

## **COURSE OUTLINE**

### **Welding Survey**

#### **Course Description**

WE 111 Welding Survey. 3 hours credit. Prerequisite: A score at a pre-determined level in reading, writing, and math on a diagnostic instrument selected by the department. This course will enable the student to develop skill in the fundamentals of arc welding through theory and practice. The student will weld in several positions using "70" series classification electrodes. Safety practices will be emphasized.

#### **Course Relevance**

The principles learned in this course will allow the student to understand how proper fundamental skills and process analysis will prepare a worker for a position in career of welding. A career in welding offers many options for employment and personal development. From industry production lines, to the laboratory, to research and development, to national defense, to sales and repair, the varied welding industry impacts virtually every industry.

#### **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
2. Demonstrate basic shielded metal arc welding skills using 70 series electrodes primarily through booth exercises and shop experiences
3. Explain the fundamental theories of shielded metal arc welding through written and/or classroom exercises

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

Through the student's involvement in this course, he/she will develop his/her ability in the following primary PACT skill areas:

1. Critical Thinking
  - Through the analysis of proper welding fundamentals, the student will recognize and understand the role these fundamentals play in obtaining a high quality weld
2. Problem Solving
  - Through the analysis of the shielded metal arc welding process the student will be able to identify strengths and/or limitations of 70 series electrodes and make decisions regarding the applications of these electrodes based on that knowledge.

### 3. Field-Related Technology

- Through the use of current industry standards and technology the student will be able to perform basic welding functions in a variety of positions with a high level of proficiency.

Secondary skills (developed but not documented):

Health Management

Reading

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

These learning outcomes and the primary Learning PACT skills will be demonstrated by

1. Performing specific weld profiles using 70 series electrodes using correct techniques and equipment

### **Course Content**

- I. Themes – Key recurring concepts that run throughout this course:
  - A. Safety
  - B. Quality
- II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
  - A. The force of gravity in relation to molten metal and various welding positions
  - B. The impact of critical welding fundamentals in relation to proper weld profiles
- III. Concepts – Key concepts that must be understood to address the issues:
  - A. Heat Selection
  - B. Proper joint preparation
  - C. Process analysis
  - D. Terminology
  - E. The principles of electrode manipulation
- IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
  - A. Perform multiple pass fillet welds in the flat position using E-7018 electrodes
  - B. Perform multiple pass fillet welds in the vertical position using E-7018 electrodes
  - C. Perform multiple pass fillet welds in overhead position using E-7018 electrodes

### **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. Shielded metal arc welding equipment and supplies

- A. Arc Welding power source classifications
- B. Constant current power sources
- C. NEMA Arc Welding power source classifications
- D. Welding leads
- E. SMAW electrodes
- F. Carbon and low-alloy steel covered electrode classification
- G. Non-ferrous electrode classifications
- H. Electrodes care
- I. Power source remote controls
- J. Weld-cleaning equipment
- K. Shields and helmets
- L. Special Arc Welding clothing

### III. Shielded metal arc welding

- A. Direct current (dc) Arc Welding fundamentals
- B. DCEN and DCEP fundamentals
- C. Alternating current (ac) Arc Welding fundamentals
- D. Selecting and Arc Welding machine
- E. Starting, stopping, and adjusting the Arc Welding power source of SMAW
- F. DC Arc blow
- G. Arc Welding joint designs

### **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, and correct use of associated equipment.

### **Grade Determination**

The student will be graded on completion of assessment tasks, learning activities, adequate participation (discussion) and the final project.