Lassen Community College Course Outline

WT 39 Welding Theory & Practice – Gas Tungsten Arc Welding
1.0 - 3.0 Units

I. Catalog Description
This is an elective welding course where students will apply the gas tungsten arc welding (GTAW) 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 D1.1, Section 4.1.3. (Instructor Authorization Required for Course Repetition.)

Transfers to CSU only
153 Hours Lab
Scheduled:

II. Coding Information
Open Entry/Open Exit: Open Entry/Exit
Grading Option: Graded or Pass/No Pass
Credit Type: Credit - Degree Applicable
TOP Code: 095650

III. 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 10 AWS (American Welding Society) joint designs (which meet or exceed the American Welding Society D1.1 Structural Welding Code standards), using gas tungsten arc welding (GTAW) on 16G steel plate with 2% thoriated tungstens and ER 70S fill rod.
2. Design and fabricate two projects using 16G steel, argon shielding, ER70S fill wire, and the gas tungsten arc welding process.
3. Complete an AWS (American Welding Society) qualification on steel plate with 1/16” ER70S, using the GTAW (gas tungsten arc welding) process.

Two Units:

1. Safely setup and perform a minimum of 10 passes for each of 10 AWS (American Welding Society) joint designs (which meet or exceed the American Welding Society D1.1 Structural Welding Code standards), using gas tungsten arc welding (GTAW) on 16G steel plate with 2% thoriated tungstens and ER 70S fill rod.
2. Safely setup and perform a minimum of 10 passes for each of 10 AWS (American Welding Society) joint designs (which meet or exceed industry standards), using gas tungsten arc welding (GTAW) on 16G stainless steel plate with 2% thoriated tungstens and ER 308 fill rod.
3. Design and fabricate two projects using 16G stainless steel, argon shielding, ER308 fill wire, and the gas tungsten arc welding process.
4. Complete two AWS (American Welding Society) qualifications on steel plate with 1/16” ER70S, using the GTAW (gas tungsten arc welding) process.

Three Units:

1. Safely setup and perform a minimum of 10 passes for each of 10 AWS (American Welding Society) joint designs (which meet or exceed the American Welding Society D1.1 Structural Welding Code standards), using gas tungsten arc welding (GTAW) on 16G steel plate with 2% thoriated tungstens and ER 70S fill rod.
2. Safely setup and perform a minimum of 10 passes for each of 10 AWS (American Welding Society) joint designs (which meet or exceed industry standards), using gas tungsten arc welding (GTAW) on 16G stainless steel plate with 2% thoriated tungstens and ER 308 fill rod.
3. Safely setup and perform a minimum of 10 passes for each of 10 AWS (American Welding Society) joint designs (which meet or exceed industry standards), using gas tungsten arc welding (GTAW) on 16G aluminum plate with pure tungsten and ER4043 fill rod.
4. Design and fabricate two projects using 16G aluminum, argon shielding, ER 4043 fill wire, and the gas tungsten arc welding process.
5. Complete three AWS (American Welding Society) qualifications on steel plate with ER70S, using the GTAW (gas tungsten arc welding) process.

B. Course Objectives

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

1. Demonstrate the skills needed to safely setup and operate gas tungsten are welding (GTAW) equipment.
2. Design and construct four welding projects utilizing the gas tungsten are welding (GTAW) process which meet accepted industry standards.

IV. Course Content

A. Safety precautions
   1. Electrical shock
   2. Rediation 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. Polarity setting
   2. Heat range & current control
   3. High frequency setting
   4. Flowmeter
   5. Electrode type & diameter
   6. Filler rod type & diameter

E. Welding preparation procedure
1. Flat stringers - mild steel, stainless steel, aluminum
2. Flat T-joints - mild steel, stainless steel, aluminum
3. Vertical T-joints - mild steel, stainless steel, aluminum

V. Assignments

A. Appropriate Reading
College text:"Welding Principles & Applications," 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 gas tungsten arc welding (GTAW) 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 tungsten arc welding (GTAW) 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: GTAW power source, shielding gas, torch components, 20 1" x 4" x 16 gauge austenitic stainless steel, GTAW helmet, leather gloves, leather coat, 308 X 1/16" diameter fill rod, welding bench.
Performance: The student will set the power source and shielding gas for stainless steel application. The student will tack weld two 16 gauge stainless steel strips into a T-joint. The student will setup the T-joint in the 3F position. The student will weld one bead, using 308 fill rod, vertical - bottom up.
Standard: The stringer beads will be inspected for length, appearance, width, ripple configuration, bead height, fusion and penetration. The joint designs will be subjected to a destructive bend test. Eighty percent of the welds must meet the standard.

VI. 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.

VII. 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

VIII. 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.

IX. Discipline/s Assignment

Welding Technology

X. Course Status

Current Status: Active
Original Approval Date: 3/27/1990
Revised By: Kory Konkol
Latest Curriculum/Academic Standards Committee Revision Date: 10/05/2021