

COURSE FAB1048: SEMI-AUTOMATED/AUTOMATED WELDING**Level:** Introductory**Theme:** Fabrication Processes**Prerequisite:** FAB1010 Fabrication Tools & Materials**Description:** Students develop basic knowledge and skills related to the use of gas metal arc welding (GMAW) and flux core arc welding (FCAW) processes in both personal use and commercial applications. They also develop introductory knowledge of submerged arc welding (SAW) processes.**Parameters:** Access to a fabrication work centre complete with gas metal arc welding (GMAW) and/or flux core arc welding (FCAW) equipment and supplies, and to instruction from an individual with formal, specialized training in arc welding practices.**Supporting Course:** FAB1050 Basic Electric Welding**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify health and safety hazards associated with GMAW, FCAW and SAW processes, and take preventative measures to avoid accidents and personal injury to self and others 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observed performance related to: <ul style="list-style-type: none"> appropriate selection and use of personal protective equipment maintenance of a clean and tidy work station safe tool/material handling and storage <p><i>Assessment Tool</i> <i>Fabrication Process: Light Gauge Fillet Welds, FAB1048-1</i></p> <p><i>Standard</i> <i>Performance rating of 2 for each applicable task</i></p>	10
<ul style="list-style-type: none"> identify power sources used in GMAW, FCAW and SAW processes 	<ul style="list-style-type: none"> knowledge of basic electrical terms as they relate to GMAW, FCAW and SAW processes <p><i>Assessment Tool</i> <i>Presentations/Reports: Components of Semi-automated/Automated Welding, FAB1048-2</i></p> <p><i>Standard</i> <i>Performance rating of 1 for each applicable task</i></p>	10

COURSE FAB1048: SEMI-AUTOMATED/AUTOMATED WELDING (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • select appropriate electrode wires and shielding gases for use in GMAW and FCAW processes • perform safe start-up and shut-down procedures for GMAW and/or FCAW processes • demonstrate safe GMAW and/or FCAW processes on light gauge mild steel and/or mild steel plate in the flat and horizontal positions • demonstrate basic competencies 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • knowledge and observed performance related to the selection and use of appropriate electrode wires and shielding gases in GMAW and FCAW processes <p><i>Assessment Tool</i> <i>Presentations/Reports: Components of Semi-automated/Automated Welding, FAB1048-2</i></p> <p><i>Standard</i> <i>Performance rating of 1 for each applicable task</i></p>	10
	<ul style="list-style-type: none"> • demonstration of safe start-up and shut-down procedures using GMAW and/or FCAW equipment <p><i>Assessment Tools</i> <i>Equipment Checklist: GMAW/FCAW Start-up and Shut-down Procedures, FAB1048-3</i></p> <p><i>Standard</i> <i>All procedures to be performed correctly</i></p>	20
	<ul style="list-style-type: none"> • completion of light gauge fillet welds in the flat and horizontal positions <p><i>Assessment Tool</i> <i>Fabrication Process: Light Gauge Fillet Welds, FAB1048-1</i> <i>Illustrative Example: Flat Tee Fillet Weld, FAB1048-4</i> <i>Illustrative Example: Horizontal Lap Joint Fillet Weld, FAB1048-5</i></p> <p><i>Standard</i> <i>Beads should be slightly convex, and of uniform width and height. Ripples are to be close, bullet shaped and free of voids, high spots, undercutting and coldlapping.</i> <i>Performance rating of 2 for each applicable task.</i></p>	50
	<ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	Integrated throughout

COURSE FAB1048: SEMI-AUTOMATED/AUTOMATED WELDING (continued)

Concept	Specific Outcomes	Notes
<p>Orientation</p> <ul style="list-style-type: none"> • Safe Work Practices and Procedures • Power Sources 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and explain safety issues related to: <ul style="list-style-type: none"> – electrical shock – toxic fumes – radiant energy from the arc • describe a safety plan in case of accident • identify basic components and operation principles for GMAW, FCAW and SAW processes • describe and compare methods of metal transfer in GMAW, FCAW and SAW processes; e.g.: <ul style="list-style-type: none"> – short arc – globular – spray arc • explain the advantages and disadvantages of GMAW, FCAW and SAW processes • demonstrate knowledge of basic electrical terms; e.g.: <ul style="list-style-type: none"> – direct and alternating current – voltage – amperage – resistance – polarity – open circuit voltage and arc voltage • relate knowledge of basic electrical terms to power sources used in GMAW, FCAW and SAW processes • identify the function of slope and inductance in CV power sources. • explain the advantages and disadvantages of different types of wire feed systems; e.g.: <ul style="list-style-type: none"> – push – pull – push–pull • identify different drive roll assemblies • describe welding gun assemblies for GMAW and FCAW processes 	<p>Discuss the importance and increasing use of GMAW and FCAW processes over other welding processes in the workplace.</p> <p>As part of an ongoing expectation, students should be able to describe a plan of action in the event of a fire or accident.</p> <p>Students need to have a good understanding of electrical terms and principles for their own safety and understanding of how the welding equipment operates.</p> <p>Discuss power with respect to:</p> <ul style="list-style-type: none"> • rating by current and duty cycle • constant voltage versus constant current.

COURSE FAB1048: SEMI-AUTOMATED/AUTOMATED WELDING (continued)

Concept	Specific Outcomes	Notes
<ul style="list-style-type: none"> • Electrode Wires • Shielding Gases • Weld Types, Positions and Joints 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe GMAW and FCAW electrode wires • identify classification systems and specifications used for GMAW and FCAW wires; i.e.: <ul style="list-style-type: none"> – Canadian Standards Association (CSA) – American Welding Society (AWS) • identify applications for the more commonly used GMAW and FCAW wires • describe the basic care, handling and storage for GMAW and FCAW wires • explain the purpose of shielding gases • identify different types of shielding gases and explain their effects • explain the advantages and disadvantages of different shielding gases in specific applications • describe the purpose and operation of a regulator/flowmeter • identify typical weld types; e.g.: <ul style="list-style-type: none"> – fillet – groove – plug or slot – stud • identify typical weld positions; e.g.: <ul style="list-style-type: none"> – flat – horizontal – vertical – overhead • list and describe the basic weld joint; e.g.: <ul style="list-style-type: none"> – butt – lap – tee – corner – edge 	<p>Discuss solid wire versus different types of rolled hollow tubing.</p> <p>Explain the difference between the way electrodes are classified in the CSA and AWS systems.</p> <p>Discuss the importance of using the correct electrode for a given application. Compare and contrast the properties/uses of:</p> <ul style="list-style-type: none"> • ER 480S-X versus ER70-X wire • ER 480S-X versus E 480IT-6 wire. <p>Discuss the effects that different shielding gases have on weld quality.</p>

