

Prepared by: H. Avila
Prepared by: T. Balestino
Revised by: D. Thornsberry
Revised by: D. Layne
Reviewed by: K. Bandy
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Welding (WELD) 1500 Welding Processes (3 Units) CSU

Advisory: Eligibility for English 1000, Reading 1005, and Mathematics 1050 strongly recommended.

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

Course Description: This introductory course provides an overview of the necessary safety, theory, and practical lab experiences associated with Oxy-Fuel Cutting, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW), and Gas Tungsten Arc Welding (GTAW). Properties and characteristics of basic weld joints, and defects will also be discussed. Additional supplies may be required.

Type of Class/Course: Degree Credit

Text: Moniz, B. J., and R. T. Miller. *Welding Skills*. 5 ed. Orland Park, Illinois: 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 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).

Course Scope and Content:

- Unit I Introduction to Safety in a Welding Shop
 - A. Overview of safety
 - B. Tool safety
 - C. Common safety practices around welding processes
 - D. Common safety practices around Oxy-fuel cutting

- Unit II Introduction to Common Welding Processes: SMAW, GMAW/FCAW, and GTAW
 - A. Requirements of a safe welding and cutting work environment
 - B. Overview of each process
 - C. Discuss most common processes

- Unit III Oxy-fuel Cutting Safety
 - A. Safety for oxy-fuel cutting in various environments
 - B. Unsafe cutting and welding practices
 - C. Safety practices used in handling Oxy-fuel equipment
 - D. Compressed Gas Association (CGA)

- Unit IV Operation of Oxy-fuel Equipment
 - A. Set up
 - B. Demonstration of cutting technique
 - C. Students apply technique and make a cut
 - D. Disassembly of cutting equipment

- Unit V Shielded Metal Arc Welding (SMAW)
 - A. History and Introduction
 - B. Theory of Shielded Metal Arc Welding
 - C. Equipment
 - D. Processes and techniques

- Unit VI Welding Concepts and Terminology
 - A. Welding Concepts
 - B. Welding Terminology
 - C. Electrodes I.D.
 - D. Weld joint design

- Unit VII Gas Metal Arc Welding (GMAW)
 - A. Theory of Gas Metal Arc Welding
 - B. Equipment
 - C. Processes and techniques

- Unit VIII Flux Core Arc Welding (FCAW)
 - A. Theory of Flux Core Arc Welding
 - B. Equipment
 - C. Processes and techniques

- Unit IX Gas Tungsten Arc Welding (GTAW)
 - A. Theory of Gas Tungsten Arc Welding

- B. Equipment
- C. Processes and techniques

- Unit X Welding Careers and Future Training
- A. Future training opportunities
 - B. Possible career options and types

Course Scope and Content: Laboratory

- Unit I Oxy-Fuel Cutting
- A. Setup of Oxy-fuel equipment
 - B. Demonstration of oxy-fuel cutting technique
 - C. Perform cuts using appropriate techniques
 - D. Disassembly of oxy-fuel equipment
- Unit II Shielded Metal Arc Welding (SMAW)
- A. Perform adjustments and fine-tuning of SMAW equipment
 - B. Demonstrate SMAW Processes and Techniques
 - C. Students weld on X block- Flat weld position
- Unit III Gas Metal Arc Welding (GMAW)
- A. Perform adjustments and fine-tuning of GMAW equipment
 - B. Demonstrate GMAW Processes and techniques
 - C. Students weld on X block- Flat weld position
- Unit IV Flux Core Arc Welding (FCAW)
- A. Perform adjustments and fine-tuning of FCAW equipment
 - B. Demonstrate FCAW Processes and techniques
 - C. Students weld on X block- Flat weld position
- Unit V Gas Tungsten Arc Welding (GTAW)
- A. Perform adjustments and fine-tuning of GTAW equipment
 - B. Demonstrate GTAW Processes and techniques
 - C. Students weld on X block- Flat weld position

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
SAM Priority Code:	C: Clearly Occupational
Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)

Program Status:	I: 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:	NO
Eligible for Pass/No Pass:	NO
Taft College General Education:	NONE