

I. **COURSE DESCRIPTION:** This curriculum that has been designed to provide apprentices with a sound working knowledge and level of skill in the safe use and operation of typical SMAW and OFG welding, cutting and heating equipment. It's terminal objective will be to develop within the apprentice the skill required to pass the flat CBW plate test.

II. **LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course the student will demonstrate the ability to:

1) ***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
- understand procedures for evacuation of shop areas in case of emergency
- 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, regulators and fittings
- 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

2) ***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 pressure and an injector torch
- pressurise and purge regulators, hoses, torch body and tip
- explain the dangers associated to the hazards of back fire and flashback
- explain the correct safe response to back fire and flashback
- identify correct verses 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 and assigned workstation

- 3) ***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 fusion-welding operations.***

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to the fusion welding of metals
- identify proper fusion welding techniques
- perform appropriate pressure settings and flame adjustments for specific fusion welding exercises
- fusion weld a variety of mild steel joint configurations with and without the use of filler rod
- perform destructive tests on completed welds to ensure weld soundness

- 4) ***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 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
- perform appropriate pressure settings and flame adjustments for specific flame cutting exercises
- flame cut mild steel
- describe potential fire, fume and explosion hazards associated to the heating of metals
- describe potential metallurgical changes that can as a result of the heating and cooling of metals

- 5) ***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 cables, electrode holder and related equipment
- correct deficiencies prior to the commencement of work
- explain basic of 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

- 6) ***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 SMAW procedures and diagnose / correct defects.***

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to the SMAW process
- 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 groove welds
- make single and multi-pass groove welds on mild steel
- perform destructive tests on welded joints to verify overall weld soundness
- describe and diagnose common weld defects

- 7) ***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 pass a flat CWB plate test .***

Potential Elements of the Performance:

- describe the physical dimensions of the CWB test plate assembly including:
 - bead sequence
 - position and number of stop / restarts
 - the acceptance criteria for the size and shape of the completed weld
- describe the physical bend test procedure to include:
 - plate thickness, width and length
 - bevel angle
 - root opening
 - number and size of bend test coupons
- describe the welding procedure to include:
 - preparation and condition of bend coupons
 - identification of face vs root bend coupons
 - acceptance criteria for possible defects

- 8) ***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

III. TOPICS:

1. Personal and Shop Safety
2. Oxyacetylene Station Setup
3. Oxyacetylene Welding and Cutting Practices
4. SMAW Station Setup
5. SMAW Welding and Cutting Practices
6. CWB Testing
7. Employment Readiness

IV. REQUIRED STUDENT RESOURCES / TEXTS and MATERIALS:

CSA Approved (Impact Resistant) Safety Glasses
CSA Approved (8 inch High Cut) Safety Work Boots
CSA Approved (Gauntlet Type) Welding Gloves
Appropriate Work Wear
Pocket Note-pad for Shop Demonstration and Discussion Content
Text: Principles of Industrial Welding

V. GRADING SYSTEM:

The final course grade will be calculated based upon the following weighted factors:

Shop Assignments	30%
CWB Test	25%
Theory Test	35%
Employment Readiness	10%

Final course grades are then assigned by means of the following breakdown:

<u>Grade</u>	<u>Definition</u>
A+	95 – 100%
A	86 – 94%
B	76 – 85%
C	60 – 75%
R (Repeat)	59% or below

VI. SPECIAL NEEDS

1. Special Needs: If you are a student with special needs (e.g. physical limitations, visual impairment, hearing impairment, 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.
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. 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/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.

4. 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.
5. Substitute course information is available in the Registrars office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. 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.

Welding
Course Name

-7-

IRN604
Code No

Welding
Course Name

-8-

IRN604
Code No

Welding
Course Name

-9-

IRN604
Code No

Welding
Course Name

-10-

IRN604
Code No

Welding
Course Name

-11-

IRN604
Code No

Welding
Course Name

-12-

IRN604
Code No

Welding
Course Name

-13-

IRN604
Code No

Welding
Course Name

-14-

IRN604
Code No