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Welding (WELD) 1510 Shielded Metal Arc Welding (SMAW) (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, and
3. apply basic understanding of the common welding processes while utilizing proper safety and technique (SMAW, GMAW, FCAW and GTAW).

Total Hours: 32 hours lecture; 59 hours lab (91 hours total)

Course Description: This course will cover the theory and application of the Shielded Metal Arc Welding (SMAW) process. Emphasis will be placed on the safe and proper application of the SMAW process. Welding will be demonstrated in a variety of positions using various electrodes. Structural and pipe certifications are a focus of this course. 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. understand and practice safe work habits in and around a fabrication shop,
2. understand and practice safe work habits related to Shielded Metal Arc Welding (SMAW),
3. demonstrate the setup, operation and theory related to Shielded Metal Arc Welding (SMAW),
4. develop skills and knowledge required to successfully create a proper weldment in a variety of positions while using common welding electrodes, and
5. understand various welding codes and test requirements often associated with the Shielded Metal Arc Welding (SMAW) process.

### Course Scope and Content: Lecture

#### Unit I Introduction and Safety Procedures

- A. Overview
- B. Safety related to Shielded Metal Arc Welding (SMAW)

#### Unit II Shielded Metal Arc Welding (SMAW)

- A. Equipment
- B. Setup and Operation

#### Unit III Weld Joints

- A. Different design
- B. Non-destructive and Destructive

#### Unit IV Shielded Metal Arc Welding (SMAW) Weld progression

- A. X block
- B. Plate
- C. Pipe

#### Unit V Electrode Selection and Specification

- A. Electrode identification
- B. Process- uphill/downhill
- C. Composition and requirements

#### Unit VI Welding Positions and Sequencing

- A. X blocks
  1. Flat, horizontal, vertical down, and overhead. 6010
  2. Flat, horizontal, vertical up, and overhead. 7018
- B. Plate
  1. Practice open root downhill. Repeat until instructed to move on. 6010
  2. Fill and cap uphill. Repeat until instructed to move on. 7018
- C. TEST – D1.1 test on plate
- D. Open root downhill 6010, 7018 fill and cap. (Certified by third party inspector)
- E. Pipe welding
- F. Sizes

#### Unit VII Welding Standards

- A. Codes
- B. Standards and Costs

- Unit VIII Weld Quality
  - A. Testing
  - B. Inspection of welds
- Unit IX Welder Code Testing
  - A. Certification
  - B. Qualification
- Unit X Welding Careers and Future Training
  - A. Future training opportunities
  - B. Possible career options and types

Course Scope and Content: Laboratory

- Unit I Shielded Metal Arc Welding (SMAW) Safety
  - A. Perform Job Safety Analysis (JSA)
  - B. Demonstrate safe operation of tools and equipment
- Unit II Shielded Metal Arc Welding (SMAW)
  - A. Perform adjustments and fine-tuning of equipment
  - B. Setup and Operation
- Unit III Weld Joints
  - A. Performing welds on different joints
  - B. Identifying Non-destructive and Destructive
- Unit IV Shielded Metal Arc Welding (SMAW) Weld progression
  - A. Perform SMAW on X block
  - B. Perform SMAW on Plate
  - C. Perform SMAW on Pipe
- Unit V Electrode Selection and Application
  - A. Identifying electrodes
  - B. Applying electrode knowledge
- Unit VI Welding Positions and Sequencing
  - A. X blocks
    - 1. Flat, horizontal, vertical down and overhead. 6010
    - 2. Flat, horizontal, vertical up and overhead. 7018
  - B. Plate
    - 1. Practice open root downhill. 6010
    - 2. Fill and cap uphill. 7018
  - C. TEST – D1.1 test on plate
  - D. Open root downhill 6010, 7018 fill and cap. (Certified by third party inspector)
  - E. Pipe welding
  - F. Sizes

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, practicals, 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
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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:	Yes
Eligible for Pass/No Pass:	NO
Taft College General Education:	NONE