

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY
SAULT STE. MARIE, ONTARIO**



COURSE OUTLINE

COURSE TITLE: WELDING

CODE NO.: MET018 / MET611 **SEMESTER:** N/A

PROGRAM: MARINE and SMALL ENGINES - Phase 1

AUTHOR: Dennis Clément-Socchia

DATE: Oct 2000 **PREVIOUS OUTLINE DATED:** Dec 1998

DEAN

DATE

TOTAL CREDITS N/A

PREREQUISITE(S): NONE

LENGTH OF COURSE: 2 Hours / Week for 8 Weeks

TOTAL CREDIT HOURS: 16 Hours

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For additional information, please contact

Kitty DeRosario, Dean,

School of Technology, Engineering & Technical Trades

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- I. COURSE DESCRIPTION:** A trades curriculum that has been designed to provide a combination of theoretical knowledge and basic practical (hands on) skill in the safe use and operation of both OFG and SMAW welding, cutting and heating equipment.
- II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**
(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will have been given the opportunity to:

- 1) *Demonstrate and describe a sound working knowledge of personal and shop safety.*

Potential Elements of the Performance:

- identify proper eye, hand, face protection
- identify proper footwear and clothing
- identify the location of shop eye wash station, light and ventilation switches
- locate and identify shop ventilation devices
- locate and identify emergency fire exits
- identify the location of shut-off valves for the shop manifold gas system
- identify procedures for evacuation of shop areas in case of emergency

- 2) *Communicate clearly and correctly in the written form a sound working knowledge of oxygen and acetylene cylinder construction as well as their safe handling and operation.*

Potential Elements of the Performance:

- describe the physical construction of both oxygen and acetylene cylinders
- identify the built-in safety devices for both oxygen and acetylene cylinders
- describe methods for identifying oxygen and acetylene cylinders, hoses,
- identify basic physical properties and dangers associated with oxygen gas
- identify basic physical properties and dangers associated with acetylene gas
- describe procedures for cylinder handling
- describe procedures for setting up, pressurising, purging and shutting down a portable oxyacetylene station

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE Cont'd:

- 3) *Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments a sound working knowledge of how to set up and operate a typical oxyacetylene workstation.*

Potential Elements of the Performance:

- perform a routine inspection of assigned workstations to determine the condition of torch body, hoses, regulators and tips
- correct deficiencies prior to the commencement of work
- understand the differences in construction and operation between a balanced
- pressurise and purge regulators, hoses, torch body and tip
- explain the dangers associated to the hazards of backfire and flashback
- explain the correct safe response to backfire and flashback
- identify correct versus unsafe flame ignition procedures
- adjust the oxyacetylene flame to produce flames designated as carburizing, neutral and oxidising
- describe procedures for the shutting down of the oxyacetylene torch, regulators

- 4) *Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments a sound working knowledge of how to perform both fusion and braze welding operations.*

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to the fusion and or braze welding of metals
- identify mild steel filler metals according to the AWS Classification system
- perform appropriate pressure settings and flame adjustments for specific fusion
- perform basic fusion welding operations on mild steel
- identify brass filler metals according to the AWS Classification system
- identify proper braze welding techniques
- perform appropriate pressure settings and flame adjustments for specific braze welding exercises
- perform basic braze welding operations on mild steel

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE Cont'd:

- 5) *Communicate clearly and correctly in the written form a reasonable working knowledge of how to perform flame cutting and heating operations.*

Potential Elements of the Performance

- describe potential fire, fume and explosion hazards associated to the flame cutting of metals
- identify proper flame cutting techniques, appropriate pressure settings and flame adjustments for specific flame cutting exercises
- describe potential fire, fume and explosion hazards associated to the heating of
- describe potential changes to ductility and hardness that can as a result from the heating and rapid cooling of metals.

- 6) *Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments a sound working knowledge of how to set up and operate a typical oxyacetylene workstation.*

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to the SMAW process
- identify and select the correct filter lenses for the task at hand
- adjust welding helmets for proper fit and maximum hazard protection
- identify electrode according to type, size and AWS / CSA numbering system
- identify and explain limited repair and service to electrode cables, holders, power sources and protective equipment
- perform a routine inspection of assigned workstations to determine the condition of power supply, cables, electrode holder and related equipment
- correct deficiencies prior to the commencement of work

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II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE Cont'd:

7. *Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments a sound working knowledge of how to set up and operate a typical SMAW workstation.*

Potential Elements of the Performance:

- identify, select and adjust welding helmets and filter lenses
- identify electrodes according to AWS / CSA numbering system, type and size
- identify techniques for setting polarity and the correct amount of welding current
- perform a routine inspection of assigned workstations to determine the condition of power supply, cables, electrode holder, ground clamp and related equipment
- correct deficiencies prior to the commencement of work
- explain basic SMAW joint designs and base metal edge / surface preparation
- describe techniques for arc ignition, setting electrode angle and travel speeds
- produce trial beads to identify possible defects and verify initial settings

8. *Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments a sound working knowledge of how to perform SMAW procedures and diagnose / correct defects.*

Potential Elements of the Performance:

- describe potential fire, fume, explosion, electrical and radiation hazards associated to the SMAW process
- perform appropriate adjustments to SMAW equipment specific to the demands of variable welding exercises
- describe and diagnose common weld defects
- identify and explain limited repair and service to electrode cables, holders, power sources and protective equipment
- produce fillet and groove welds capable of passing visual examination and / or destructive testing

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II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE Cont'd:

9. *Demonstrate by means of regular attendance, punctuality, respect for fellow students as well as lab / shop equipment, a willingness to assume the responsibilities of employment.*

Potential Elements of the Performance:

- be present for all scheduled classes
- provide a satisfactory reason for having to leave class early
- provide a reasonable excuse for being absent from class
- provide a written statement to the professor explaining the reason(s) for being absent on an assignment due date or the day of a scheduled test
- demonstrate behaviour that does not interfere with or obstruct the over-all learning environment
- actively participate in all course assignments and projects
- operate any and all lab / shop equipment according to guidelines prescribed by the college and / or course professor
- wear personal protective equipment at all times while in the shop
- return all equipment and unused practice materials to their designated place upon completion of work
- remove all scrap and thoroughly clean individual and / or assigned station

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

C.S.A. Approved (High Cut) Safety Work Boots
C.S.A. Approved (Impact Resistant) Safety Glasses
Appropriate Work Wear
Notebook c/w Paper
Two Finger (Gauntlet Type) Welding Gloves
Text: Principles of Industrial Welding

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V. EVALUATION PROCESS/GRADING SYSTEM

The evaluation will consist of an over-all theory test as well as designated lab/shop assignments and / or practical shop tests for which students must demonstrate proficiency in both knowledge and hands on skill.

Failure to complete all designated shop assignments shall result in the loss of the entire 10% allocated to the “Employment Readiness” evaluation.

The over-all *theory test* will represent **35%** of the final course mark and will be ‘*open book*’ using MET018 / MET611 course notes and the identified text.

All *practical lab / shop assignments* and *tests* will represent **55%** of the mark for the final course mark and must be completed prior to the writing of the said theory test.

The evaluation for *employment readiness* will consist of a day to day recording of the Elements of Performance listed. Each infraction will constitute the loss of one percentage point from the **10 percentage points** allocated to this outcome.

While all tests and assignments are designed to be completed with the specified time limit (or less), students **MUST** report to the shop/ classroom fully prepared. Your professor will supply only the necessary materials and instruction.

The final mark for MET018 / MET611 will be determined by means of the following grades list and related weights

Course Grading Scheme		Final Mark (*see item \$ 3 under Special Notes)	
A	85 - 100%	Shop Assignments / Tests	55%
B	75 - 84%	Theory Test	35%
C	60 - 74%	Employment Readiness	10%
D	50 - 59%		
F	0 - 49%		

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

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 post secondary institutions.

Plagiarism

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. 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, as may be decided by the professor.

Course Changes

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

Final Mark

Evaluations concerning the **Final Mark** are further affected by the conditions set forth in the printed handout, *Welding Department Guidelines*. Be sure that you receive a copy of these guidelines.

Lab & Shop Demonstrations

Course materials that are discussed and / or explained during any and all lab or shop demonstrations are subject to evaluation and will be used as the basis for questions on quizzes and course tests.

DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.

PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following:

1. The successful completion of an OFG / SMAW welding course with Learning Outcomes and Elements of Performance that are at least 70% compatible with this course outline ...

AND

2. The successful challenge of the over-all theory test identified by this course outline.

<OR>

3. Documented proof of at least three (3) years of competent trade experience involving both the use and operation of OFG / SMAW equipment that is compatible with Learning Outcomes described within this course Outline ...

AND

4. The successful challenge of the over-all theory test identified by this course outline.