

Lassen Community College Course Outline

WT-37 Welding Theory & Practice – Shielded Metal Arc Welding

1.0 or 3.0 Units

I. Catalog Description

This is an elective welding course where the student will apply the shielded metal arc welding (SMAW) process to selected projects. This course has been approved for open entry/open exit. This course may be taken for three enrollments not to exceed three units, or as required to maintain welding qualifications per American Welding Society (AWS) D1.1 Section 4 Period of Effectiveness. (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

Repeatability: Not repeatable.

Open Entry/Open Exit: Open Entry/Exit

Grading Option: Graded or Credit/No Credit

Credit Type: Credit - Degree Applicable

TOP Code: 095650

III. Course Objectives

A. Student Learning Outcomes:

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

One Unit:

1. Safely setup and perform flat stringer and flat overlap welds with a minimum of 15 passes each using ER7018-1/8", and ER6010-1/8" electrodes, which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
2. Safely setup and perform a minimum of 15 passes for each of the two AWS joint designs with 7018-1/8", and two with E6010-1/8" electrodes which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.

Three Units:

1. Safely setup and perform flat stringer and flat overlap welds with a minimum of 15 passes each using ER7018-1/8", and E6010-1/8" electrodes, which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
2. Safely setup and perform a minimum of 15 passes for each of the three AWS joint designs with E7018-1/8", and three with ER6010-1/8" electrodes which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
3. Safely setup and perform ten practice qualification tests (two 1G, four 3G and

- four 4G) on plate with ER7018, using the SMAW process.
4. Complete three AWS qualifications (1G, 3G and 4G) on steel plate with ER7018, using the SWAW process.

IV. Objectives:

One Unit:

1. Safely setup and perform flat stringer and flat overlap welds with a minimum of 15 passes each using ER7018-1/8", and ER6010-1/8" electrodes, which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
2. Safely setup and perform a minimum of 15 passes for each of the two AWS joint designs with 7018-1/8", and two with E6010-1/8" electrodes which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.

Three Units:

1. Safely setup and perform flat stringer and flat overlap welds with a minimum of 15 passes each using ER7018-1/8", and E6010-1/8" electrodes, which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
2. Safely setup and perform a minimum of 15 passes for each of the three AWS joint designs with E7018-1/8", and three with ER6010-1/8" electrodes which meet or exceed the AWS D1.1 Structural Welding Code standards, using SMAW on 3/8" plate.
3. Safely setup and perform ten practice qualification tests (two 1G, four 3G and four 4G) on plate with ER7018, using the SMAW process.
4. Complete three AWS qualifications (1G, 3G and 4G) on steel plate with ER7018, using the SWAW process.

Course Content

One Unit:

- A. Safety precautions**
 1. Safe working conditions
 2. SMAW equipment
 3. Precautions for welders and welding operators
 4. Personal protection
 5. Fire prevention
 6. Ventilation and fume hazards
 7. Noise protection
- B. Project procedures**
 1. Construction steps
 2. Identify recognized joint designs
 3. Tacking procedures
 4. Fixturing
- C. Equipment setup**
 1. Amperage determination
 2. Filler rod selection
 3. Polarity selection
- D. Welding preparation procedure**

1. Flat stringers - overlaps w/stop & starts - E6010 -1/8"
2. Horizontal T-joints-2F- E6010 -1/8"
3. Vertical T-joints-3F- E6010 -1/8"
4. Flat stringers - overlaps w/stop & starts - E7018 -1/8"
5. Horizontal T-joint - 2F - E7018 -1/8"
6. Vertical T-joint 3F - E7018 -1/8"

Three Units: (in addition to one unit requirements)

A. Welding procedure

1. Overhead T-joint 4F - E6010 -1/8"
2. Overhead T-joint 4F - E7018 -1/8"
3. Practice two 1G plate qualifications
4. Practice four 3G plate qualifications
5. Practice four 4G plate qualifications.

B. AWS qualification

1. Set up
2. Procedure - 3/8" – 1G, 3G and 4G

V. Assignments

A. Appropriate Readings

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 skill and understanding of course content by demonstrating application of the SMAW process to selected projects which meet accepted industry standards.

C. Expected Outside Assignments

None

D. Specific Assignments that Demonstrate Critical Thinking

Students will be required to demonstrate understanding of SMAW 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 plate, 1/8" E6010 SMAW electrodes, chipping hammer, wire brush, SMAW helmet, leather welding jacket, leather welding gloves, SMAW power source, welding table.

Performance: The student will set the power source for amperage and polarity. The student will tack weld the two pieces of 3/8" plate into a T-joint configuration using the E6010 electrodes. The student will apply 15 overlapping stringer beads in the vertical, bottom to top, position.

Standard: The overlapping stringer beads will be inspected for uniform width, length, height, overlaps, legs, face and ripple appearance. Seventy-five of the welds will 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

Hybrid 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:

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: 11/29/2022