPE and follow all safety procedures.
1.4. you demonstrate the ability to adjust torch to a hotter or cooler flame if needed.

**Learning Objectives**

1.a. Explore the parts of the oxy-acetylene torch.
1.b. Examine safety practices while lighting the oxy-acetylene torch.
1.c. Identify ways to adjust the oxy-acetylene torch.
1.d. Determine correct temperature flame for welding various thicknesses of metal.
1.e. Examine how to adjust torch to a hotter and cooler neutral flame using incremental steps.

### 2. Weld a pad of beads using mild steel.

**Assessment Strategies**

2.1. Skill Demonstration

**Criteria**

*You will know you are successful when:*

2.1. you wear PPE and follow safety procedures.
2.2. you produce several weld beads of at least six inches long with equal size and smooth, uniform contour.
2.3. you perform fusion welds on light gauge steel while manipulating filler rod into the weld pool.
2.4. you adapt weld technique to achieve desired result.

**Learning Objectives**

2.a. Determine the correct temperature for welding various thicknesses of metal.
2.b. Examine technique for fusion welds on light gauge steel.
2.c. Discuss penetration and weld contour using sample welds.
2.d. Explain welding techniques to achieve desired result.

### 3. Weld groove welds.

**Assessment Strategies**

3.1. Skill Demonstration

**Criteria**

*You will know you are successful when:*

3.1. you wear PPE and follow all safety procedures.
3.2. you set up equipment to perform groove welds.
3.3. you weld a groove butt joint, flat position on mild steel and obtain complete penetration.

**Learning Objectives**

3.a. Determine the correct temperature flame for welding various thicknesses of metal.
3.b. Discuss application of weld.
3.c. Identify welding techniques to achieve desired result.
3.d. Identify penetration and weld contour using sample welds.

## 4. Braze weld fillet and groove welds.

**Assessment Strategies**

4.1. Skill Demonstration

**Criteria**

*You will know you are successful when:*

4.1. you wear PPE and follow safety procedures.
4.2. you identify the equipment used in brazing and braze welding.
4.3. you produce several bronze weld beads of at least 4" long with equal size and a smooth, uniform contour.
4.4. you braze weld a fillet weld on a tee joint and obtain equal legs on the fillet and proper bonding to the base metal.
4.5. you braze weld a fillet weld on a lap joint and obtain bonding between the base metal and the brass.
4.6. you produce a brazed joint that contains the correct amount of filler metal and heat input to facilitate bonding.

**Learning Objectives**

4.a. Explore the process of brazing and braze welding.
4.b. Examine how to prepare metal for braze welding (degrease, scratch the surface, flux).
4.c. Explore techniques to achieve the desired weld on various metals.
4.d. Identify the application of the weld.
4.e. Examine the acceptance criteria for a completed weld.
4.f. Practice brazing and braze welding on various joints.
4.g. Examine welding tips as they relate to the job with metal thicknesses and conductivity.

## 5. Perform brazing on copper and dissimilar metals.

**Assessment Strategies**

5.1. Skill Demonstration

**Criteria**

*You will know you are successful when:*

5.1. you choose the proper fluxes and filler metal for brazing application.
5.2. you apply the proper fluxes and filler metal for brazing application.
5.3. you wear PPE and follow all safety procedures.
5.4. you produce a brazed joint that contains the correct amount of filler metal and heat input to facilitate bonding.
5.5. you prepare the metal for silver brazing lap, socket, and nut to plate joints.

**Learning Objectives**

5.a. Examine which flux can be used with various base metals.
5.b. Demonstrate techniques to achieve desired outcome.
5.c. Practice brazing on various metals.
5.d. Examine welding tips as they relate to the job with metal thicknesses and conductivity.
5.e. Illustrate how to add the silver brazing rod uniformly around the joint snd sweat the silver through it.

## 6. Braze weld on cast iron.

**Assessment Strategies**

6.1. Skill Demonstration

**Criteria**

*You will know you are successful when*

6.1. you wear PPE and follow safety procedures.
6.2. you demonstrate proper joint fit up.
6.3. you demonstrate correct metal preparation.

**Learning Objectives**

6.a. Examine proper techniques to prepare the cast iron.
6.b. Examine the acceptance criteria for a completed weld.
6.c. Practice welds on cast iron.