



**I. COURSE DESCRIPTION:** A trades curriculum that has been designed to provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of manual and / or semi-automatic OFG, SMAW, GMAW / FCAW and AAC cutting and welding equipment.

**H. 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;**

**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) *Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform semi-automatic flame cutting operations.***

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to process of flame cutting and / or heating of metals
- identify proper flame cutting and heating techniques
- select appropriate pressure settings, flame adjustments and travel speeds
- flame cut mild steel using manual and semi-automatic equipment
- describe potential changes in base metal ductility, brittleness and strength that can occur as a result of their rapid heating and cooling.

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE**  
**(Continued)**

***Demonstrate and describe by means of practical shop assignments and tests a sound working knowledge of how to set up and operate a typical SMA W 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
- identify basic SMAW joint designs
- set correct polarity and welding amperage
- describe techniques for arc ignition, setting electrode angle and travel speeds
- produce trial beads to identify possible defects and verify initial settings
- produce sample weld for visual and destructive testing and evaluation

***Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform HARD SURFACING procedures via the SMAW process.***

Potential Elements of the Performance:

- describe increased fume hazards and ventilation requirements associated to the application and use of hard surfacing alloys
- identify and describe general service requirements for mechanical parts
- identify and describe general service conditions for mechanical parts- identify general 'composition groups' for mechanical parts that are to be repaired by means of the hard surfacing operation

H. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)

- identify general preheating temperatures and techniques
- identify the effects of size and shape on hard surfacing techniques
- identify the general rule for deposit thickness
- identify the effect of 'required finish'<sup>5</sup> electrode selection
- list general categories for the 'grouping' of hard surfacing electrodes
- perform hard surfacing operations

5) *Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform GMA W/FCA W procedures and diagnose / correct possible defects*

Potential Elements of the Performance:

- identify and explain pre-weld service requirements for drive rolls, contact tips, gun nozzle and liner
- identify and set correct shielding gas flow rates, voltage and wire feed speed specific to the demands of single and multi-pass fillet welds and groove welds
- understand the relationship between electrical stick-out and weld quality
- describe techniques for arc ignition, setting electrode angle and travel speeds
- identify and explain the differences between the 'push' vs 'pull' techniques for depositing electrode metal
- produce trial beads to identify possible defects and verify initial setting
- produce sample weld for visual and destructive testing and evaluation

6) *Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform AAC/G procedures.*

Potential Elements of the Performance:

- identify increased radiation, fume and electrical shock hazards related to the AAC/G process
- identify additional protective equipment, ventilation requirements and safe work practices related to the operation of the AAC / G process
- identify common use and application of the process

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE**  
**(Continued)**

- identify special duty cycle and amperage requirements of a power supply designed for use with the AAC / G process
- identify correct polarity and amperage settings
- identify typical pressure, moisture and lubricant content of air supply
- identify electrode shape, construction and safe handling techniques
- identify considerations related to the location and set up of a safe AAC / G work station
- describe techniques for setting correct electrode extension, angle, arc ignition and travel speeds
- describe methods of (post operational) oxide removal and base metal cleaning
- perform AAC / G operations
- submit samples for testing and evaluation

***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 to the professor for having to leave class early
- provide a reasonable excuse to the professor 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"

**V. EVALUATION PROCESS/GRADING SYSTEM**

The evaluation for Learning Outcomes # 1 thru # 6 will be determined by means of *Designated In/Shop Assignments and Tests as well as two Theory Tests.*

All practical shop assignments and tests must be completed prior to the writing of theory test # 2. Work not completed by this date will be assigned a failing grade.

The evaluation for Learning Outcome # 7 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 *10percentage 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 assignment or test instructions.

The Final Mark for MET210 will be calculated as follows:

<u>Course Grading Scheme</u>		<u>Final Mark (see item # 3 under special HW)</u>	
A+	90 - 100% Outstanding Achievement	Shop Assignments and Tests	50%
A	80 - 89% Above Average Achievement	Theory Tests	40%
B	70 - 79% Average Achievement	Employment Readiness	10%
C	60 - 69% Satisfactory Achievement		

- U Unsatisfactory, only given on the midterm report  
S Satisfactory, only given on the midterm report  
R Repeat, signifies a failing grade  
X A temporary grade that is limited to instances where special circumstances have prevented the student from demonstrating the required elements of performance by the end of the course semester. An X grade must have the Deans approval and has a *maximum* time limit of 120 days after which it becomes an R grade.

**VL SPECIAL NOTES:**

1. Special Needs

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

2. 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.

3. Student 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.

4. Course materials that are discussed and / or explained during any and all lab or shop demonstrations are subject to evaluation. Students are therefore responsible for the content of all lab / shop demonstrations.

5. Your Professor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

6. Substitute Course Information is available at the Registrars Office.

7. Any person caught cheating or substituting another persons work in place of their own for the purpose of grading or evaluation will automatically fail the said assignment or test. College policy\* also dictates that such persons may be subject to immediate dismissal.

\* Students should refer to the definition of academic dishonesty provided in the Sault College Statement of Student Rights and Responsibilities .

## **H. PRIOR LEARNING ASSESSMENT**

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

1. The successful completion of an welding course having Learning Outcomes and Elements of Performance that are at least 80% compatible with this course outline ...

AND

2. The successful challenge of both theory tests identified by this course outline.

<OR>

3. Documented proof of at least three (3) years of competent trade experience involving the use of manual and / or semi-automatic OFG, SMAW, GMAW / FCAW ans AAC equipment in a manner that is compatible with Learning Outcomes described in MET210-3...

AND

4. The successful challenge of both theory tests identified by this course outline.