



## COURSE OUTLINE: MTF105 - GMAW WELDING 1

Prepared: Dave Holley

Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	MTF105: GAS METAL ARC WELDING 1
<b>Program Number: Name</b>	4051: METAL FABRICATION 4053: WELDING TECHNIQUES
<b>Department:</b>	IRONWKR APPR./WELDING RELATED
<b>Semesters/Terms:</b>	20F, 21W
<b>Course Description:</b>	Describe the fundamentals, construction features and consumables of the Gas Metal Arc Welding (GMAW) process in accordance with government safety regulations, manufacturers recommendations and approved industry standards.
<b>Total Credits:</b>	2
<b>Hours/Week:</b>	3
<b>Total Hours:</b>	45
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>This course is a pre-requisite for:</b>	MTF138, MTF142
<b>Vocational Learning Outcomes (VLO's) addressed in this course:</b>	<p><b>4051 - METAL FABRICATION</b></p> <p>VLO 2 Apply knowledge of various welding and metal cutting techniques and theories to produce components and sub-assemblies.</p> <p>VLO 3 Prepare materials by utilizing fabrication machinery and equipment.</p> <p>VLO 5 Understand and use a variety of destructive and non-destructive methods to test welds.</p> <p>VLO 7 Complete all work in compliance with health and safety legislation and prescribed organizational practices and procedures to ensure safety of self and others.</p> <p>VLO 8 Work responsibly and effectively in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.</p> <p><b>4053 - WELDING TECHNIQUES</b></p> <p>VLO 1 Perform work responsibly and in compliance with the Occupational Health and Safety Act.</p> <p>VLO 3 Recognize and understand use of welding symbols.</p> <p>VLO 6 Perform weld applications utilizing Shielded Metal Arc (SMAW), Flux Core (FCAW) and Gas Metal Arc (GMAW Mig Welding) welding equipment.</p> <p>VLO 7 Use welding techniques according to industry standards.</p> <p>VLO 8 Create high quality welds on various types of materials and create joints in the flat, horizontal, vertical and overhead positions.</p>

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



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	VLO 9 Identify defect in welds, demonstrate how to prevent them and define procedures for correction of defective weld quality.				
<b>Essential Employability Skills (EES) addressed in this course:</b>	<p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>				
<b>Course Evaluation:</b>	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>				
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	<p>1.Late hand in penalties will be -10% per day.</p> <p>2.If a student misses a test, he/she must have a valid reason (i.e. medical or family emergency documentation shall be required). In addition, the instructor MUST be notified PRIOR to the test sitting. If this procedure is not followed the student will receive a mark of zero on the test with no make-up option.</p> <p>3.Re-writes are NOT allowed for any written assignment, quiz or test.</p> <p>4.Course attendance is mandatory. Any student that is not present for the first 3 classes in each course, will be deemed to have not completed the required safety orientation for the course and will not be permitted to continue. One percent (1 %) per hour will be deducted from the final course grade for unexcused* absence. Any unexcused attendance beyond 15% of the total allocated course hours will result in the student receiving a failing grade for the course.</p> <p>Valid reasons would include: Doctors note Family Death or Serious Illness supported by a written note.</p> <p>Unexcused absence* will be determined in a case by case basis by the instructor of each course.</p>				
<b>Course Outcomes and Learning Objectives:</b>	<table border="1"> <thead> <tr> <th>Course Outcome 1</th> <th>Learning Objectives for Course Outcome 1</th> </tr> </thead> <tbody> <tr> <td> <p>A curriculum has been designed to: Provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of typical Gas Metal Arc welding equipment. To develop the clients welding skill to the point where he/she can pass the pre-qualified CWB plate test in the specified position</p> </td> <td> <p>1. Demonstrate by means of practical shop assignments, a sound working knowledge of both Personal and Shop Safety. Potential Elements of the Performance: - identify proper work boots, gloves and eye protection - identify recommended fabrics and materials for personal protective clothing - identify and select proper shades of welding lenses - identify, select and adjust welding helmets for proper fit and vision - locate and identify shop lighting and ventilation switches - locate and identify emergency exits - understand procedures for evacuation of shop areas in the case of emergencies</p> <p>2. Demonstrate the ability to set up and operate a typical GMAW workstation. Potential Elements of the Performance:</p> </td> </tr> </tbody> </table>	Course Outcome 1	Learning Objectives for Course Outcome 1	<p>A curriculum has been designed to: Provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of typical Gas Metal Arc welding equipment. To develop the clients welding skill to the point where he/she can pass the pre-qualified CWB plate test in the specified position</p>	<p>1. Demonstrate by means of practical shop assignments, a sound working knowledge of both Personal and Shop Safety. Potential Elements of the Performance: - identify proper work boots, gloves and eye protection - identify recommended fabrics and materials for personal protective clothing - identify and select proper shades of welding lenses - identify, select and adjust welding helmets for proper fit and vision - locate and identify shop lighting and ventilation switches - locate and identify emergency exits - understand procedures for evacuation of shop areas in the case of emergencies</p> <p>2. Demonstrate the ability to set up and operate a typical GMAW workstation. Potential Elements of the Performance:</p>
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- identify proper eye, hand and face protection
- identify proper footwear and clothing
- identify potential fire, fume and explosion hazards associated in the Gas Metal Arc
- briefly describe the differences between a constant current and a constant voltage welding machine
- explain why a constant voltage machine is used for the GMAW process
- identify electrode types, sizes according to CSA / AWS specification
- identify various shielding gases and their potential use(s)
- perform a routine inspection of assigned workstations to determine the
  - condition of wire feeder, cables, torch body, hoses and regulators
- report / correct deficiencies prior to the commencement of work
- describe procedures for setting shielding gas flow rate, voltage, wire feed speed and visible (electrode) stick-out distance
- describe techniques for arc ignition, setting gun angle and travel speeds

3. Demonstrate the ability to perform GMAW procedures as well as

Identify and Correct Weld Defects.

Potential Elements of the Performance:

- produce fillet and groove welds on both thin gauge and thick metals
- perform adjustments to voltage and wire feed speed in accordance with the demands of base metal thickness and joint design
- change / replace rolls of electrode wire
- perform in-service adjustments to wire drive rolls, contact tip and nozzle

4. Demonstrate the level of skill required to pass a pre-qualified CWB Plate Test Assembly in the specified position.

Potential Elements of the Performance:

- prepare test plate assemblies as per W47.1 specifications relating to:

- thickness, width and length dimensions
- root opening
- bevel angle
- number and location of bend test coupons
- S class vs. class qualification
- weld the test plate assemblies as per W47.1 specifications relating to:

- number and location of stop / restarts
- weld bead sequence
- dimensions of completed weld
- acceptable vs. unacceptable visual defects
- prepare bend test coupons as per W47.1 specifications

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relating to:

- minimum coupon width
- minimum coupon thickness
- shape of flame cut edges and corners
- acceptable vs. unacceptable dimensions for test defects
- understand W47.1 specifications relating to:
- period of welder qualification
- conditions of welder qualification
- qualified welding process

**Evaluation Process and Grading System:**

<b>Evaluation Type</b>	<b>Evaluation Weight</b>
Flat CWB	20%
Flat Lap	15%
Flat Tee	15%
Horizontal CWB	20%
Horizontal Lap	15%
Horizontal Tee	15%

**Date:**

June 11, 2020

**Addendum:**

Please refer to the course outline addendum on the Learning Management System for further information.

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