

**WESTERN IOWA TECH COMMUNITY COLLEGE**  
**Course Syllabus**

Term:  
Course Number and Section: WEL 330 \_\_\_\_  
Course Title: Welding Fundamentals  
Semester Hours: 1.00  
Meeting time/location:  
Instructor:  
Phone: 712.274.8733 Ext.  
E-mail: @witcc.edu  
Office Location:  
Office Hours:

**COURSE DESCRIPTION AND PREREQUISITES/COREQUISITES:**

This course is designed for the student who needs basic welding skills. The four welding processes covered are: Shielded Metal Arc Welding (SMAW or stick), Oxy-Acetylene Welding, Gas Metal Arc Welding (MIG), and Gas Tungsten Arc Welding (TIG). Topics include: safety, setup of equipment, electrode selection, metal transfer, shielding gases, welding distortion control, and the welding of ferrous and nonferrous metals. Lab experience will provide for skill development in these areas.

Prerequisite: None  
Co-requisite: None

**REQUIRED TEXTBOOKS/MATERIALS**

1. -. *MIG Welding Handbook*, Current ed. SAB Welding and Welding Products
2. -. *Pocket Welding Guide*, Current ed. Hobart Institute of Welding Technology

**COURSE OBJECTIVES**

The course will provide information which should enable the student to:

1. Operate oxy-acet welding equipment in a safe manner
2. Identify common oxy fuel gases
3. Braze in the flat and vertical positions
4. Perform cutting operations using manual and automatic equipment
5. Perform cutting operations on heavy and light metal
6. Follow safety procedures for welders
7. Visually inspect welds and do practical weld tests
8. Understand distortion
9. Identify and use various types of metal transfer
10. Select proper filler metals
11. Set welding parameters per welding procedure
12. Set up and operate a TIG welder in a safe manner

**CONTENT OUTLINE:**

- I. Safety in MIG Welding
  - A. Eye protection
  - B. Clothing
  - C. Electrical shock
  - D. Hazardous fumes
- II. Oxy-acetylene Welding Safety
  - A. Cylinders
  - B. Hoses
  - C. Blow pipes
  - D. Welding pipes
  - E. Harmful fumes and gases
- III. Fuel Gases – Oxy Acetylene

- A. Acetylene
- B. Mapp
- C. Propane and natural gas
- D. Liquefied gases
- IV. Filler Metals – Oxy Acetylene - SMAW
  - A. Ferrous metal
    - 1. mild steel
    - 2. cast iron
  - B. Non-ferrous metal
    - 1. aluminum
    - 2. copper
- V. Fusion Welding – Oxy Acetylene
  - A. Melting points
  - B. Torch and rod control
  - C. Welding tip sizes
  - D. Joint preparation
  - E. Puddle control
- VI. Brazing
  - A. Flux types
  - B. Joint preparation
  - C. Heat range
  - D. Dissimilar metals
- VII. Weld Inspection and Testing
  - A. Porosity and its causes
  - B. Slag inclusions
  - C. Weld size
  - D. Bend testing
- VIII. Welding Power Sources – GMAW/GTA/SMAW
  - A. Generators and alternators
  - B. Transformers
  - C. Rectifiers
  - D. Voltage
  - E. Amperage
  - F. Duty Cycle
- IX. Electrode Selection – SMAW/GMAW
  - A. Mild steel electrodes
  - B. Low hydrogen electrodes
- X. Metal Transfer - GMAW
  - A. Short arc
  - B. Globular transfer
  - C. Spray transfer
  - D. Pulsed arc
- XI. Shielding Gases - GMAW
  - A. Argon
  - B. CO<sub>2</sub>
  - C. Helium
  - D. Mixtures
- XII. Tig Welding Equipment
  - A. Water cooled torches
  - B. Water supplies
  - C. Power sources
  - D. Flow meters and regulators
  - E. Cables
  - F. Remote controls
- XIII. Current Selection - GTAW
  - A. Direct current
  - B. Alternating current
  - C. High frequency
  - D. Remote switches
  - E. Pulsed arc

## **COMPETENCIES:**

At the conclusion of the course the student will be able to:

1. Identify components of oxy-fuel welding equipment
2. Describe precautions for working with harmful gases
3. Follow all safety procedures for oxy-acetylene welding
4. Identify different types of metals (ferrous and nonferrous)
5. Select proper welding and cutting tip sizes
6. Read all gauges properly
7. Interpret Electrode ID numbers and their respective uses
8. Determine proper welding current and amperage
9. Describe weld defects
10. Observe all safety procedures of different shielding gases
11. Identify various types of MIG welding
12. Describe the characteristics of different shielding gases
13. Selection of proper current based upon base metal
14. Set up a TIG welder
15. Adjust the controls of a TIG welder
16. Set up oxy-acetylene apparatus
17. Prepare joints for fusion welding
18. Perform fusion welding in the flat and vertical position
19. Determine the proper heat for brazing
20. Select the correct cutting tips for heavy and light gauge metal
21. Make clean cuts on heavy and light gauge metal
22. Set up an arc welding machine
23. Produce welds in flat and horizontal positions
24. Set up a MIG welding station
25. Operate MIG welding equipment in a safe manner
26. Adjust machine for short arc welding
27. Adjust machine for spray arc welding
28. Adjust machine for glodutar transfer

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