

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: WELDING

CODE NO. : MSE716 **LEVEL:** 2

PROGRAM: MARINE & SMALL ENGINES – Level 2

AUTHOR: Steve Witty
INSTRUCTOR: Bill Hanchuck

DATE: January 2015 **PREVIOUS OUTLINE DATED:** January 2010

APPROVED:
“Corey Meunier”
CHAIR

TOTAL CREDITS: 2

PREREQUISITE(S): Successful completion of WELDING for the MSE Level 1 or its equivalent.

HOURS/WEEK:

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

I. **COURSE DESCRIPTION:** This course was primarily designed to provide a combination theoretical knowledge and hands on skill associated with the safe use and operation of Gas Metal Arc and the Shielded Metal Arc welding equipment. Additionally, it will provide students with an introduction to the theory of Gas Tungsten Arc welding process by means of self study modules and shop demonstrations.

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 eye protection as well as the need to wear it at all times while in the welding shop
- identify proper hand and face protection as well as the need to wear it during any and all cutting, heating or welding operations
- identify proper footwear and clothing
- identify the dangers associated with contact lenses, butane lighters, exposed metal jewelry, long hair and beards
- identify the location of commonly used welding tools, face shields and leather jackets
- identify personal safety equipment that must be supplied by the student
- locate and identify shop lighting and ventilation controls
- locate and identify emergency shop exits
- understand emergency shop evacuation procedures
- locate and identify manifold shut-off valves for the shop gas system

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

Potential Elements of the Performance:

- 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 and 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 and identify and correct potential weld defects.***

Potential Elements of the Performance:

- produce fillet and groove welds on base metals not greater than ¼ inch thick
- 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
- identify and troubleshoot the possible cause(s) of common weld defects

4. ***Demonstrate the ability to set up and operate a typical SMAW Workstation.***

Potential Elements of the Performance:

- identify, select and adjust welding helmets and lenses
- identify electrodes according to type, size and AWS / CSA designation
- identify guidelines for electrode selection and application
- identify techniques for adjusting both welding current and polarity
- perform a routine inspection of assigned workstation to determine the condition of welding machine, cables, electrode holders and related equipment
- correct deficiencies prior to the commencement of shop assignments
- identify basic SMAW joint designs
- describe techniques for arc ignition, electrode manipulation and travel speeds
- produce trial weld beads to identify possible defects and verify current settings

5. ***Demonstrate the ability to perform SMAW procedures and identify and correct potential weld defects.***

Potential Elements of the Performance:

- produce fillet and groove welds on base metals not greater than ¼ inch thick
- identify and troubleshoot the possible cause(s) of common weld defects
- identify and explain limited repair and service activities related to electrode cables, holders, welding machines and protective equipment

6. ***Study and observe demonstrations on the set up and safe operation of Gas Tungsten Arc welding equipment.***

Potential Elements of the Performance:

- identify tungsten electrode types, sizes and 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 installing and reading a shielding gas flow meter
- set proper shielding gas flow rates
- describe techniques for arc ignition, torch angle and travel speeds
- identify GTAW filler rods by means of diameter and CSA / AWS specification
- observe and participate (where practical) in GTAW demonstrations.

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 Workstation
3. GMAW Practices and Procedures
4. Set up and Operation of a SMAW Workstation
5. SMAW Practices and Procedures
6. GTAW Practices and Procedures

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)
- Pocket Note-pad (for Shop Demonstrations and Discussion)
- Modules: Course Pack MSE716

V. EVALUATION PROCESS/GRADING SYSTEM:Part 1 NOTES:

1. Re-writes are NOT allowed for any written assignment, quiz or test.
2. Repeats are NOT allowed for any shop test
3. Course attendance is mandatory. One percent (1 %) per hour will be deducted
from the final course grade for apprentices with more than 4 hours of unexcused* absence.

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

Valid reasons would include:

- Doctor's note
- Apprenticeship Ministry 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 & Tests	70 %
Theory Quiz & Test	30 %
Attendance	-1% per Unexcused Hour
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%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
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.