

BUTTE COLLEGE

COURSE OUTLINE

I. CATALOG DESCRIPTION

WLD 28 - Mig and Tig Arc Welding

3 Unit(s)

Prerequisite(s): WLD 22, WLD 24, WLD 25, WLD 26, WLD 40, WLD 50, WLD 154 and NCCER Level II Welding Qualification

Co-requisite(s): WLD 30, WLD 32, WLD 34, WLD 36, WLD 42, WLD 56, WLD 156

Recommended Prep: Reading Level III; English Level II; Math Level II

Transfer Status: CSU

17 hours Lecture

102 hours Lab

This course includes the gas metal arc welding (GMAW)/metal inert gas (MIG), gas tungsten arc welding (GTAW)/tungsten inert gas (TIG) and flux cored arc welding (FCAW) processes, in the flat, vertical, horizontal, and overhead positions. It will also include safety procedures, electrode identification, joint fit-up and alignment, base metal preparation, weld quality, and beads, with a focus on theory and practice.

II. OBJECTIVES

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

- A. Operate the GMAW units to weld in the flat, horizontal, vertical, and overhead positions.
- B. Operate the FCAW units to weld in the flat, horizontal, vertical, and overhead positions.
- C. Operate the GTAW units to weld in the flat, horizontal, vertical, and overhead positions.
- D. Operate the GMAW, FCAW, and GTAW processes, demonstrating the skill needed for certification.
- E. Demonstrate proper base metal and bead qualification procedures per requirements set by the American Welding Society (AWS).
- F. Identify and use the AWS classification of electrodes, wires, and rod when selecting the correct electrode for the job.
- G. Master the skills needed to pass certification as per the requirements set by the AWS.

III. COURSE CONTENT

A. Unit Titles/Suggested Time Schedule

Lecture	
<u>Topics</u>	<u>Hours</u>
1. Introduction and safety	2.00
2. Introduction to GMAW	1.00
3. Constant voltage characteristics	0.50
4. Shielding gases (including gas mixtures)	0.50
5. Filler wire classifications	0.50
6. Operating variables	0.50
7. Weld defects	0.50
8. Fillet welds and groove welds	1.00
9. MIG welding of aluminum	0.50
10. MIG welding of stainless steel	0.50

11. Flux core wire welding processes (FCAW)	1.00
12. Introduction to GTAW	1.50
13. GTAW welding of various metals and shielding gases	1.00
14. Establishing the arc and forming a weld pool	1.00
15. Process Characteristics	0.50
16. Relationship of rod angle to plate and torch angle to plate	0.50
17. GTAW of Aluminum	1.00
18. GTAW of Carbon and Low Alloy Steels	1.00
19. GTAW of Stainless Steel	1.00
20. GTAW of Dissimilar Metals	1.00
Total Hours	17.00

Lab

<u>Topics</u>	<u>Hours</u>
1. Introduction and safety	1.50
2. Introduction to GMAW	1.50
3. Constant voltage characteristics	3.00
4. Shielding gases (including gas mixtures)	3.00
5. Filler wire classifications	3.00
6. Operating variables	3.00
7. Weld defects	3.00
8. Fillet welds and groove welds	6.00
9. MIG welding of aluminum	3.00
10. MIG welding of stainless steel	3.00
11. FCAW process	12.00
12. Introduction to GTAW	12.00
13. GTAW welding of various metals and shielding gases	6.00
14. Establishing and arc and forming a weld pool	6.00
15. Process Characteristics	6.00
16. Relationship of rod angle to plate and torch angle to plate	6.00
17. GTAW of Aluminum	6.00
18. GTAW of Carbon and Low Alloy Steels	6.00
19. GTAW of Stainless Steel	6.00
20. GTAW of Dissimilar Metals	6.00
Total Hours	102.00

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Instructor Demonstrations
- C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- D. Discussion
- E. Demonstrations
- F. Multimedia Presentations

G. Laboratory Experiments

V. **METHODS OF EVALUATION**

- A. Exams/Tests
- B. Quizzes
- C. Homework
- D. Lab Projects
- E. Lab Final Project
- F. Lab Mid-term Project

VI. **EXAMPLES OF ASSIGNMENTS**

- A. Reading Assignments
 - 1. Read assigned AWS journal article and be prepared to discuss in class.
 - 2. Read chapter 1 of the GTAW handbook and be prepared to discuss in class.
- B. Writing Assignments
 - 1. Write an essay explaining how the assigned AWS article can be implemented into the process and how it relates to the class.
 - 2. Describe an order of operations for GTAW equipment setup.
- C. Out-of-Class Assignments
 - 1. Answer review questions for chapter 5.
 - 2. Research the proper process for setting up GMAW equipment using manufactures publication.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

- A. William H. Minnick. Gas Tungsten Arc Welding Handbook. The Goodheart-Wilcox Company, Inc., 2000.
- B. William H. Minnick. Gas Metal Arc Welding Handbook. The Goodheart-Wilcox Company, Inc., 2000.
- C. William H. Minnick. Flux Core Arc Welding Handbook. The Goodheart-Wilcox Company, Inc., 2000.
- D. National Center for Construction Education and Research (NCCER). Welding Level Two. 4th Edition. Pearson Education INC, 2010.
- E. National Center for Construction Education and Research (NCCER). Welding Level Three. 4th Edition. Pearson Education INC, 2010.

Materials Other Than Textbooks:

- A. All tools listed in the Butte College Welding Technology Program Guide.

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