SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title	WELDING PROCESSES & FABRICATION (SHOP & THEORY)
Code No.:	MET 120-•12 **and** MET 106-5
Program:	WELDING AND FABRICATING
Semester:	2
Date:	JULY 18,. 1983
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New: Revision:

APPROVED:

Chairperson Date

WELDING PROCESSES & FABRICATION — Course Name
MET 120-12 MET 106-5 — Course Number

PHILOSOPHY/GOALS:

An attempt is made in this semester to expose the student to a large variety of welding practices, processes and types of metals.

He is encouraged to experiment as well as develop the necessary self-discipline and perserverance to master the indicated exercises.

Above all, he will learn sound welding skills, extend his blueprint reading and fabricating techniques such as cutting and lay-out work on plate, pipe and placing special emphasis on structural steel lay-out and detailing practices.

MET 120-12 Welding Processes & Fabrication
MET 106-5 (Shop and Theory)—continued

Semester 2

Block Electric Arc Welding 2 Section	Theory - Lab	Topic Information
		The student should be able to do the C.W.B. class "V" and class "0" tests
TOTAL HOURS	6 60	

WELDING AND FABRICATING

MET 120-12 Welding Processes & Fabrication
MET 106-5

Semester 2

Block Electric
Arc Welding 2

Section	Theory	Lab	Topic Information
			The student should be able to: weld fillets in vertical down positions using E6010-11 electrodes
			The student should be able to weld multipass fillets in horizontal position using E6010-14, 24, 27, 28, & 18 rods
			The student should be able to weld fillets in vertical up a overhead position with E6010-11, 13, 16, & 18 electrodes
			The student should be able to weld butt joints on l/4"-3/8" plate vertical down using E6010-11 electrodes sizes to 3/16"
E (a)	**1**	**15**	The student should be able to weld butt joints on 3/8"-l" plate using E6010-11, E7016-18 sizes 3/32'*-5/32" in vertical up and overhead positions
(b)		**15**	
F		**4**	The student should be able to weld plate to pipe, sizes 2"-8" in 2G and 5G positions using E6010-11 and E7016-18 electrodes
			The student should be able to build up shafts and sprockets
			The student should be able to weld and fabricate truss and direct beam to column connections

WELDING AND FABRICATING

Block Weld. Metallurgy 2

Section	Theory	Lab	Topic Information
			The student should be able to:
A		1	-identify major ferrous and non-ferrous alloys
B	4		-interpret classification systems for steels, irons, aluminum, magnesium, copper, stainless steels, tool steels, hardfacing wires and rods
C	2		-interpret the Fe3-C phase diagram
D			-interpret I-T.T. diagrams
E	6	2	-select a suitable welding & heat treat procedure for welding crack sensitive alloys
F	1		-interpret and correct weld failures
G	1 1		-select suitable filler metals for joining like & dissimilar metals
H	1 1		-appreciate welding variables i.e. current density, effect of polarity and shielding gases on arc characteristics
TOTAL HOURS	15		

Block Gas Metal
Arc Welding & G.T.A.W.

Section	Theory	Lab	Topic Information
			The student should be able to:
A (a)	2	2	-set up water-cooled and air-
(b)			cooled torches for ferrous and non-ferrous metals
(c)			-understand the argon arc characteristics
(d)		5	-weld a root pass in sch, 40 pipe in 6G positions
(e)	1 4		-weld common joints of aluminum (1/8) thickness, copper and stainless steel
(f)	1		-select filler metals and electrodes for G.T.A.W. welding
(g)	1		-do standard repairs to welding accessories
(h)	1		-guard against health and safety hazards
B			-set up and use the following equipment:
(a)		1	-Hobart Microwire (0.035) with $C0_2$
(b)		1	-Lincoln Innershield (Sam 400)
(c)		1	-Linde (Unio Melt) Fluxcored + $C0_2$
(d)		1	-Airco Miget Gun with the control box for drooping characteristics machines
(e)			-Subarc attachment for Linde unit
C (a)			-understand the Spray and Drooping type arc transfer
(b)			-understand Slope, Inductance, A/V relations
(c)			-calculate heat input in joules/ inch
(d)			-do time and cost studies
(e)			-guard against health hazards
(f)		1	-weld a root pass with a Microwire unit
(g)		1	-do fillet welds in position with Innershiek

Block Fabrication 2

Section	Theory	Lab	Topic Information
			The student should be able to:
A (a)			-lay out and erect a staircase including 2 types of railings
(b)			-measure, fabricate and erect railing for steps and balconies
B			-make his own toolbox for assorted tools
			-make a utility trailer
			-fabricate and install a safe trailer hitch from light gauge plate
			-make various containers, hoppers, ducts
	1	1	-fabricate pipe and angle iron frames
	6	4	-fabricate from blueprints common structural steel connections
			-use safety standard shop equipment for fitting, i.e. jacks, clamps, chainpull
			-understand the causes of distortion and adopt welding procedures and techniques to correct it
	2	1	-do basic pipe fitting and threading
	2	1	-know and use standard fasteners (types of bolts, grades, etc.) hooks, chains and slings
TOTAL HOURS	20	15	

WELDING AND FABRICATING

Block Pipe Welding Section	Theory	Lab	Topic Information
			The student should be able to:
	1/2		-torch cut pipe using radial mitre and bevel cuts
B (a)		1/2	-use the H.S.M. pipe bevelling machine
(b)		1/2	-use line up clamps and jigs, contour markers
	1/2		-select electrodes according to A.P.I. - A.S.M.E. Code requirements
			-oxy-acetylene weld pipe up to 1 1/4" diameter
	1/2	5	-weld 2" - 12" sch. 40 pipe downhand–API Code
	1/2	50	-weld 2" - 8" sch. 80 pipe uphill using 3/32" - 1/8" E6010-11, 7018 electrodes
	1	8	-fabricate basic pipe assemblies from his own templates (tee elbow lateral)
			-weld a root pass using Tig and Microwire
			-pass the Pipe Test in 5G and 6G position according to A.S Boiler and Pressure Vessel Code, Section IX. Supervised by a local inspector
TOTAL HOURS	3	70	

Block Gas Metal Arc Welding & G.T.A.W Section	Theory - Lab	Topic Information
C (h)		•weld deep grooves with all power sources
(i)		do basic trouble shooting
TOTAL HOURS	6 20	