



Course Outcome Summary

31442315 Welding-Tungsten Inert Gas I (TIG)

Course Information:

- Description:** The study of welding techniques on mild steel and applications of the gas-tungsten arc welding process which will also include set up, troubleshooting and tungsten selection on ferrous materials (steel).
- Instruction Level:** Technical Diploma
- Total Credits:** 2.00
- Total Hours:** 72.00
- Purpose/Goals:** Develop safety in his/her work habits and welding procedures when using GTAW welding equipment and procedures. Develop skills required to operate equipment and perform procedures using the GTAW process. Learn welding terminology, tungsten types, wires and gases for given conditions. Learn the identification, weldability and welding procedures for ferrous metals. Weld using DCSP on ferrous metals in the 1F, 2F, 3F, 1G, 2G, 3G positions.
- Textbooks:** *Gas Tungsten Arc Welding Handbook. 6th Edition. Copyright 2013. Minnick, William H. Publisher: Goodheart-Wilcox Co. ISBN-13:978-1-60525-793-8. Required.*
- Supplies needed:** 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 books - \$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
- Core Abilities:**
1. Apply mathematical concepts.
 2. Demonstrate ability to think critically.
 3. Demonstrate ability to value self and work ethically with others in a diverse population.
 4. Make decisions that incorporate the importance of sustainability.
 5. Transfer social and natural science theories into practical applications.
 6. Use effective communication skills.
 7. Use technology effectively.
- Program Outcomes:**
1. Demonstrate industry recognized safety practices
 2. Interpret welding drawings

3. Produce gas tungsten arc welds (GTAW)
4. Perform thermal cutting

Course Competencies:

1. Weld a pad on mild steel with filler.

Domain Psychomotor Level Practice Status Active

Linked Core Abilities

Apply mathematical concepts. Demonstrate ability to think critically. Use effective communication skills. Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
 Interpret welding drawings
 Produce gas tungsten arc welds (GTAW)

Assessment Strategies

1.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 1.1. learner demonstrates how to set polarity and amperage correctly.
- 1.2. learner demonstrates how to hold and feed filler wire in leading edge of puddle.
- 1.3. learner arranges welded beads by use of a padding technique.
- 1.4. learner welds pad in 1-3 hour lab.
- 1.5. learner produces 10 beads with a 90% proficiency.
- 1.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 1.a. Use safety equipment.
- 1.b. Set polarity and proper amperage.
- 1.c. Use foot control.
- 1.d. Locate correct material thickness and shear to proper size.
- 1.e. Weld beads together side-to-side.
- 1.f. Restart existing weld and fill craters.
- 1.g. Identify a good weld.

2. Weld outside corner with and without filler.

Domain Psychomotor Level Practice Status Active

Linked Core Abilities

Apply mathematical concepts. Demonstrate ability to think critically. Use effective communication skills. Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
 Interpret welding drawings
 Produce gas tungsten arc welds (GTAW)

Assessment Strategies

2.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 2.1. learner demonstrates how to shear, align and tack weld material needed with 100% proficiency within 10 minutes.
- 2.2. learner will produce four weld joints without filler with a 100% proficiency.
- 2.3. learner will produce four weld joints with 1/16" filler with a 100% proficiency.
- 2.4. learner will produce weld joints completely filled.
- 2.5. learner will complete weld joints in 1-3 hour lab.
- 2.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 2.a. Use safety equipment.
- 2.b. Set polarity and amperage.
- 2.c. Use foot control.
- 2.d. Locate proper material thickness to be welded.
- 2.e. Align plate to 90 degrees with outside corners.
- 2.f. Fill joint completely with flat or slight crown.
- 2.g. Identify a good weld.

3. Weld a lap joint.

<i>Domain</i>	<i>Psychomotor</i>	<i>Level</i>	<i>Practice</i>	<i>Status</i>	<i>Active</i>
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Linked Core Abilities

- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Use effective communication skills.
- Use technology effectively.

Linked Program Outcomes

- Demonstrate industry recognized safety practices
- Interpret welding drawings
- Produce gas tungsten arc welds (GTAW)

Assessment Strategies

- 3.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 3.1. learner demonstrates how to shear, align and tack weld material needed with 100% proficiency within 10 minutes.
- 3.2. learner will produce four weld joints without filler with a 95% proficiency.
- 3.3. learner will produce four weld joints with 1/16" filler with a 95% proficiency.
- 3.4. learner will construct weld joint completely filled.
- 3.5. learner will have 1-3 hour lab to produce welds.
- 3.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 3.a. Use safety equipment.
- 3.b. Set polarity and amperage.
- 3.c. Use foot control.
- 3.d. Fill weld joints completely with a slight crown.
- 3.e. Identify a good weld.
- 3.f. Articulate filler to proper bead profile.

4. Weld a T-joint.

<i>Domain</i>	<i>Psychomotor</i>	<i>Level</i>	<i>Practice</i>	<i>Status</i>	<i>Active</i>
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Linked Core Abilities

- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Use effective communication skills.
- Use technology effectively.

Linked Program Outcomes

- Demonstrate industry recognized safety practices
- Interpret welding drawings
- Produce gas tungsten arc welds (GTAW)

Assessment Strategies

- 4.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 4.1. learner will demonstrate how to shear, align and tack weld material needed with 100% proficiency within 10 minutes.
- 4.2. learner will produce four welds without filler with a 100% proficiency.
- 4.3. learner will produce four welds with 1/16" filler with a 100% proficiency.
- 4.4. learner will construct weld joints completely filled with no "suck back".
- 4.5. learner will have 1-3 hour lab to complete with 95% proficiency.
- 4.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 4.a. Use of safety equipment.
- 4.b. Set current correctly.
- 4.c. Use foot control.
- 4.d. Tack weld plates in proper position.
- 4.e. Weld around both sides of joint.
- 4.f. Filling joint with a slight crown without burn through.
- 4.g. Identify a good weld.
- 4.h. Locate correct material thickness and size.

5. Weld a pipe to plate.

Domain Psychomotor Level Practice Status Active

Linked Core Abilities

- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Use effective communication skills.
- Use technology effectively.

Linked Program Outcomes

- Demonstrate industry recognized safety practices
- Interpret welding drawings
- Produce gas tungsten arc welds (GTAW)

Assessment Strategies

- 5.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 5.1. learner will demonstrate shear and sawing of material, align and tack weld material needed with 100% proficiency within 15 minutes.
- 5.2. learner will construct weld joint completely filled.
- 5.3. learner will produce two welds with filler with a 95% proficiency.
- 5.4. learner will have 1-3 hour lab to complete.
- 5.5. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 5.a. Use safety equipment.
- 5.b. Set current level.
- 5.c. Use foot control.
- 5.d. Maintain proper torch angle while traveling in a circle.
- 5.e. Fill joint completely with slight crown with consistent starts/stops.
- 5.f. Weld three passes and measure to size.

6. Weld a horizontal square butt joint.

Domain Psychomotor Level Practice Status Active

Linked Core Abilities

- Apply mathematical concepts.
- Demonstrate ability to think critically.
- Use effective communication skills.
- Use technology effectively.

Linked Program Outcomes

- Demonstrate industry recognized safety practices

Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

6.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 6.1. learner will demonstrate how to align and tack materials to correct root opening with 100% proficiency within 15 minutes.
- 6.2. learner will construct and fill two complete joints with proper penetration in root.
- 6.3. learner will have 4 1/2 hours (1 1/2 labs) to complete with 95% proficiency.
- 6.4. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 6.a. Use safety equipment.
- 6.b. Align materials to achieve proper root penetration.
- 6.c. Set proper amperage.
- 6.d. Use foot control.
- 6.e. Construct a horizontal weld with no undercut on face.
- 6.f. Identify a good weld.
- 6.g. Measure size of root opening.

7. Weld a flat groove.

Domain	Psychomotor	Level	Practice	Status	Active
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Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

7.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 7.1. learner will demonstrate cutting, aligning and tacking material needed with 100% proficiency in 30 minutes.
- 7.2. learner will construct and completely fill joint with slight crown.
- 7.3. learner will have 2-3 hour labs to complete with 100% proficiency.
- 7.4. learner will demonstrate a macro-etch test on weld.
- 7.5. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 7.a. Use safety equipment.
- 7.b. Proper use of beveling equipment.
- 7.c. Perform a multiple pass weld filling groove with slight crown.
- 7.d. Understand a macro-etch test.
- 7.e. Identify and "read" results for a good weld.
- 7.f. Measure any defects.
- 7.g. Locate correct material thickness and size.

8. Weld outside corner on 16ga mild steel.

Domain	Psychomotor	Level	Practice	Status	Active
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Linked Core Abilities

Apply mathematical concepts. Demonstrate ability to think critically. Use effective communication skills. Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

8.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 8.1. learner demonstrates alignment and tacking technique of proper material with 100% proficiency with 15 minutes.
- 8.2. learner constructs completely filled joint without filler.
- 8.3. learner will have 90 minutes to complete with a 95% proficiency.
- 8.4. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 8.a. Use safety equipment.
- 8.b. Align and tack material to 90 degrees.
- 8.c. Perform weld using low current.
- 8.d. Use of foot control.
- 8.e. Perform a 1-pass weld and fill joint to flat or slight crown.
- 8.f. Identify a good weld.
- 8.g. Locate correct material thickness and size.

9. Weld a lap joint on 16ga mild steel.

Domain	Psychomotor	Level	Practice	Status	Active
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Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

9.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 9.1. learner demonstrates proper tacking on material with 100% proficiency within 10 minutes.
- 9.2. learner constructs completely filled joint with filler.
- 9.3. learner will have 90 minutes to complete with a 95% proficiency.
- 9.4. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 9.a. Use safety equipment.
- 9.b. Perform proper tacking technique to keep material from warping and gapping.
- 9.c. Use foot control.
- 9.d. Perform a weld with filler and completely fill with a slight crown.
- 9.e. Fill joint without burning through backside.
- 9.f. Weld with low current.
- 9.g. Identify a good weld.

9.h. Locate correct material thickness and size.

10. Weld a T-joint on 16ga mild steel.

Domain Psychomotor **Level** **Practice** **Status** Active

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

10.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 10.1. learner demonstrates proper tacking technique on thin material with a 100% proficiency within 15 minutes.
- 10.2. learner constructs two joints and fill completely with filler.
- 10.3. learner will have 90 minutes to complete with 90% proficiency.
- 10.4. learner will be able to understand acceptable welding beads according to AWS standards

Learning Objectives

- 10.a. Use safety equipment.
- 10.b. Perform a one-pass weld without burning through backside of joint.
- 10.c. Fill joint completely and "wrap" corners.
- 10.d. Use foot control and low currents.
- 10.e. Identify a good weld.
- 10.f. Locate correct material thickness and size.

11. Weld a vertical up T, lap joint combination.

Domain Psychomotor **Level** **Practice** **Status** Active

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

11.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 11.1. learner demonstrates proper alignment and tacking with a 100% proficiency within 15 minutes.
- 11.2. learner demonstrates proper torch manipulation.
- 11.3. learner constructs weld joint and fill completely.
- 11.4. learner completes lab in allotted time with 95% proficiency.
- 11.5. learner understands acceptable welding beads according to AWS standards.

Learning Objectives

- 11.a. Use safety equipment.

- 11.b. Fill joint completely with slight crown using filler.
- 11.c. Perform a vertical up weld.
- 11.d. Proper torch and filler angle.
- 11.e. Proper torch speed while moving upwards.
- 11.f. Identify a good weld.
- 11.g. Locate material thickness.

Weld a groove open-root in the horizontal position.

<i>Domain</i>	<i>Psychomotor</i>	<i>Level</i>	<i>Practice</i>	<i>Status</i>	<i>Active</i>
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Linked Core Abilities

Apply mathematical concepts. Demonstrate ability to think critically. Use effective communication skills. Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices
 Interpret welding drawings
 Produce gas tungsten arc welds (GTAW)

Assessment Strategies

12.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 12.1. learner demonstrates shearing, beveling, aligning and tacking of proper material needed with 100% proficiency.
- 12.2. learner performs weld in the horizontal position.
- 12.3. learner constructs weld filling joint with multiple passes.
- 12.4. learner will have 2-3 hour labs to complete with 95% proficiency.
- 12.5. learner will perform macro-etch test.
- 12.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 12.a. Use safety equipment.
- 12.b. Set correct root opening.
- 12.c. Construct joint with proper land and root opening dimensions.
- 12.d. Weld in the horizontal position.
- 12.e. Achieve proper penetration through root.
- 12.f. Perform multiple pass weld and fill completely with slight crown.
- 12.g. Cut joint in half and perform macro-etch test.
- 12.h. Identify and "read" good weld.

Weld a pipe groove using pulse technique.

<i>Domain</i>	<i>Psychomotor</i>	<i>Level</i>	<i>Practice</i>	<i>Status</i>	<i>Active</i>
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Linked Core Abilities

Apply mathematical concepts. Demonstrate ability to think critically. Use effective communication skills. Use technology effectively.

Linked Program Outcomes

Demonstrate industry recognized safety practices

Interpret welding drawings
Produce gas tungsten arc welds (GTAW)

Assessment Strategies

13.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

- 13.1. learner demonstrates cutting, beveling and proper tacking/alignment of pipe with 100% proficiency within 30 minutes.
- 13.2. learner performs weld in horizontal position filling joint completely with a 90% proficiency.
- 13.3. learner demonstrates use of pulse controls.
- 13.4. learner completes in (2) 3 hour labs.
- 13.5. learner will get complete joint penetration.
- 13.6. learner will be able to understand acceptable welding beads according to AWS standards.

Learning Objectives

- 13.a. Use safety equipment.
- 13.b. Set pulse controls.
- 13.c. Set current.
- 13.d. Use bare wire to set proper dimensions of root opening.
- 13.e. Weld pipe joint completely with multiple passes.
- 13.f. Depositing filler at correct time of pulse sequence.
- 13.g. Achieve 100% penetration with foot control adjustments.
- 13.h. Identify a good weld.
- 13.i. Use of lab sheets.