

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: SHIELDED METAL ARC WELDING (SMAW) 2

CODE NO. : MTF137 **SEMESTER:** N/A

PROGRAM: METAL FABRICATOR TECHNICIAN and
WELDING TECHNIQUES

AUTHOR: Steve Witty
INSTRUCTOR: Bill Hanchuck

DATE: January **PREVIOUS OUTLINE DATED:** January
2017 2016

APPROVED: *“Corey Meunier”* Jan '17
CHAIR DATE

TOTAL CREDITS: 3

PREREQUISITE(S): MTF107

HOURS/WEEK: 3

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**For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610**

I. COURSE DESCRIPTION:

A trades curriculum that has been designed to provide students with a combination of theoretical knowledge and hands on skill in relation to the safe use and operation of the SMAW welding process in the Vertical and Overhead positions.

1. *Identify and Select Personal Protective Equipment for Arc Welding Operations.*

Potential Elements of the Performance:

- identify proper eye, hand and face protection
- identify proper footwear and clothing
- identify and select filter lenses
- describe the effects of exposure to ultra violet and / or infrared radiation
- locate and identify shop ventilation controls
- locate and identify emergency exits
- locate and identify manifold shut-off valves for the shop gas system
- identify hazards associated with the SMAW process
- understand emergency shop evacuation procedures

2. *Demonstrate and describe how to set up and operate a typical SMAW Workstation.*

- Potential Elements of the Performance:
- identify, select and adjust welding helmets and lenses
- identify SMAW electrodes according to type, size, current type, polarity and welding position according to AWS and CSA designation
- identify and describe the various types of welding machine according to construction, duty cycle and current type
- perform a routine inspection of assigned workstation to determine the condition of welding machine, cables, electrode holders and related equipment
- understand the hazards of open circuit voltage (OCV) and arc voltage
- identify / set welding machine controls to their designated value(s)
- describe techniques for arc ignition, electrode manipulation and travel speeds
- produce trial weld beads to identify possible defects and verify current settings

3. Demonstrate the ability to produce sound welds as well as identify / troubleshoot and make corrective adjustments for weld defects.

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to the SMAW process
- perform appropriate adjustments to SMAW equipment specific to the demands of single and multi-pass fillet welds
- make single and multi-pass fillet welds on mild steel
- perform appropriate adjustments to SMAW equipment specific to the demands of single and multi-pass groove welds
- make single and multi-pass groove welds on mild steel
- perform destructive tests on welded joints to verify overall soundness
- describe, identify and take corrective actions for common weld defects

4. CSA and AWS Classification of SMAW Electrodes.

Potential Elements of the Performance:

- identify, select electrodes by
 - Classification
 - Diameter
 - Desired Weld Appearance
- Identify and select the correct operating current for electrodes based upon
 - Diameter
 - Joint Design
 - Required Strength
- Identify the correct storage and handling procedures for each of the following electrode types
 - Low Hydrogen
 - Non-Low Hydrogen

5. Demonstrate the ability to pass a CWB Plate Test* Vertical & Overhead Positions.

Potential Elements of Performance:

- describe the physical dimensions of the CWB test plate assembly including:
 - bead sequence
 - position and number of stop / restarts
 - the acceptance criteria for the size and shape of the completed weld

- describe the physical bend test procedure to include:
 - plate thickness, width and length
 - bevel angle
 - root opening
 - number and size of bend test coupons
- describe the welding procedure to include:
 - preparation and condition of bend coupons
 - identification of face vs root bend coupons
 - acceptance criteria for possible defects

*S-Class Plate Test for Apprentices w/o a valid S-Class CWB Ticket

*T-Class Plate Test for Apprentices with a valid S-Class CWB Ticket

III. TOPICS:

1. Personal Protective Equipment and Safety
2. SMAW equipment safety and set-up
3. SMAW basic operations
4. SMAW electrodes
5. CWB test procedures

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Impact Resistant Safety Glasses (CSA Approved)
- High Cut (6 inch min) Safety Work Boot (CSA Approved)
- Weld Gloves (CSA Approved)

V. EVALUATION PROCESS/GRADING SYSTEM:

Part 1 NOTES:

1. Late hand in penalties will be 10% per day. Assignments will not be accepted past one week late unless there are extenuating and legitimate circumstances.
2. If a student misses a test/lab he/she must have a valid reason (i.e. medical or family emergency – documentation shall be required). In addition, the instructor MUST be notified PRIOR to the test or lab sitting. If this procedure is not followed the student will receive a mark of zero on the test/lab with no make-up option.
3. Re-writes are NOT allowed for any written assignment, quiz or test.
4. Repeats are NOT allowed for any shop test
5. Course attendance is mandatory. One percent (1 %) per hour will be Deducted from the final course grade for unexcused* absence.

* Any absence without a written, valid reason will be deemed unexcused.

Valid reasons would include:

- Doctor's note
- Family Death or Serious Illness supported by a written note.

Part 2 Final Course Grades:

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

Factor	Value
Shop Assignments and Practical Tests	100%
-3F Vertical X pc	15%
-3F Vertical Lap pc	15%
-3GF Vertical CWB S Class	20%
-4F Overhead X pc	15%
-4F Overhead Lap pc	15%
-4GF Overhead CWB S Class	20%
Attendance	-1% per Unexcused Hour
Late	-1% per Late
Shop Clean-up	-1% per Incident

The following semester grades will be assigned to students:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	
A	80 – 89%	4.00
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.