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. 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 (SDS)
   F. Special protective clothing
   G. Fire protection
   H. Equipment maintenance
   I. Electrical 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

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

V. Shielded Metal Arc Welding (SMAW) (stick welding
A. Welding current
B. SMAW 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. GMAW spot welding
J. Setup of GMAW equipment
K. Wire speed feed
L. Arc voltage and amperage characteristics
M. Electrode extension
N. Welding gun angle
O. 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 TEXTBOOK AND MATERIAL:

To be determined by the faculty.
Miller Open Book Welding online instruction.