

#172

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Title: **WELDING**

Code No.

Semester:

Program: **HDE-APPRENTICE BASIC**

Semester:

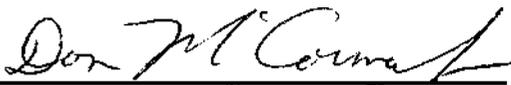
Author: **Pgnnis Socchia**

Date: **1991-Q1-Q7**

Previous Outline Dated:

1989 Q5 19

APPROVED:



Dean, School of Technical Trades

9 (~oi~ Of
Date

COURSE NAME: WEUMfi_____ **COURSE NUMBER:** N/A

PREREQUISITE(S): HDE APPRENTICESHIP (BASIC LEVEL)

I. PHILQS0PHY/<3QALS:

To provide students with a basic level of skills in dealing with oxy-acetylene welding equipment, practices and procedures. In addition, it will provide the student with a 'hands on' appreciation of metallurgy as it relates to welding and heat treatment.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course, the student will:

1. Perform braze welding, fusion welding and flame cutting exercises.
2. Identify metals by means of simple shop tests.
3. Understand the basics of heat treatment and mechanical properties.

III. TOPICS TO BE COVERED:

1. Program introduction and orientation
2. Welder Safety
3. Construction and Assembly of Equipment
4. Flame Types, Filler Metals and Weld Faults
5. Theory Test #1
6. Fusion Welding Practices
7. Flame Cutting practices
8. Practical Test #1
9. Basic heat Treatment and Distortion of Metals
10. Basic mechanical properties of metals
11. Non-Fusion Welding practices
12. Theory Test #2
13. Practical Test #2

Note: Performance objectives and/or course topics may not always be achieved or covered to the ideal depth owing to circumstances beyond our control (i.e. holidays, weather, sickness, equipment failure, etc.)

SUMMARY - HDE APPRENTICE - BASIC

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
1a b	1/2T	Orientation to program. Introduction and scope: fusion welding, non-fusion welding, cutting, heating.	O.A.W. I.A.S.#1
2a b c d	1L	Assembling and handling of equipment Construction and storage of equipment. Repairs to accessories.	Demo/Note Demo
	1/2T	Types of oxy-actylene flames and fuel mixtures.	O.A.W. I.A.S.#2
	1/2T	Welding terms, positions, joints	O.A.W. I.A.S.#3
f g		Filler metals and their selection. Weld faults.	Notes O.A.W. I.A.S.#4
3	8L	Fusion welding practices.	Notes/Demo
4		Non-fusion welding practices.	O.A.W. I.A.S.#5
a b c	2L 1L 1L	Braze welding. Brazing Soldering	Notes/Demo
	2L	Cutting practices.	O.A.W. I.A.S.#6 Demo
	1/2L	Distortion of metals.	O.A.W. I.A.S.#7 Demo
	2L	Basic heat treatment of metals.	O.A.W. I.A.S.#8 Demo
8a	2T	Intoduction to physical metallurgy.	O.A.W. I.A.S.#9
b	1/2L	Identification of metals.	
9	1/2T	Written Test	
TOTAL HRS.	4T, 20L	12 WEEKS	

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
1a	1/2T	Orientation to program. - outline of topics to be covered - grading system: A,B,C,D,F. - method of evaluation - testing modes, dates - shop safety and regulations - personal safety - repair of shop equipment Introduction to O.A.W. - Scope: fusion non-fusion cutting heating	O.A.W. I.A.S.#1
2a	IL	Assembling and handling of equipment. - assemble and disassemble hoses, regulators, torches, tips - identify and change "O" rings - adjust goggles, strikers - transport welding cylinders and cart Construction of equipment. - study cross-section of cylinders - location of safety devices - identification and marking of cylinders Repairs to accessories. - hose splicing, crimping tools, hose diameters	Notes/Demo Notes/Demo Demo
	1/2T	Types of O.A. flames and fuel mixtures. - lighting torches and adjustment - flame type and effect on weld puddle - characteristics and uses of other fuel gases: Mapp, natural gas, propane, air-acetylene - welding and cutting on containers	O.A.W. I.A.S.#2 Notes/Demo

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
2e	1/2T	<p>Welding terms, positions, joints.</p> <ul style="list-style-type: none"> - 3 types of welds: bead, groove and fillet - explanation of face, root, throat of weld - 5 types of joints: butt, lap, tee, corner, edge - weld positions in respect to fillet welds - explanation of joint penetration and fusion 	O.A.W. I.A.S.#3
f		<p>Filler metals and their selection.</p> <ul style="list-style-type: none"> - RG45, RG60 - tensile strength, ductility - weld soundness in respect to SI content 	Notes
g		<p>Weld faults: identification and prevention.</p> <ul style="list-style-type: none"> - appearance, overlap, undercut, lack of fusion, brittle welds, porosity, excessive convexity, concavity 	O.A.W. I.A.S.#4 Notes
3	8L	<p>Fusion welding practices, 16 gauge metal.</p> <ul style="list-style-type: none"> - beads, no rod and with rod - edge joint without rod - outside corner joint, with rod - butt joint with rod - lap joint with rod 	Notes/Demo
4a	2L	<p>Non-fusion welding practices.</p> <ul style="list-style-type: none"> - braze welding: definition, uses - advantages and disadvantages - braze weld tee-joint (both sides) 2F; 3F 	I.A.S.#5 Notes/Demo
	IL	<ul style="list-style-type: none"> - brazing, definition; uses - braze tee-joint 16 gauge metal using Allstate #45 (RB45) - safety: fumes, fluxes <p>Soldering</p> <ul style="list-style-type: none"> - definition; uses - fluxes - soldering equipment 	

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY		
	L-LAB		
	1L	- solder steel to steel - solder wire connection	
	2L	Cutting practices. - manual cutting, with and without guide bar - piercing - bolt cutting - cutability of metals	O.A.W. I.A.S.#6 Demo
	1/2T	Distortion of metals. - upsetting - heat input - neutral axis - heating for shrink fits	O.A.W. I.A.S.#7 Demo
a	2L	Basic heat treatment for metals. - effect of heat on: grain size and microstructure - forging, hardening, tempering a cold chisel - case hardening	O.A.W. I.A.S.#8 Demo
b			
8a	2T	Introduction to physical metallurgy. - tensile strength - yield strength - ductility - elasticity - toughness - impact strength - factor of safety - allowable stress	O.A.W. I.A.S.#9 Metals and How to Weld Them.
	1/2L	Identification of metals. - flame test - spark test - appearance, density of carbon steels - L.A.H.S. steels - stainless steels - aluminum, magnesium, white metal - copper based alloys - HR & CR sheet steel	

TOTAL HRS. 4T, 20L - 12 WEEKS

COURSE NAME: WELDING

COURSE NUMBER: N/A

EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

General Asssssmgnt

A = 85 - 100%

B = 75 - **84%**

C = 60 - 74%

D = 50 - 59%

F = 0 - **49%**

*** Final Mark**

2 Theory Tests 30%

Shop Tests 70%

Attendance (**See Attached)

Total 100%

VI. REQUIRED STUDENT RESOURCES:

CSA **APPROVED** SAFETY WORK BOOTS
CSA APPROVED SAFETY (IMPACT) GLASSES
Notebook, pen, paper
Work Wear

VII. ADDITIONAL RESOURCE MATERIALS AVAILALBE IN THE COLLEGE LIBRARY BOOK SECTION:

N/A

VIII. SPECIAL NOTES:

* Student evaluations concerning the 'final mark' are further affected by the conditions set forth in the printed handout, 'Guidelines for Related Welding'.

BE SURE TO OBTAIN A COPY FROM YOUR INSTRUCTOR

** Special guidelines for safety and class attendance are included in the above handout.