

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: WELDING

CODE NO. : MSE716 and MSE201 **SEMESTER:** N/A

PROGRAM: MARINE & SMALL ENGINES - Level 2

AUTHOR: Steve Witty

DATE: Dec 2008 **PREVIOUS OUTLINE DATED:** Nov 2007

APPROVED:

“Corey Meunier”

CHAIR

_____ **DATE**

TOTAL CREDITS: 2

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

HOURS/WEEK:

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School of Technology & Skilled Trades

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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 $\frac{1}{4}$ 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:

<i>Factor</i>	<i>Value</i>
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	Definition	<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:

Cheating

Students caught cheating during any theory quiz, test or exam will be removed from class pending a public apology to their fellow classmates and a letter giving them permission to return to class from the Dean's Office.

Theft and Damage

Students caught stealing and / or deliberately damaging shop tools and equipment will be removed from class pending a public apology to their fellow classmates and a letter giving them permission to return to class from the Dean's Office.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.