

# WELD 0005C - STRUCTURAL STEEL WELDING CERTIFICATION

## Catalog Description

Formerly known as WELD 80

Prerequisite: Completion of WELD 5B and WELD 2A with grades of "C" or better

Advisory: Students must be competent in vertical and overhead position welding using certification welding processes of SMAW, FCAW-G and FCAW-S

Hours: 42 (6 lecture, 36 laboratory)

Description: Designed to certify the welder within the guidelines of American Welding Society (AWS) Structural Steel Code D1.1. Focus on manipulative skill development with SMAW E-7018 in 4G and 3G, FCAW-G in 3G and FCAW-S in 3G and 4G in preparation for the actual certification test. (not transferable)

## Course Student Learning Outcomes

- CSLO #1: Apply safety standards and explain expectations of standards used in both learning and work site environments of structural steel construction of buildings, bridges, and miscellaneous iron work of stair and elevators.
- CSLO #2: Define terms related to this course: American Welding Society code D1.1 Structural Steel and D1.8 Seismic, access hole, cyclic load, demand critical joint, protected zone, preheat and inter-pass temperature.
- CSLO #3: Demonstrate manipulative welding skills to test to American Welding Society structural welding code D1.1 and use code standards to evaluate qualification to become certified to weld structural steel welding applications.
- CSLO #4: Explain the importance of the responsibilities of structural welding performed to code quality levels.

## Effective Term

Fall 2024

## Course Type

Credit - Degree-applicable

## Contact Hours

42

## Outside of Class Hours

12

## Total Student Learning Hours

54

## Course Objectives

Lecture Objectives:

1. Employ safe practices when using equipment, as well as value the welding certification standard in public safety.

2. Apply AWS Structural code D1.1 to formulate PQR (procedure qualification record) and WPS (weld procedure specification) for the welding process used.
3. Apply parameters needed for success with each welding process and position.
4. Inspect completed weld specimens after testing to evaluate and analyze weld fusion and soundness.
5. List and compare pre-approved welding processes AWS D1.1 code.
6. Examine structural welding joint designs preapproved by AWS D1.1 code.

Laboratory Objectives:

1. Demonstrate the welding process to deposit welds that meet AWS structural welding code evaluation by performance destructive testing (Guided Bend Test).
2. Construct weld qualification test joints using AWS Welding code pre-qualified design in carbon steels and E70 series filler rods using the SMAW, or FCAW welding process.
3. Operate various cutting processes to construct weld test plates and create sample weld specimens for testing the completed welds.
4. Inspect completed weld specimens after testing to evaluate weld fusion and soundness.
5. Complete the following weld tests to industry standards:
  - a. Welding test SMAW in 4G with E-7018.
  - b. Welding test SMAW in 3G with E-7018.
  - c. Welding test FCAW-G in 3G with E-7018.
  - d. Welding test FCAW-S in 3G with E71T-8.
  - e. Welding test FCAW-S in 4G with E71T-8.

## General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

## Articulation Information

### Methods of Evaluation

- Skill Demonstrations
  - Example: Students will be evaluated on the process of: 1. Cutting the structural sample material to specification for weld test plates. 2. The fitup, alignment and tack welding into a test article. 3. Following the welding of the test article, the cutting of the weld samples for final testing. 4. Documentation of WPS and PQR for the above outlined process, and the welding parameters used. All performance tests graded to industry standards.

## Repeatable

No

## Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Following instructor demonstration, students will apply OFC skills process to remove weld samples for testing.

Lecture:

1. Traditional lecture and handouts used to present formats of welding procedures. Students are expected to actively participate in the lecture.
2. Interactive discussions in the development of welding parameters for temperature, amperes, voltage and electrode movement to be applied during the laboratory period.
3. Instructor guided study group and then on an individual student basis, welding procedures and parameters are developed for WPS (Weld Procedure Specifications) and PQR (Procedure Qualification Records).

Distance Learning

1. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

- OER Link:
- OER:
- Welding Skills
  - Author: B.J. Moniz and R.T. Miller
  - Publisher: American Technical Publishers
  - Publication Date: 2010
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:

**Other materials and-or supplies required of students that contribute to the cost of the course.**

## Typical Out of Class Assignments

### Reading Assignments

Research AWS structural code in reference area of library for selection of: 1. Pre-qualified processes 2. Weld joints Following the manufactures specifications; set machine to correct parameter's. 3. Testing criteria and related materials.

### Writing, Problem Solving or Performance

Write the following Welding Procedure Specifications: 1. (WPS)/ Procedure Qualification Record 2. (PQR) and Welder Qualification Record 3. (WQR) Performance test and evaluation.

### Other (Term projects, research papers, portfolios, etc.)

1. Welding performance test required for the successful completion of the course. On site welding inspector to evaluate/observe weld tests and evaluate completed weld specimens.

### Required Materials

- Structural Welding Quality Handbook
  - Author: Steel Structures Technology Center
  - Publisher: Steel Structures Technology Center, Inc.
  - Publication Date: 2008
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:
- Welding Principles and Practices
  - Author: Edward R. Bohnart
  - Publisher: McGraw-Hill
  - Publication Date: 2018
  - Text Edition: 5th
  - Classic Textbook?: