

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON



COURSE OUTLINE

Course Title: WELDING

Code No.: MET210

Semester.: Winter

Program: 2nd Year P/S HEAVY EQUIPMENT

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Date: Jan 1998

Previous Qntlim» Date- Jan 1993

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Total Credits: 2

Prerequisite^): MET100

Length of Course: 15 wks

Total Credit Hours: 30

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Written permission of The Sault College of Applied Arts & Technology is prohibited.
For additional information, please contact Kitty DeRosario, Dean, School of Trades
& Technology, (705) 759-2554, Ext 642.*

COURSE DESCRIPTION: A curriculum that has been designed to provide a combination of theoretical knowledge and practical skill in the safe use and operation of manual and semi-automatic OFG, SMAW, GMAW / FCAW welding equipment. It will include both shop demonstrations and practical application of the above equipment in order to reinforce learning.

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 demonstrate the ability to:

Communicate clearly and correctly in the written form as well as 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, hand, and face protection
- identify proper footwear and clothing
- 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
- explain procedures for evacuation of shop areas in case of emergency

Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments and tests 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 electrode according to type, size and AWS / CSA numbering system
- identify guidelines for electrode selection and application
- identify techniques for adjusting both welding current and polarity
- 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

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

Communicate clearly and correctly in the written form as well as demonstrate by means of practical shop assignments and tests, a sound working knowledge of how to perform SMA Wprocedures and diagnose /correct defects.

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to SMAW
- 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 vee groove welds
- make single and multi-pass groove welds on mild steel
- describe and diagnose common weld defects
- identify and explain limited repair and service to electrode cables, holders, power sources and protective equipment

Communicate clearly and correctly in the written form as well as demonstrate 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 the flame cutting of metals
- adjust gas pressures and machine travel speeds according to a variety of plate thicknesses and joint designs
- explain the dangers associated to the hazards of backfire and flashback
- explain the correct safe response to backfire and flashback
- describe procedures for the shutting down of the semi-automatic oxyacetylene cutting and welding equipment.

LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE

(Continued)

*Communicate clearly **and** correctly in the written form as well as demonstrate by means of practical shop assignments and tests, a sound working knowledge of how to perform hard surfacing procedures via the SMA Wprocess.*

Potential Elements of the Performance:

- describe potential fume hazards and special ventilation practices associated to the use of hard surfacing electrodes
- describe the relationship between service conditions, service requirements and electrode selection
- describe preheating and hard surfacing techniques
- perform hard surfacing operations

*Communicate clearly **and** correctly in the written form as well as demonstrate by means of independent study assignments as well as practical shop assignment a sound working knowledge of the Carbon Arc Cutting / Gouging Processes.*

Potential Elements of Performance:

- identify metals that can be cut and / or gouged via the ACC/G process
- identify equipment that is required to make up a typical ACC/G workstation
- identify carbon electrodes to include both size and type
- identify polarity requirements and current settings for various electrodes
- identify typical air pressures required for ACC/G procedures
- describe safety procedures for working with the ACC/G process
- describe techniques for arc ignition, setting electrode angle and travel speeds
- produce typical cutting and / or gouging operations in the flat and horizontal positions
- describe typical procedures and techniques for the removal of carbon from surfaces that have been exposed to the ACC/G Process prior to welding

LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE

(Continued)

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 GMA W/FCA Wprocedures and diagnose / correct defects.

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to GMAW
- identify and explain the service requirements for drive rolls, contact tips, gas nozzle and liner
- produce single and multipass welds on mils steel plate in the flat and horizontal positions
- perform appropriate adjustments to GMAW equipment specific to the demands of variable welding exercises
- describe and diagnose defective welds

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
- be in the lab/shop or classroom within 5 minutes of the scheduled starting time
- be present for the taking of attendance
- 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

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
Two Finger (Gauntlet Type) Welding Gloves
IAS "Instructional Aid Sheets"
Module: "Basic OxyFuel Gas Welding"
Text: "New Lessons in Arc Welding"

EVALUATION PROCESS/GRADING SYSTEM

The evaluation for Learning Outcomes # 1 through # 7 will be determined by means of *Practical Lab/Shop Assignments and Tests* as well as two *Theory Tests*.

The evaluation for Learning Outcome # 8 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 assignment or test instructions.

The Final Mark for MET-210 will be calculated as follows:

Shop Assignments / Tests	60%
Theory Tests	30%
Employment Readiness	10%

General Grading Scheme

A+	95 - 100%
A	86 - 94%
B	76 - 85%
C	60 - 75%
R	0 - 59%

Shop Grading Scheme

A+ = 95	A = 90	A- = 86
B+ = 83	B = 80	B- = 76
C+ = 73	C = 67	C- = 61
R = 35		

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 compiling 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. Any person caught cheating or substituting another person's 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.

VH. 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 oxyacetylene flame cutting and welding course **with** 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 welding and flame cutting equipment that is compatible with Learning Outcomes described in MET210... **AND**
4. The successful challenge of both theory tests identified by this course outline.