

#80-5

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:       ARC & GAS WELDING

CODE NO.:            WLDIOO - THEORY   WLDIOI -- PRACTICAL

PROGRAM LENGTH: 101 HOURS

PROGRAM:            ST. MARYS PAPER

DATE:                UPDATED MAY 1996

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APPROVED:

  
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SCHOOL OF TECHNICAL TRADES

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**ARC & GAS WELDING**  
COURSE NAME

WLDIOQ/WLPIQt \_\_\_\_\_  
CODE NO.

TOTAL CREDITS: N/A

PREREQUISITECS): N/A

**1. PHILOSOPHY/GOALS:**

This course introduces the student to Gas Welding, Cutting and Arc Welding skills, with emphasis on safety and a sound understanding of the operation of the equipment, good welding skills and a workable knowledge of general weldability of metals

**11. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):**

The practical objective of this program is to develop the student's ability to weld according to CSA W47.1 Class "S" Test criteria to the best of his/her ability.

**III. TOPICS TO BE COVERED:**

**Approximate Time  
Frames (Optional)**

- 1) Oxy-Acetylene Welding
- 2) Shielded Metal Arc Welding
- 3) Certification of Welders
- 4) Testing and Inspection of Welds

<b>TOPIC NUMBER</b>	<b>TOPIC DESCRIPTION</b>
	Oxy-Acetylene Welding
1	Shop Safety; Personal Safety
2	Oxy-acetylene equipment and accessories - assembly, disassembly - lighting the torch, backfire, flashback - types of flames
3	Fusion Welding Practices - bead - edge joint - corner joint - lap joint - tee joint
4	Properties of Gases - acetylene; free and dissolved - propane; free and compressed - natural gas - nitrogen - carbon dioxide - oxygen
5	Storage of Cylinders - use and transport - manifold system; need
6	Weld Terms and Definitions
7	Weld Faults
8	Filler Metal Selection
9	Oxy-Fuel Gas Cutting - cut ability of metals - pressures and tip selection
10	Cutting Practices - straight lines, bevel cuts, free and guided - mitre cuts, copes - cutting of rounds - light and heavy gauge cutting
11	Repair Welding Practices - welding of cylinders that have held combustible materials

**TOPIC  
NUMBER**

**TOPIC DESCRIPTION**

Shielded Metal Arc Welding

- |   |   |
|---|---|
| 1 | Shop Safety; Personal Safety  |
| 2 | Adjustment of Welding Machines<br>- use of accessories  |
| 3 | Welding Practices<br>- beads and weaves in all positions (pad)<br>- outside corner joints in position<br>- Fillet welds<br>- IF (FLAT) E6010 1/8<br>E6011 1/8<br>E7018 1/8<br>E7024 1/8<br>- 2F          E6010 1/8<br>E6011 1/8<br>E7018 1/8<br>E7024 1/8<br>E7028<br>- 3F          E6010 1/8<br><b>E6011 1/8</b><br><b>E7018 1/8</b><br>- 4F          E6010 1/8<br><b>E6011 1/8</b><br><b>E7018 1/8</b><br><br>Pipe to Plate; Pipe Axis Vertical & Horizontal<br>CWB Testing Class "S"<br>Flat & Horizontal Only |
| 4 | Types of Welding Machines<br>- constant current - variable voltage concept<br>- transformer A.C.<br>- transformer/rectifier A.C./D.C.<br>- generator D.C.<br>- constant voltage machines<br>- electrical characteristics;<br>input, output<br>- selection of welding machines   |
| 5 | Filler Metals<br>- AWS/CSA classifications<br>- operating characteristics<br>- mechanical properties<br>- selection of rods<br>- storage and reconditioning   |

TOPIC NUMBER	TOPIC DESCRIPTION
6	Welding Terms and Definitions <ul style="list-style-type: none"><li>- fillet weld types, sizes, measurements</li><li>- groove weld, types, size of</li><li>- positions, passes, layers</li><li>- arc blow</li></ul>
7	Weld Symbols <ul style="list-style-type: none"><li>- location of elements on reference line</li><li>- groove welds, fillet welds</li><li>- size of welds</li></ul>
8	Weld Faults <ul style="list-style-type: none"><li>- penetration-fusion; incomplete penetration</li><li>- weld appearance; imperfect shape</li><li>- overlap, undercut, porosity; cold lapping</li><li>- hydrogen induced cracking; cold cracking</li><li>- solidification cracking; hot cracking</li><li>- laminations, delaminations</li><li>- effect of arc strikes; removal</li><li>- weld failures, ductile, brittle</li></ul>
9	Distortion <ul style="list-style-type: none"><li>- causes, preventions</li><li>- welding procedures, heat in put</li><li>- heat shrinking, straightening</li></ul>
10	ASTM/SAE/CSA Classification of Steels Weldability and Rod Selection for: <ul style="list-style-type: none"><li>- low alloy- high strength steels</li></ul> <u>Certification Q&amp; Welders</u> <ul style="list-style-type: none"><li>- CSA W 47.1 Class "S"</li></ul> <u>Testing and Inspection of Welds:</u> <ul style="list-style-type: none"><li>- visual inspection<ul style="list-style-type: none"><li>- guided bend test</li><li>- nick break</li><li>- etching of welds</li><li>- weldability test (clip test)</li></ul></li></ul>

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**EVALUATION METHODS:** (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

Grades will be assigned in accordance with the Ministry of Colleges and Universities Guidelines as follows:

<b>A - 85 to 100%</b>	Theory Tests - Pass 60%
<b>B - 75 to 84%</b>	
<b>C - 60 to 74%</b>	Oxy-Acetylene 1
<b>D - 50 to 59%</b>	Arc Welding 2
<b>F - 0 to 49% (Failure)</b>	

Practical: - Class F-B & H-A

ATTENDANCE REQUIREMENT IS 90%

**VI. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the instructor.

**VII. REQUIRED STUDENT RESOURCES**

Oxy-Acetylene Welding Module (Supplied as class-set)  
Arc Welding Module (Supplied as class-set)  
I.A.S. (Instruction Aid Sheets) and notes  
System and the Welding Procedure for CSA W47.1 Class "S" Tests

Personal Safety Equipment required:  
CSA Approved (High Top) Safety Boots  
CSA Approved Safety Glasses  
Welding Mitts

**VIII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:**

**IX. SPECIAL NOTES**

Students with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

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