

COURSE OUTLINE

Welding 121

I. Catalog Statement

Welding 121 is the first in a series of occupational welding course designed to prepare the student of employment in the welding industry. It covers the theory of welding processes, welding safety, terms, basic metallurgy; and the fundamentals of metallic arc and oxyacetylene welding.

Units - 3

Lecture 1 hour, laboratory 6 hours

Note: This course may be taken 3 times; a maximum of 9 units may be earned.

Recommended Preparation: English 120 or ESL 165

II. Course Entry Expectations

Skill Level Ranges: Reading 3; Writing 3; Listening/Speaking 3; Math 3.

III. Course Exit Standards

1. perform manipulative skills in oxy-fuel welding, cutting, brazing, and shielded metal arc welding, and plasma arc cutting,
2. demonstrate a working knowledge of oxy-fuel, welding and cutting equipment, shielded metal arc welding equipment, plasma arc cutting equipment and their theories,
3. critique and evaluate weldments after properly performing a series of destructive tests on the samples,
4. demonstrate proper safety precautions in the use of oil oxy-fuel and shielded metal arc welding equipment,
5. write and compile a general welding notebook to be used as a reference guide for related classes,
6. show a general knowledge of basic metallurgy, welding terms and metal identification.

Course Outline

A.	Methods of welding	3 hours
B.	Welding terms	2 hours
C.	Basic welding design and application	2 hours
	1. Welding joints	
	2. Applications	
D.	Common metals identification	6 hours
	1. Identifying procedures	
	2. testing metals	
E.	Basic Metallurgy	4 hours
	1. Physical properties of metals	
	2. Annealing and stress relief	
	3. Tempering	
	4. Work hardening	
	5. Effects of alloying	
	6. Classification of steels	
	7. Classification of aluminum	
F.	Welding Safety	2 hours
	1. Hazards	
	2. Clothing and equipment	
G.	Oxyacetylene Welding and Brazing	30 hours
	1. O/A safety in setting up equipment	
	2. O/A definitions and procedures	
	3. Flame types and uses	
	4. Regulators, torch maintenance	
	5. Welding rods: types, alloys	
	6. Common defects: inclusions, blowholes, porosity	
	7. Flat position welding:	
	a. Running a puddle bead	
	b. Welding edge and cover joints on 16 ga. Material	
	c. Running a bead with a filler rod	
	d. Butt, tee and lap joints using a filler rod	
	8. Vertical position welding of butt, tee, and lap joints on 16 ga. material	
	9. Brazing:	
	a. Preparing the base metal	
	b. Laying a bronze bead on plate	
	c. Brazing a butt, tee, and lap joints	

- H. Oxyacetylene cutting theory and practice 2 hours
 - 1. Setting up equipment for manual and automatic flame cutting
 - 2. Manual flame cutting
 - 3. Automatic flame cutting
- I. Metallic Arc Welding 49 hours
 - 1. Definitions and classification of arch welding
 - 2. Safety hazards
 - 3. Machines and accessories
 - a. Transformers
 - b. Rectifiers
 - c. Transformer/Rectifier
 - 4. Electrode selection
 - a. A.W.S. classification code
 - b. Characteristics of electrodes
 - c. Identification and N.E.M.A. color code
 - 5. Selection of polarity of current
 - a. AC
 - b. DC positive or negative
 - 6. Problems encountered
 - a. Arc blow
 - b. Inclusions
 - c. Porosity
 - d. Gas pockets
 - e. Cracking
 - 7. Preparation of work
 - a. Joint design
 - b. Types of joints
 - c. Welding positions
- J. Arc Welding in various positions 12 hours
 - 1. Using electrodes E6010, E6013, E7018, E7024
 - 2. Striking an arc
 - 3. Running a bead on flat plate
 - 4. Building up a pad
 - 5. Butt, fillet, vee groove welding
 - 6. Guided band testing, tensile testing, cutting coupons

IV. Methods of Presentation

The following instructional methodologies may be used in the course:

1. Lecture;
2. Demonstration;
3. Videotapes;
4. Guest speakers

V. Assignments and Methods of Evaluation

1. Final project.
2. Regular quizzes.
3. Examination at the end of each instructional mode.
4. Final examination.

VI. Textbook

Lincoln, James F., Principals of Industrial Welding. 1st Edition.
Lincoln Welding Publishers
10th Grade Textbook Reading Level. ISBN: 78-71871