

Welding Metallurgy

Outline of Instruction

Course Information

Organization	Monroe County Community College, Applied Science and Engineering Technology
Developers	R.S.Chandel
Development Date	8/23/2007
Revised Date	8/27/2009
Course Number	WELD-105
Instructional Level	Associate Degree
Instructional Area	Welding Technology
Division	Industrial Technology
Potential Hours of Instruction	60
Total Credits	3

Description

This course covers the metallurgical aspects of the welding of common engineering metals such as plain carbon, alloy and stainless steels, aluminum and cast iron. The selection of filler metals, transfer and recovery of alloying elements and the design of preheating and post heating cycles is also emphasized. Incidences of defects such as cracking and porosity and factors affecting these will also be discussed.

Major Units

Metallurgy of steels

Thermal effects during welding

Metallurgical aspects of cracking and pore formation.

Filler metals, fluxes and gases

Preheating and postheating

Welding of Industrial alloys such as plain carbon, low alloy and stainless steels, cast irons, aluminum & their alloys and exotic metals such as chromium steels and Inconel.

Welding of Dissimilar Metals and Hardfacing

Methods of Instruction

The methods of instruction utilized in this course will include but not be limited to Lecture, Demonstration, Discussion, in Class Activity, Video, and Lab exercises.

Lab Work and Lab Reports

There will be a number of Lab experiments, some lasting one session, while others lasting 2 sessions. For this purpose, students will form the Lab Groups comprising 3-4 students. The Lab Groups will be formed before the first experiment and the group members are expected to stick together for the remainder of the term. The Lab report will, however, be submitted individually and graded.

Types of Instruction

Instruction Type

Classroom Presentation

Contact Hours

60

Credits

3

Textbooks

T. B. Jefferson and Graham Woods. *Metals and How to Weld Them*. The James F Lincoln Arc Welding Foundation, Clevel. **Edition:** 1990.

Learner Supplies

None.

Prerequisites

WELD-100

MATL-101

Exit Learning Outcomes

General Education Outcomes

- A. Demonstrate an understanding of the process of scientific inquiry
- B. Apply mathematical approaches to the analysis of numerical information
- C. Use computer technology to communicate information
- D. Communicate information in writing using the rules of standard American English

Course Outcomes

1. Evaluate effects of welding heat on the transformations in the weld metal and HAZ of welds.

2. **Compute the weld metal chemistry from the filler metal and base plate compositions**
3. **Predict the hot cracking and cold cracking susceptibility**
4. **Select the filler materials for a given base material and welding process**
5. **Prescribe the Preheat and Postheat requirements**
6. **Design a welding procedure for the production welds as per codes**