

WLD 112
BASIC WELDING PROCESSES

COURSE DESCRIPTION:

Prerequisite: DMA 010, 020, 030, DRE 096, or satisfactory score on placement test
Corequisite: None

This course introduces basic welding and cutting. Emphasis is placed on beads applied with gases, mild steel fillers, and electrodes and the capillary action of solder. Upon completion, students should be able to set up welding and oxy-fuel equipment and perform welding, brazing, and soldering processes. Course Hours Per Week: Class, 1; Lab, 3 Semester Hours Credit: 2

LEARNING OUTCOMES:

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

- a. Demonstrate Oxyacetylene setup and safety processes
- b. Demonstrate Oxyfuel welding and torch cutting
- c. Demonstrate SMAW (stick) plate equipment setup, safety and operation
- d. Demonstrate GMAW (MIG) equipment setup, safety and operation
- e. Demonstrate GTAW (TIG) equipment setup, safety and operation
- f. Explain the basic welding joint designs, symbols, codes and standards

OUTLINE OF INSTRUCTION:

- I. Introduction to welding
 - a. History of welding
 - b. Welding defined
 - c. The uses of welding
 - d. Welding and cutting processes
 - e. Oxyacetylene welding, cutting, and brazing
 - f. Thermal cutting processes
 - g. Occupational opportunities in welding
- II. Safety
 - a. Burn classifications
 - b. Face, eye, and ear protection
 - c. Respiratory protection
 - d. Ventilation
 - e. Material Safety Data Sheets (MSDS)
 - f. Special protective clothing
 - g. Fire protection
 - h. Equipment maintenance
 - i. Electrical safety

- j. Ladder safety
- III. Flame cutting
 - a. Metals cut by the oxyfuel process
 - b. Eye protection
 - c. Cutting torches and tips
 - d. Oxyfuel cutting, setup and operation
 - e. Hand cutting
 - f. The physics of a cut
 - g. Cutting applications
 - h. Pipe cutting
- IV. Plasma Arc cutting
 - a. The plasma torch
 - b. Power and gas cables
 - c. Power requirements
 - d. Heat input
 - e. Distortion
 - f. Applications
 - g. Machine cutting
 - h. Manual cutting
 - i. Plasma Arc gouging
- V. Shielded Metal Arc Welding (SMAW) (stick welding)
 - a. Welding current
 - b. SMA welding arc temperature and heat
 - c. Types of welding power
 - d. Arc blow
 - e. Types of power sources
 - f. Generator and Alternator type welding machines
 - g. Converting AC to DC
 - h. Duty cycle
 - i. Welder accessories
 - j. Arc length
 - k. Electrode angle
 - l. Electrode manipulation
 - m. Positioning of the welder and the plate
 - n. Stringer beads
 - o. Edge welds
 - p. Square butt joints
 - q. Outside corner joint
 - r. Lap joint
- VI. Gas Metal Arc Welding (GMAW) (MIG welding)
 - a. Weld metal transfer method
 - b. Shielding gases
 - c. Welding power supplies

- d. Speed of the wire electrode
- e. Molten weld pool control
- f. Power settings
- g. Gun angle
- h. Electrode (wire) feed unit
- i. GMA spot welding
- j. Setup of GMAW equipment
- k. Gas density and flow rates
- l. Wire speed feed
- m. Arc voltage and amperage characteristics
- n. Electrode extension
- o. Welding gun angle
- p. Metal preparation

VII. Gas Tungsten Arc Welding (GTAW) (TIG welding)

- a. Equipment and setup
- b. Types of tungsten electrodes
- c. Shaping the tungsten
- d. Types of welding current
- e. Shielding gases
- f. Pre flow and post flow
- g. Shielding gas flow rates
- h. Remote controls
- i. Torch angle
- j. Filler rod manipulation
- k. Tungsten contamination
- l. Current setting

REQUIRED TEXTBOOKS AND MATERIALS:

Jeffus, Larry, Welding, Principles and Applications. 7th ed. ISBN: 978-1-111-03917-2
Students will also need OSHA approved safety glasses. Steel toe work boots or shoes are preferred but not required.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.