

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Gas Metal Arc Welding (GMAW)

CODE NO. : MTF142 **SEMESTER:** TWO

PROGRAM: Metal Fabricator Technician / Welding Techniques

AUTHOR: Courtney McLaren

DATE: Jan 2012 **PREVIOUS OUTLINE DATED:** Jan 2011

APPROVED:
“Corey Meunier”
CHAIR **DATE**

TOTAL CREDITS: THREE

PREREQUISITE(S): MTF105

HOURS/WEEK: THREE

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Technology & Skilled Trades

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I. COURSE DESCRIPTION:

A curriculum that 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.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

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

2. *Demonstrate the ability to set up and operate a typical GMAW workstation.***Potential Elements of the Performance:**

- identify proper eye, hand and face protection
- identify proper footwear and clothing
- identify potential fire, fume and explosion hazards associated with the Gas Metal Arc Welding process
- 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 in the Vertical and Over-head positions.
- 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. T – 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 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

III. TOPICS:

1. Personal and Shop Safety
2. Functions, Construction and Principle(s) of Operation of Gas Metal Arc Welding equipment
3. GMAW Operations and faults
4. Weld Testing and Quality Assurance

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Impact Resistant Safety Glasses (CSA Approved)
- High Cut (6 inch) Safety Work Boot (CSA Approved)
- Weld Gloves (CSA Approved)
- Modules: Course Pack MTF 105

V. EVALUATION PROCESS/GRADING SYSTEM:**Part 1 NOTES:**

1. Late hand in penalties will be 10% per day. Assignments will not be accepted past one week late unless there are extenuating and legitimate circumstances.
2. If a student misses a test/lab he/she must have a valid reason (i.e. medical or family emergency – documentation may be required). In addition, the instructor **MUST** be notified **PRIOR** to the test or lab sitting. If this procedure is not followed the student will receive a mark of zero on the test/lab with no make-up option.
3. Re-writes are **NOT** allowed for any written assignment, quiz or test.
4. Repeats are **NOT** allowed for any shop test
5. Course attendance is mandatory. One percent (1 %) per hour will be Deducted from the final course grade for apprentices with more than 4 hours of unexcused* absence.

[Any absence without a written, valid reason will be deemed unexcused.]

Valid reasons would include:

- Doctor's note
- Apprenticeship Ministry note
- Family Death or Serious Illness supported by a written note.

Part 2 Final Course Grades:

The final course grade will be determined by means of the following list of weighted factors:

| Factor | Value |
|------------------|------------------------|
| Shop Assignments | 65 % |
| Practical Tests | 35 % |
| Attendance | -1% per Unexcused Hour |
| Shop Clean-up | -1% per Incident |

The following semester grades will be assigned to students:

| Grade | Definition | Grade Point Equivalent |
|--------------|--|-------------------------------|
| A+ | 90 – 100% | |
| A | 80 – 89% | 4.00 |
| B | 70 - 79% | 3.00 |
| C | 60 - 69% | 2.00 |
| D | 50 – 59% | 1.00 |
| F (Fail) | 49% and below | 0.00 |
| CR (Credit) | Credit for diploma requirements has been awarded. | |
| S | Satisfactory achievement in field /clinical placement or non-graded subject area. | |
| U | Unsatisfactory achievement in field/clinical placement or non-graded subject area. | |
| X | A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. | |
| NR | Grade not reported to Registrar's office. | |
| W | Student has withdrawn from the course without academic penalty. | |

VI. SPECIAL NOTES:Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.