SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: WELDING

CODE NO. : IRN820 **LEVEL:** 3

PROGRAM: IRONWORKER - ADVANCED

AUTHOR: Steve Witty
INSTRUCTOR: Bill Hanchuck

DATE: January 2016 **PREVIOUS OUTLINE DATED:** March 2015

APPROVED:

"Corey Meunier"

CHAIR

TOTAL CREDITS: 5

PREREQUISITE(S): Successful completion of WELDING for the Intermediate Ironworker level of training or its equivalent.

HOURS/WEEK:

I. COURSE DESCRIPTION: A curriculum that has been designed to:

- Provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of typical Gas Metal Arc / Flux Core Arc welding equipment.
- To develop the clients welding skill to the point where s/he can pass the pre-qualified CWB plate test in the specified position.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. ***Demonstrate by means of practical shop assignments, a sound working knowledge of both Personal and Shop Safety.***

   Potential Elements of the Performance:
   - identify proper work boots, gloves and eye protection
   - identify recommended fabrics and materials for personal protective clothing
   - identify and select proper shades of welding lenses
   - identify, select and adjust welding helmets for proper fit and vision
   - locate and identify shop lighting and ventilation switches
   - locate and identify emergency exits
   - understand procedures for evacuation of shop areas in the case of emergencies

2. ***Demonstrate the ability to set up and operate a typical GMAW / FCAW Workstation.***

   Potential Elements of the Performance:
   - identify proper eye, hand and face protection
   - identify proper footwear and clothing
   - identify potential fire, fume and explosion hazards associated to either the Gas Metal Arc or the Flux Core Arc welding process
   - briefly describe the differences between a constant current and a constant voltage welding machine
   - explain why a constant voltage machine is used for the GMAW process
   - identify electrode types, sizes according to CSA / AWS specification
   - identify various shielding gases and their potential use(s)
   - perform a routine inspection of assigned workstations to determine the
   - condition of wire feeder, cables, torch body, hoses and regulators

- report / correct deficiencies prior to the commencement of work
- describe procedures for setting shielding gas flow rate, voltage, wire feed speed and visible (electrode) stick-out distance.
- describe techniques for arc ignition, setting gun angle and travel speeds

3. ***Demonstrate the ability to perform GMAW procedures as well as Identify and Correct Weld Defects .***

Potential Elements of the Performance:

- produce fillet and groove welds on both thin gauge and thick metals
- perform adjustments to voltage and wire feed speed in accordance with the demands of base metal thickness and joint design
- change / replace rolls of electrode wire
- perform in-service adjustments to wire drive rolls, contact tip and nozzle

4. ***Demonstrate the level of skill required to pass a pre-qualified CWB Plate Test Assembly in the specified position***

Potential Elements of the Performance:

- prepare test plate assemblies as per W47.1 specifications relating to:
  - thickness, width and length dimensions
  - root opening
  - bevel angle
  - number and location of bend test coupons
  - S – class vs. T – class qualification
- weld the test plate assemblies as per W47.1 specifications relating to:
  - number and location of stop / restarts
  - weld bead sequence
  - dimensions of completed weld
  - acceptable vs. unacceptable visual defects
- prepare bend test coupons as per W47.1 specifications relating to:
  - minimum coupon width
  - minimum coupon thickness
  - shape of flame cut edges and corners
  - acceptable vs. unacceptable dimensions for test defects
- understand W47.1 specifications relating to:
  - period of welder qualification
  - conditions of welder qualification
  - qualified welding process

5. ***Demonstrate the ability to read and interpret Welding Symbols beyond a basic level of comprehension.***

   Potential Elements of the Performance:

   - recognize and interpret groove weld symbols and dimensions relating to the:
     - type of groove specified
     - groove angle and root opening
     - depth of preparation vs. depth of penetration
     - use of back welds vs. backing welds
     - use of backing bars
   - recognize and interpret fillet weld symbols and dimensions relating to the
     - leg size and length
     - continuous vs. intermittent
     - unequal leg size
     - fillet and groove weld combinations
   - recognize and interpret supplemental weld symbols related to
     - field weld and weld all around
     - welding process
     - required electrode(s)
     - base metal(s) use
     - GTSM

III. TOPICS:

Clients may expect the following list of topics to be covered during this course of instruction.

1. Personal and Shop Safety
2. Set up and Operation of a GMAW / FCAW workstation
3. GMAW / FCAW Practices and Procedures
4. CWB Test Plate Procedures
5. Welding Symbols

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- CSA Approved (Impact Resistant) Safety Glasses
- CSA Approved (6 inch High Cut) Safety Work Boots
- CSA Approved (Gauntlet Type) Welding Gloves
- Appropriate Work Wear (see Welding Shop Guidelines)
- Modules Course Pack IRN804

V. EVALUATION PROCESS/GRADING SYSTEM:

The final course grade will be determined by means of the following list of weighted factors:

Factor	***Value***	***Exemption Value***
Shop Assignments	35 %	CWB Ticket 65 %
CWB S Class Tests	35 %	0 %
Theory Quiz & Test	30 %	35 %

If you have a valid GMAW or FCAW – CWB ticket in the flat position or a valid GMAW or FCAW – CWB all-position ticket you may request exemption from having to do the Sault College CWB S Tests.
You may do so by providing the course instructor with your ticket(s) for verification and photocopy.

Persons who apply for and receive the exemption will have their final course grade calculated using the percentages displayed in the ***Exemption Value*** column.

The following semester grades will be assigned to students:

Grade	**Definition**	*Grade Point Equivalent*
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Attendance:
Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.