

## **COURSE OUTLINE** **Welding and Pipe Fitting**

### **Course Description**

WE 213. Welding and Pipe Fitting. 2 hours credit. Prerequisite: A score at a pre-determined level on a placement instrument and WE 116 and WE 121 or instructor approval. This course will enable the student to develop proficiency in welding and pipe fitting, as well as expose the student to cutting, beveling, preparation, and fit-up of pipe prior to the welding process. The student will learn various procedures of pipe welding, as well as cutting, beveling, preparation and fit-up of pipe prior to the welding process. The student will also be exposed to pipe saddling and fitting. The student will apply proper safety practices throughout the course.

### **Course Relevance**

The principles learned in this course will allow the student to understand how proper fundamental skills and process analysis will prepare them for a position in a career of welding.

### **Required Materials**

Althouse, A.D. (2004). *Modern welding*. Tinley Park, IL: Goodheart-Wilcox Company, Inc.

### **Learning Outcomes**

The intention is for the student to be able to:

1. Demonstrate safety in the use of Shielded Metal Arc Welding equipment.
2. Demonstrate advanced Shielded Metal Arc Welding skills primarily through booth exercises and shop experiences.

### **Learning PACT Skills that will be DEVELOPED and documented in this course**

Through involvement in this course, the student will develop ability in the following PACT skill area(s):

#### **Analytical Thinking Skills**

1. Problem solving
  - Through the analysis of proper fit-up procedures and pipe welding fundamentals, the student will recognize the role these procedures and fundamentals play in obtaining a quality weld profile.

#### **Major Summative Assessment Task(s)**

These learning outcome(s) and the Learning PACT skill(s) will be demonstrated by

1. Performing proper fundamentals and techniques in pipe fit-up.
2. Exhibiting the ability to apply techniques in the shielded arc metal process while completing a pipe groove in the 1G position.

## **Course Content**

- I. Skills/Competencies – Actions that are essential to achieve the course outcomes:
  - A. Demonstrate the knowledge of and the ability to carry out proper pipe fit-up
  - B. Perform a pipe groove weld in the 1G position
- II. Themes – Key recurring concepts that run throughout this course:
  - A. Safety
  - B. Quality
- III. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
  - A. The force a gravity in relation to molten metal and various welding positions
  - B. The impact of critical welding fundamentals in relation to proper weld profiles
  - C. The impact of critical fit-up procedures and fundamentals in relationship to proper weld profiles
- IV. Concepts – Key concepts that must be understood to address the issues:
  - A. Proper joint preparation
  - B. Process analysis
  - C. Terminology
  - D. Heat Selection

## **Learning Units**

- I. Safety in the welding shop
  - A. Accidents
  - B. General shop safety
  - C. Safety in the welding environment
  - D. Oxy-fuel Gas Welding and cutting safety
  - E. Arc Welding and cutting safety
  - F. Resistance welding safety
  - G. Safety around welding robots
  - H. Special welding process safety
- II. Pipe and tube welding
  - A. Types of pipe
  - B. Types of tubing
  - C. Preparing pipe joints for welding
  - D. Arc welding pipe joints
  - E. GTAW and GMAW pipe joints
  - F. Welding tube joints using SMAW
  - G. Welding tube joints using GMAW and GTAW
  - H. Heat treating pipe and tube weld joints
  - I. Inspecting pipe and tube welds
  - J. Hot shortness
  - K. Weld backing rings
  - L. Welding plastic pipe

**Learning Activities**

Learning activities will be hands on exercises in both booth and shop. Classroom lecture is designed to enable the student to understand the key principles in process analysis, welding fundamentals, process and electrode classification analysis, basic pipe fit-up procedures and fundamentals, and correct use of associated equipment.

**Grade Determination**

The student will be graded on completion of assessment tasks, learning activities, adequate participation, tests, and written assignments.