

EICC COURSE DEVELOPMENT MODEL (CDM)

CATALOG COURSE NUMBER: WEL-192

COURSE TITLE: Gas Tungsten Arc Welding

Originating College: ☐ CCC ☐ MCC ☒ SCC

Effective Term/Year: Fall 2015

Initiating Faculty Member: Bruce Baldwin

Initiating Department Coordinator: Ben Kettering

Reason for submission: Check all that apply

☒ New Course If yes, type of course:

☐ A&S

To be considered for General Education? ☐ Yes ☐ No Category:

To be part of an A & S Concentration? ☐ Yes ☐ No Concentration:

☒ CTE Program Title: Gas Tungsten Arc Welding ☐ Required ☒ Elective

☐ General Education or Program Review ☐ Reactivation of an inactive course ☐ Making course inactive

☒ Changing course; please explain: Changing course due to the increase in credit hours from 2.5 to 4 semester credit hours.

☐ Other; please explain:

Contact Hours/Distribution of Contact Hours

Lecture Hours

Lab Hours

Clinical Hours

Coop Hours

Hours per Week: 2.00 Hours per Week: 4.00 Hours per Week: Hours per Week:

Number of Weeks: 16.50 Number of Weeks: 16.50 Number of Weeks: 16.50 Number of Weeks: 16.50

****Note: If offering a course for the full fall or spring semester, the number of weeks is 16.5**

Total Lecture Hrs: 39.60 Total Lab Hrs: 79.20 Total Clinical Hrs: Total Coop Hrs:

Semester Hours Credit: 4.00 if variable credit, give range:

Allow repeat* for credit: ☐ Yes ☒ No

If yes, total course repeats allowed: If yes, total credits:

*Note that repeat for credit means a student can pass the course and then repeat it for additional credit. An internship course is an example of a course that could be set up as repeatable for additional credit

Course or courses this CDM replaces, if any: Gas Tungsten Arc Welding WEL-133

CATALOG COURSE DESCRIPTION: This course focuses on gas tungsten arc welding (TIG) and other related processes. Topics such as process variation, welding in various positions, principle of operation, shielding gases, and filler rods will be studied. Safety and practical application of these welding processes will be stressed.

RECOMMENDED ENTRY LEVEL SKILLS/KNOWLEDGE:

PRE-REQUISITE COURSES

CCN#	COURSE TITLE
MFG 186	Plant Safety

CO-REQUISITE COURSES

CCN#	COURSE TITLE

PUBLISHED MATERIAL(S) USED FOR CDM DEVELOPMENT: Hobart Institute of Welding Technology EW369, Troy, OH: Hobart Institute of Welding Technology, 2011, Print.

In general it is expected that source material will be dated within 5 years of this CDM date. If all materials/ textbooks cited above are older than this, please explain:

GENERAL COURSE GOALS

Upon successful completion of this course the student should be able to:

The student will be familiar with and practice safety procedures related to the Gas Tungsten Arc Welding process, classify filler rod, assemble various weld joints, weld mild steel, stainless steel and aluminum.

TOPICAL OUTLINE

1. Gas Tungsten Arc Welding Course Overview
2. Introduction to GTAW
3. The Safety and Health of Welders
4. Equipment Set Up, Adjustment and Shutdown
5. Stringer Beads, Flat position
6. The Essentials of GTAW
7. Fillet Weld, Lap Joint
8. The Metallurgy and Weldability of Carbon Steel
9. Fillet Weld, Outside Corner Joint
10. Fillet Weld, T-Joint, Horizontal, Vertical and Flat
11. Fillet Weld, T-Joint, Overhead
12. Square-Groove Weld, Butt Joint, Flat
13. Square-Groove Weld, Destructive Test
14. Square-Groove Weld, Butt Joint Horizontal and Vertical Up
15. Square-Groove Weld, Butt Joint, Overhead
16. Introduction to GTAW with Pulsed Power
17. Square-Groove Weld, Butt Joint, Flat
18. The Welding Characteristics of Stainless Steel
19. Square-Groove Weld, Butt Joint, Horizontal
20. Fillet Weld, Lap Joint, Horizontal and Flat
21. Fillet Weld, Outside Corner Joint, Flat
22. Fillet Weld, T-Joint, Horizontal, Vertical and Flat
23. Visual Inspection of Stainless Steel
24. The Welding Characteristics of Aluminum
25. Stringer Beads, Flat
26. The Effect of Process Variables on the Welding Arc
27. Fillet Weld, Outside Corner Joint, Flat
28. Fillet Weld, Outside Corner Joint, Vertical
29. Fillet Weld, Lap Joint, Horizontal and Flat
30. Fillet Weld, T-Joint, Horizontal and Flat
31. Fillet Weld, T-Joint, Horizontal and Flat
32. Fillet Weld, T-Joint, Vertical Up
33. Visual Inspection of Aluminum

COURSE OBJECTIVES

Upon successful completion of the course, a student should be able to:

1. GTAW Course Overview
 - a. Demonstrate entry level welding skills.
2. Introduction to GTAW
 - a. Explain GTAW operating principles.
 - b. Describe electrodes used in GTAW.
 - c. Select correct power source.
3. The Safety and Health of Welders
 - a. Demonstrate safe work practices.
 - b. Recognize unsafe work conditions.
4. Equipment Set Up, Adjustment and Shutdown
 - a. Define correct set up procedures.
 - b. Identify correct adjusting knobs and switches.
 - c. Perform correct equipment shutdown.
5. Stringer Beads, Flat Position
 - a. Produce quality stringer beads on 11-gauge carbon steel.
6. The Essentials of GTAW

- a. Choose correct electrodes.
- b. Create electrode tapers.
- c. Formulate shielding gas ratio.
- d. Demonstrate correct electrode angles.
- e. Employ correct travel speed.
- f. Operate proper filler metal additions.
- 7. Fillet Weld, Lap Joint
 - a. Assemble a lap joint.
 - b. Produce a quality fillet weld in lap joints using the flat and horizontal welding positions.
- 8. The Metallurgy and Weldability of Carbon Steel
 - a. Discuss how heat and carbon affects properties of steel.
 - b. Explain heat treatment.
 - c. Recognize the SAE-AISI, ASTM and AWS designation systems.
- 9. Fillet Weld, Outside Corner Joint
 - a. Assemble a outside corner joint using mild steel.
 - b. Produce quality fillet welds on outside corner joints using the flat welding position.
- 10. Fillet Weld, T-joint, Horizontal, Vertical and Flat
 - a. Assemble a t-joint.
 - b. Produce quality fillet welds on t-joints using the horizontal, vertical and flat welding positions.
- 11. Fillet Weld, T-Joint, Overhead
 - a. Assemble a t-joint.
 - b. Produce quality t-joint fillet welds using the overhead welding position.
- 12. Square-Groove Weld, Butt Joint, Flat
 - a. Assemble a butt joint.
 - b. Produce quality square groove butt joint welds on carbon steel using the flat welding position.
- 13. Square-Groove Weld, Destructive Test
 - a. Produce a quality square-groove butt joint weld.
 - b. Perform a visual inspection.
 - c. Perform a guided bend test.
- 14. Square-Groove Weld, Butt Joint Horizontal and Vertical Up
 - a. Construct a butt joint.
 - b. Produce quality square-groove butt joint weld in the horizontal and vertical up welding positions.
- 15. Square-Groove Weld, Butt Joint, Overhead
 - a. Construct a butt joint.
 - b. Create quality square-groove butt joint welds in the overhead welding positions.
- 16. Introduction to GTAW with Pulsed Power
 - a. Explain advantages of pulsed current.
 - b. Discuss background amperage.
 - c. List pulses per second.
- 17. Square-Groove Weld, Butt Joint, Flat
 - a. Assemble a butt joint using stainless steel.
 - b. Produce quality square-groove welds using the flat welding position.
- 18. The Welding Characteristics of Stainless Steel
 - a. Define austenitic, ferritic, martensitic and duplex stainless steel.
- 19. Square-Groove Weld, Butt Joint, Horizontal
 - a. Assemble a butt joint using stainless steel.
 - b. Produce quality square-groove butt joint welds using the horizontal welding position.
- 20. Fillet Weld, Lap Joint, Horizontal and Flat
 - a. Assemble a lap joint using stainless steel.
 - b. Produce quality fillet welds in lap joints using the horizontal and flat welding positions.
- 21. Fillet Weld, Outside Corner Joint, Flat
 - a. Construct a outside corner joint using stainless steel.
 - b. Produce quality fillet welds in outside corner joints using the flat welding position.
- 22. Fillet Weld, T-Joint, Horizontal, Vertical and Flat
 - a. Construct a t-joint using stainless steel.
 - b. Produce quality t-joint fillet welds using the horizontal, vertical and flat welding positions.
- 23. Visual Inspection of Stainless Steel
 - a. Describe joint penetration, fusion, porosity.
 - b. Identify cracks, tungsten inclusions, root reinforcement and face reinforcement.
- 24. The Welding Characteristics of Aluminum
 - a. Explain cathodic bombardment.

- b. Compare heat treatable aluminum alloys to non-heat treatable alloys.
- c. Define filler metal selection.
- 25. Stringer Beads, Flat
 - a. Produce quality stringer beads on aluminum.
- 26. The Effect of Process Variables on the Welding Arc
 - a. Describe the effects of process variables.
 - b. Explain how current, machine settings, shielding gas and electrode tip geometry affect the welding arc.
- 27. Fillet Weld, Outside Corner Joint, Flat
 - a. Construct a outside corner joint using aluminum.
 - b. Produce a quality outside corner joint fillet weld using the flat welding position.
- 28. Fillet Weld, Outside Corner Joint, Vertical
 - a. Assemble an outside corner joint using aluminum.
 - b. Produce quality fillet welds in outside corner joints using the vertical up welding position.
- 29. Fillet Weld, Lap Joint, Horizontal and Flat
 - a. Construct lap joints using aluminum.
 - b. Produce quality fillet welds in lap joints using the horizontal and flat welding positions.
- 30. Square-Groove Weld, Butt Joint, Flat
 - a. Assemble a butt joint using aluminum.
 - b. Produce quality square-groove butt joints using the flat welding position.
- 31. Fillet Weld, T-Joint, Horizontal and Flat
 - a. Construct a t-joint using aluminum.
 - b. Produce quality fillet welds in t-joints using the horizontal and flat welding positions.
- 32. Fillet Weld, T-Joint, Vertical Up
 - a. Construct a t-joint using aluminum.
 - b. Produce quality multi-pass fillet welds in t-joints using the vertical up welding position.
- 33. Visual Inspection of Aluminum
 - a. Locate cracks, tungsten inclusions and porosity.
 - b. Evaluate root reinforcement and face reinforcement.

RECOMMENDED METHODS OF INSTRUCTION: Check all appropriate methods of instruction to facilitate student learning of course objectives.

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|--|---|
| <input type="checkbox"/> Case Studies | <input checked="" type="checkbox"/> Class Discussions |
| <input type="checkbox"/> Computer lab work | <input checked="" type="checkbox"/> Computer-assisted tools |
| <input type="checkbox"/> Computer-assisted writing | <input type="checkbox"/> Conducting experiments |
| <input type="checkbox"/> Demonstration or modeling | <input type="checkbox"/> Electronic interaction |
| <input type="checkbox"/> Field observation | <input type="checkbox"/> Field trips |
| <input type="checkbox"/> Guest speaker | <input checked="" type="checkbox"/> Guided practice |
| <input type="checkbox"/> In-class writing or editing workshops | <input type="checkbox"/> Journals |
| <input type="checkbox"/> Lecture | <input type="checkbox"/> Library instruction and resources |
| <input type="checkbox"/> Model building | <input type="checkbox"/> Peer review |
| <input type="checkbox"/> Readings | <input type="checkbox"/> Role play |
| <input type="checkbox"/> Service learning | <input checked="" type="checkbox"/> Simulation |
| <input type="checkbox"/> Student and instructor conferences | <input type="checkbox"/> Student collaborative learning |
| <input type="checkbox"/> Student presentation | <input checked="" type="checkbox"/> Student projects |
| <input checked="" type="checkbox"/> Tests or quizzes | <input type="checkbox"/> Worksheets/surveys |
| <input type="checkbox"/> Writing assignments/exercises (graded or not) | |
| <input type="checkbox"/> Other (please list specifics): | |

RECOMMENDED EVALUATION METHODS: Check all appropriate methods of evaluation to assess student achievement of course objectives.

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|---|---|
| <input type="checkbox"/> Class workshops | <input checked="" type="checkbox"/> Classroom discussions/participation |
| <input type="checkbox"/> Collaborative work | <input checked="" type="checkbox"/> Demonstration of skill(s) |
| <input type="checkbox"/> Individual conferences | <input type="checkbox"/> Journals |

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|---|--|--|
| <input type="checkbox"/> Laboratory reports | | <input type="checkbox"/> Oral presentations |
| <input type="checkbox"/> Portfolios | | <input type="checkbox"/> Pretest/Posttest |
| <input type="checkbox"/> Quizzes | | <input type="checkbox"/> Reading responses |
| <input type="checkbox"/> Student presentations | | <input checked="" type="checkbox"/> Student projects |
| <input checked="" type="checkbox"/> Tests | | <input type="checkbox"/> Writing Assignments |
| <input type="checkbox"/> Other (please list specifics): | | |

ATTENDANCE: Policies on attendance will be formulated by the instructor and communicated to the students on the course syllabus.

ACADEMIC DISHONESTY: Policies on academic dishonesty can be found in the EICC student code of conduct published in the student handbook.

CDM CREATION/REVIEW/REVISION INFORMATION

Originally Written by:	Date:
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Department Chair, Comments, & Date:

Does similar curriculum exist at other EICC Colleges? <input type="checkbox"/> CCC <input type="checkbox"/> MCC <input type="checkbox"/> SCC <input type="checkbox"/> No
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If yes, Counterparts Consulted, College, Comments & Date:

CDM Review or Revision Date:

Faculty member(s) & College:

Does similar curriculum exist at other EICC Colleges? <input type="checkbox"/> CCC <input type="checkbox"/> MCC <input type="checkbox"/> SCC <input type="checkbox"/> No
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Changes made to course which will require further review steps:

<input type="checkbox"/> Making course inactive <input type="checkbox"/> Credit hours <input type="checkbox"/> Contact hours <input type="checkbox"/> Course Description
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<input type="checkbox"/> 25% or more of course objectives <input type="checkbox"/> Other minor revisions or no revisions
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Dean Review, Comments & Date:

If changes made require further review and approval:

College Curriculum Committee Sign-off & Date:

IC Review Subcommittee Sign-off & Date:

Instructional Council Approval:
