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Date revised: Spring 2017
C&GE approved: April 17, 2017
Board approved: May 10, 2017
Semester effective: Spring 2018

Welding (WELD) 1540 Pipe Welding (3 Units) CSU

Prerequisite: Successful completion of WELD 1500 Welding Processes with a grade of “C” or better

Prerequisite knowledge and skills:

Before entering the course, the student should be able to:

1. understand the principles of safe work habits in a shop setting as related to oxy-fuel cutting and the various electric arc welding processes,
2. set up oxy-fuel cutting equipment for the cutting of ferrous and nonferrous alloys,
3. demonstrate the setup, operation, and theory related to Shielded Metal Arc Welding (SMAW), and
4. apply basic understanding of the common welding processes while utilizing proper safety and technique (SMAW, GMAW, FCAW and GTAW)

Total Hours: 24 hours lecture; 72 hours lab (96 hours total)

Course Description: This course is designed to provide knowledge and welding skill development related to the requirements of the American Society of Mechanical Engineers (ASME), Section IX and/or the American Petroleum Institute (API), 1104 Welding Codes. Emphasis will be placed on developing the necessary skill to pass the related code tests. Additional welding supplies may be required. This course has a material fee.

Type of Class/Course: Degree Credit

Text: Moniz, B. J., and R. T. Miller. *Welding Skills*. 5th ed., American Technical Publishers, 2015.

Additional Instructional Materials:

Students are expected to have the following items:

1. #5 Shaded Safety Glasses & Clear Safety Glasses
2. Welding leather gloves
3. Work boots (above the ankle)
4. Long sleeve shirt & jeans (no holes or rips)
5. Welding hood/helmet
6. Welding cap
7. Pair of pliers (multi-use, wire cutters)
8. Wire brush



9. Chipping hammer

Optional material/equipment:

1. Grinder

Course Objectives:

By the end of the course, a successful student will be able to:

1. comprehend and practice safe work habits related to Shielded Metal Arc Welding (SMAW) within the pipe welding trades,
2. demonstrate the setup, operation, and theory associated with welding pipe while using Shielded Metal Arc Welding (SMAW),
3. understand welding test requirements often associated with different welding processes and the pipe welding trade, and
4. successfully weld mild steel pipe in accordance with a specific welding code. Results will vary depending upon skill level.

Course Scope and Content: Lecture

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|----------|---|
| Unit I | Introduction and Safety Procedures |
| | A. General safety |
| | B. Shielded Metal Arc Welding (SMAW) and pipe welding safety |
| | C. Oxy-fuel cutting safety |
| Unit II | Shielded Metal Arc Welding (SMAW), |
| | A. Equipment |
| | B. Application review |
| Unit III | American Society of Mechanical Engineers (ASME) |
| | A. Section IX welding code overview |
| | B. Pipe certification requirements |
| Unit IV | Electrode Selection and Specification |
| | A. Identification |
| | B. Application |
| Unit V | Oxy-fuel Beveling and Cutting |
| | A. American Society of Mechanical Engineers (ASME) Section IX code test |
| | B. Equipment |
| | C. Setup and operation |
| Unit VI | Pipe Size |
| | A. Identification |
| | B. Measuring |
| | C. Pipe size related to course progression |
| Unit VII | Welding Positions and Sequencing |
| | A. 1G (flat) |
| | B. 2G (Horizontal) |
| | C. 5G (Vertical) |



D. 6G (45 degrees)

Unit VIII Common Welding Code Terms

- A. Definitions
- B. Tolerances

Unit IX Weld Testing Techniques

- A. Destructive
- B. Nondestructive

Unit X Weld Inspection

- A. Methods of inspection
- B. Defects and discontinuities

Unit XI Common Welding Codes Overview

- A. American Welding Society (AWS) D1.1
- B. American Society of Mechanical Engineers (ASME) Section IX
- C. American National Standards Institute (ANSI) B31.3

Unit XII American Welding Society (AWS) Certified Welding

- A. Test parameters and protocol
- B. Requirements
- C. Qualification

Unit XIII Weld Test

- A. Coupon development
- B. Certified Welding Inspector (CWI) inspection
- C. Report development

Unit XIV Professional Development and Future Trends

- A. Future training opportunities
- B. Possible career options and types

Course Scope and Content: Laboratory

Unit I Shielded Metal Arc Welding (SMAW),

- A. Perform adjustments and fine-tuning of equipment
- B. Setup and operation
- C. Demonstrate safe operation of SMAW

Unit II Electrode Selection and Application

- A. Identify electrodes
- B. Apply electrode knowledge

Unit III Oxy-fuel Beveling and Cutting

- A. Equipment adjustment and fine-tuning
- B. Setup and operation

Unit IV Practical Application of the Techniques

- A. Practice welding pipe using SMAW
- B. Apply techniques appropriate to specific welding positions



- Unit V Welding Positions and Sequencing
- A. Perform welds in the 1G (flat) position
 - B. Perform welds in the 2G (Horizontal) position
 - C. Perform welds in the 5G (Vertical) position
 - D. Perform welds in the 6G (45 degrees) position
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- Unit VI Tools and Equipment
- A. Practice safety of tools and equipment related to pipe welding operations
 - B. Demonstrate proper setup and shutdown
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- Unit VII Weld Inspection
- A. American Society of Mechanical Engineers (ASME) Section IX
 - B. Utilize methods of inspection
 - C. Identifying and addressing defects and discontinuities
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- Unit VIII American Welding Society (AWS) Certified Welding
- A. Conform to test parameters and protocol
 - B. Satisfy requirements
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- Unit IX Weld Test
- A. Prepare coupons for test
 - B. Undergo inspection by Certified Welding Inspector (CWI)
 - C. Undergo destructive weld testing
 - D. Report development

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside regular class time doing the following:

1. Assigned readings from the text
2. Completing the necessary assignments

Methods of Instruction:

1. Lecture and discussion
2. Group Activities/ Projects
3. Presentations
4. Guest lectures/ presentations
5. Laboratory activities
6. Class discussions

Methods of Evaluation:

1. Computational and non-computational problem-solving demonstrations
2. Skill demonstrations
3. Formative and summative examinations
4. Quizzes
5. Participation



6. Individual and group exercises and projects
7. Reports and written assignments
8. Oral Presentation

Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

1. Curriculum development for each lab.
2. Published schedule of individual laboratory activities.
3. Published laboratory activity objectives.
4. Published methods of evaluation.
5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is physically present in lab when students are performing lab activities.
2. Instructor is responsible for active facilitation of laboratory learning.
3. Instructor is responsible for active delivery of curriculum.
4. Instructor is required for safety and mentoring of lab activities.
5. Instructor is responsible for presentation of significant evaluation.

Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practical's, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean-up of equipment and materials.

Supplemental Data:

TOP Code:	095650: Welding Technology
SAM Priority Code:	C: Clearly Occupational
Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class



Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	Y:
Eligible for Pass/No Pass:	NO
Taft College General Education:	NONE