

COURSE OUTLINE **Industrial Welding I**

Course Description

WE 150. Industrial Welding I. 6 hours credit. Prerequisite: A score at a pre-determined level on a placement instrument. This course will enable the student to acquire skills and knowledge of Gas Metal Arc Welding (GMAW) procedures, blueprint reading, and cutting operations within a short-term, industrial-based format. The student will learn weld test and job search procedures, as applied to the industry, as an integral component of the curriculum. The student will apply proper safety practices throughout the course.

Course Relevance

The fundamental skills acquired in this course will affect the student's workplace outcomes throughout their careers. Intrinsic core abilities will have long-term economic impact upon the student's earning capacity.

Required Materials

Selected personal safety items and tools as dictated by the instructor.

Learning Outcomes

The intention is for the student to be able to:

1. Demonstrate interpretive print reading skills.
2. Explain the fundamental theories of the various cutting operations covered through written and/or classroom exercises.
3. Demonstrate basic gas metal arc welding skills 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):

Technology Skills

1. Discipline-specific technology
 - Through the use of current industry technology, the student will learn to perform specific welding procedures according to American Welding Society (AWS) standards.

Major Summative Assessment Task(s)

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

1. Performing a specific AWS testing procedure selected by the department.

Course Content

- I. Skills/Competencies – Actions that are essential to achieve the course outcomes:

- A. Demonstrate comprehension of two dimensional drawing concepts through the creation of an assigned project
- B. Demonstrate blueprint reading and interpretation through assigned laboratory projects
- C. Identify and utilize key industry welding symbols
- D. Demonstrate the ability to perform and know all major components of the Carbon-Arc Gouging process, Plasma Arc cutting process and Oxy-fuel cutting process
- E. Demonstrate an understanding of set-up and operation of various shape cutting procedures
- F. Perform fillet weld profiles on steel sheet metal and aluminum sheet metal using the gas metal arc welding process
- G. Demonstrate the ability to change out the shielding gas cylinder on a gas metal arc welding station
- H. Demonstrate the ability to field strip and name all consumable parts of a gas metal arc welding gun
- I. Demonstrate the ability to change out the wire spool on a gas metal arc welding station
- J. Perform Groove welds on steel plate using the gas metal arc welding process

Learning Units

- I. Introduction to blueprint reading
 - A. Prints: The language of the of Industry
 - B. Review of measurement
 - C. Review of fractions and decimals
- II. Print reading fundamentals
 - A. Alphabet of lines
 - B. Understanding prints
 - C. Basic plane geometry
 - D. Dimensioning welding prints
- III. Welding fundamentals
 - A. Structural metals
 - B. Common joints and welds
- IV. Reading welding prints
 - A. Welding symbols
 - B. Fillet Welds
 - C. Groove welds
- V. 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
- VI. Plasma Arc cutting
- A. Plasma Arc cutting principles
 - B. Plasma Arc cutting equipment and supplies
 - C. Plasma and shielding gases
 - D. Setting up the PC station
 - E. Safety equipment
 - F. Preparing to cut
 - G. Cutting procedure
 - H. Cutting quality
 - I. Plasma Arc gouging
 - J. Shutting down the PAC station
- VII. Arc and Oxygen Arc cutting equipment and processes
- A. Air Carbon Arc Cutting (CAC-A) equipment
 - B. Air Carbon Arc Cutting and gouging
 - C. Carbon Arc Cutting (CAC) and gouging equipment
 - D. Carbon Arc Cutting and gouging
- VIII. Oxy-fuel Gas Cutting equipment and supplies
- A. Complete portable oxy-fuel gas cutting outfit
 - B. The cylinder truck
 - C. Regulators of oxy-fuel gas cutting
 - D. The cutting torch
 - E. Torch guides
 - F. Multiple torches
- IX. Oxy-fuel Gas cutting
- A. The heat combustion of steel
 - B. Oxy-fuel Gas Cutting process
 - C. Cutting outfit
 - D. Cutting torch
 - E. Using a cutting torch
 - F. Cutting steel with the oxy-fuel gas cutting torch
 - G. Cutting ferrous alloy metals
 - H. Cutting cast iron
 - I. Automatic cutting
- X. Gas metal arc welding equipment and supplies
- A. The Gas Metal Arc Welding station
 - B. Arc welding power sources of GMAW
 - C. Wire feeders used with GMAW
 - D. GMAW shielding gases

- E. The GMAW welding gun
- F. GMAW electrodes
- G. Smoke-extracting systems
- H. Flux Cored Arc Welding (FCAW)
- I. The Flux Cored Arc Welding station
- J. Flux Cored Arc Welding electrode wire
- K. Accessory devices
- L. Filter lenses or use when gas-shielded arc welding
- M. Protective clothing

XI. Gas metal arc welding

- A. Gas Metal Arc Welding principles
- B. GMAW power sources
- C. Setting up the GMAW station
- D. Preparing metal for welding
- E. Electrodes extension
- F. Welding procedures
- G. Shutting down the station
- H. Welding joints in the flat welding position
- I. Welding joints in the horizontal welding position
- J. Welding joints in the vertical welding position
- K. Welding joints in the overhead welding position
- L. Automatic GMAW and FCAW
- M. GMAW and FCAW safety

XII. Special ferrous welding applications

- A. Ferrous metals and alloys
- B. Welding medium and high carbon steels
- C. Welding alloy steels
- D. Welding chrome-molybdenum steels
- E. Nickel-based alloys
- F. Welding recoated steels
- G. Welding maraging steels
- H. Stainless steels
- I. Welding dissimilar ferrous metals
- J. Welding cast iron

XIII. Special nonferrous welding applications

- A. Aluminum
- B. Preparing aluminum for welding

XIV. Procedures and welder qualifications

XV. Getting and holding a job in the welding industry

Learning Activities

Learning activities will be assigned to assist the student to achieve the intended learning outcomes through classroom and shop exercises, lecture and other activities at the discretion of the instructor(s).

Grade Determination

The student will be graded on learning activities and assessment tasks. Grade determinants may include the following: adequate participation (discussion), projects, and other methods of evaluation employed at the discretion of the instructor(s).