Course Outline

2026-2027 Catalog

WLD 28 - Mig and Tig Arc Welding

Catalog Description

Transfer Status: CSU

Prerequisite: WLD 50 and NCCER Level II Welding Qualification

Unit(s): 3.00

Lecture: 17.00 Contact hours/34.00 Out of class hours/51.00 Total hours/1.00 Unit(s)
Lab: 102.00 Contact hours/0.00 Out of class hours/102.00 Total hours/2.00 Unit(s)
Total: 119.00 Contact hours/34.00 Out of class hours/153.00 Total hours/3.00 Unit(s)

Course Description: 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.

Objectives

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

1. Safely operate GMAW units to weld in the flat, horizontal, vertical, and overhead positions.
2. Safely operate FCAW units to weld in the flat, horizontal, vertical, and overhead positions.
3. Safely operate GTAW units to weld in the flat, horizontal, vertical, and overhead positions.
4. Safely operate the GMAW, FCAW, and GTAW processes, demonstrating the skill needed for certification.
5. Demonstrate proper base metal and bead qualification procedures per requirements set by the American Welding Society (AWS).
6. Identify and use the AWS classification of electrodes, wires, and rod when selecting the correct electrode for the job.
7. Master the skills needed to pass certification as per the requirements set by the AWS.

Course Content

Topic Titles / Suggested Time Topic

Lecture

Topics	Lec Hrs
Introduction and safety	2.00
Introduction to GMAW	1.00
Constant voltage characteristics	0.50
Shielding gases (including gas mixtures)	0.50
Filler wire classifications	0.50
Operating variables	0.50
Weld defects	0.50
Fillet welds and groove welds	1.00
MIG welding of aluminum	0.50
MIG welding of stainless steel	0.50
Flux core wire welding processes (FCAW)	1.00
Introduction to GTAW	1.50
GTAW welding of various metals and shielding gases	1.00
Establishing the arc and forming a weld pool	1.00
Process Characteristics	0.50
Relationship of rod angle to plate and torch angle to plate	0.50
GTAW of Aluminum	1.00
GTAW of Carbon and Low Alloy Steels	1.00
GTAW of Stainless Steel	1.00
GTAW of Dissimilar Metals	1.00
Total Hours:	**17.00**

Lab

Topics	Lab Hrs
Introduction to GMAW	1.50
Constant voltage characteristics	3.00

Topics	Lab Hrs
Shielding gases (including gas mixtures)	3.00
Filler wire classifications	3.00
Operating variables	3.00
Weld defects	3.00
Fillet welds and groove welds	6.00
MIG welding of aluminum	3.00
MIG welding of stainless steel	3.00
FCAW process	12.00
Introduction to GTAW	12.00
GTAW welding of various metals and shielding gases	6.00
Establishing and arc and forming a weld pool	6.00
Process Characteristics	6.00
Relationship of rod angle to plate and torch angle to plate	6.00
GTAW of Aluminum	6.00
GTAW of Carbon and Low Alloy Steels	6.00
GTAW of Stainless Steel	6.00
GTAW of Dissimilar Metals	6.00
Introduction and safety	1.50
Total Hours:	**102.00**

Methods of Instruction

A. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
B. Instructor Demonstrations
C. Laboratory Experiments
D. Lecture

Methods of Evaluation

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

Examples of Assignments

Reading Assignments

1. Read chapter 1 of the GTAW handbook and be prepared to discuss in class.
2. Read assigned AWS journal article and be prepared to discuss in class.

Writing Assignments

1. Write a 500-word 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.

Out-of-Class Assignments

1. Research the proper process for setting up GMAW equipment using manufactures publication.
2. Answer review questions for chapter 5.

Recommended Materials of Instruction

Minnick, W., & Prosser, M. (2021). Gas Tungsten Arc Welding Handbook. *Goodheart-Wilco, 7th.* 9781645641377.
National Center for Construction Education and Research (NCCER). (2025). Welding Level Two. *Pearson, 6th.* 9780138216160.

Other Learning Materials

All tools listed in the Full-Time Welding Program Semester 2 tool list on the Butte College Welding Technology website.

Minimum Qualifications

Welding

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