Lassen Community College Course Outline

WT 38 Welding Theory & Practice – Gas Metal Arc Welding

1.0 or 3.0 Units

I. Catalog Description

This is an elective welding course where students will apply the gas metal arc welding (GMAW) process to selected projects. This course has been approved for open entry/open exit. This course may be taken for a total of three enrollments, not to exceed three units, or as required for qualification by the American Welding Society (AWS) D1.1, Section 4.1.3. (Instructor Authorization Required for Course Repetition.) This course may be taken for either 1 unit, at 51 hours, or 3 units, at 153 hours. Students may retake the course up to three times only for the 1 unit option

Transfers to CSU only
51 to 153 Hours Lab, 51 to 153 Total Student Learning Hours
Scheduled:

II. Coding Information

III.

Repeatability: Not repeatable
Open Entry/Open Exit: Open Entry/Exit
Grading Option: Graded or Pass/No Pass
Credit Type: Credit - Degree Applicable
TOP Code: 095650

IV. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:

One Unit:

1. Safely setup and perform a minimum of 10 passes for each of four AWS joint designs, which meet or exceed the AWS D1.1 Structural Welding Code standards, using GMAW on 10G steel with CO2 shielding and ER70S .035" diameter fill wire.
2. Design and fabricate two projects using 16G-10G steel, CO2 shielding, ER70S .035" diameter fill wire, and the gas metal arc welding process.
3. Complete an AWS qualification on steel with .035" ER70S, using the GMAW process.

Three Units:

1. Safely setup and perform a minimum of 10 passes for each of four AWS joint designs, which meet or exceed the AWS D1.1 Structural Welding Code standards, using GMAW on 10G steel plate with CO2 shielding and ER70S .035" diameter fill wire.
2. Design and fabricate six projects using 16G-10G steel, CO2 shielding, ER70S .035" diameter fill wire, and the GMAW process.
3. Safely setup and perform a minimum of 10 passes for each of four AWS joint designs, which meet or exceed industry standards using GMAW on 10G aluminum with argon shielding and ER 4043 .035" fill wire.

4. Complete two AWS qualifications on steel plate with .035" ER70S, using the GMAW process.

B. Course Objectives

Upon completion of this course the student will be able to:

One Unit:

1. Demonstrate the skills needed to safely set up and operate GMAW equipment.
2. Design and construct four welding projects utilizing the GMAW process which meet accepted industry standards.

Three Units:

1. Demonstrate the skills to safely set up and operate gas metal arc welding (GMAW) equipment.
2. Prepare and complete AWS welding qualification for GMAW in the 3F position.
3. Prepare and complete AWS welding qualification for GMAW in the 4F position.
4. Demonstrate the skills needed to weld non-ferrous metals with the GMAW) process.
5. Design and construct two welding projects, on non-ferrous metals, utilizing the GMAW)process.
6. Demonstrate skills needed to complete course objectives for the one unit course.

V. Course Content

One Unit:

A. Safety precautions
1. Electrical shock
2. Radiation hazards
3. Compressed gases
4. Air contamination
5. Emergency shop procedures

B. Project design
1. Dimensioned drawings
2. Isometric views
3. Materials list
4. Cost estimate

C. Project procedures
1. Construction steps
2. Identify recognized joint designs
3. Tacking procedures
4. Fixturing

D. Equipment setup
1. Voltage setting
2. Wire speed
3. Shielded gas setting
4. Filler rod type and diameter

E. Welding preparation procedure
1. Flat stringers - overlaps w/stop-starts
2. Horizontal T- joints (2F)
3. Vertical T-joints (3F)
4. Overhead T-joints (4F)

Three Units:

A. Safety precautions
   1. Electrical shock
   2. Radiation hazards
   3. Compressed gases
   4. Air contamination
   5. Emergency shop procedures
B. AWS Qualification
   1. Set up of materials
   2. Tacking procedures
   3. Fixturing
   4. Welding sequence
   5. AWS code requirements for testing
C. Equipment Setup
   1. Voltage setting
   2. Wire speed
   3. Shielding gas setting
   4. Filler rod
D. Non-ferrous metals
   1. Identification
   2. Preparation
   3. Fixturing
E. Welding procedure
   1. Flat stringers - overlaps w/stop-starts
   2. Horizontal T-joints (2F)
   3. Vertical T-joints (3F)
   4. Overhead T-joints (4F)
F. Project Procedures
   1. Dimensioned drawings
   2. Material list
   3. Cost estimate
   4. Construction steps

VI. Assignments

A. Appropriate Reading

Standard text: "Welding Principles and Practices," and/or trade manuals will be primary sources of course readings. Additional information sources will include product and use guides from industry manufacturers to enhance the learning process.

B. Writing Assignments

Students will apply technical skills and understanding of course content by demonstrating application of the GMAW process to selected projects which meet accepted industry standards.

C. Expected Outside Assignments

None

D. Specific Assignments that Demonstrate Critical Thinking

Student will be required to demonstrate understanding of gas metal arc welding (GMAW) practices by applying technical information to selected projects which meet accepted industry standards. An example of the critical thinking and demonstration of welding techniques would be the following:
Given: Two 4" x 7" x 3/8" low-carbon steel plates, FCAW power source, fixturing booth, chipping hammer, wire brush, electric arc helmet, leather coat, leather gloves,

shielding gas and flowmeter.
Performance: The student will set the power source for voltage and wire speed. The student will set the shielding gas flowmeter. The student will demonstrate safe application of the flux cord wire, using the multiple stringer bead technique to a T-joint in the 2F position. A total of 15 overlapping beads will be applied to each side of the T-joint.
Standard: The coupon will be visually inspected for weld defects after each bead application. The stringer beads shall be free of defects, to include: Porosity, slag inclusions, lack of fusion, undercut. There shall be equal legs and a flux face. Ninety percent of the welds shall meet the standard.

VII. Methods of Evaluation

Methods for determining student grades will be accomplished by the following:

1. Completion of required selected projects.
2. Participation in classroom learning activities.

VIII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

- ☑ Traditional Classroom Delivery
- ☐ Correspondence Delivery
- ☐ Interactive Television Delivery
- ☐ Online Delivery

Demonstration/laboratory

IX. Representative Texts and Supplies

Jeffus, Larry;*"Welding Principles & Applications*", 2017, 8th Edition, Delmar Cengage Learning, ISBN: 978-1-305-494695-5

Supplies: (required)
Gauntlet leather welding gloves
Safety glasses
Leather "logging type" boots
Cuffless, heavy cotton workpants, in good repair
Ear plugs, pliers w/cutters, and welding hat.

X. Discipline/s Assignment

Welding Technology

XI. Course Status

Current Status: Active
Original Approval Date: 3/27/1990
Revised By: Kory Konkol
Latest Curriculum/Academic Standards Committee Revision Date: 11/29/2022