



8377

EXPLORATION OF WELDING
TECHNOLOGY (9)

15S/15E/15M

10S/10E/10M

A Welding Technology Course

8377 EXPLORATION OF WELDING TECHNOLOGY (9)

15S/15E/15M 10S/10E/10M

Course Description

This is an optional course intended for students wishing to explore welding technology. The emphasis is on hands-on introductory welding activities.

Goal 1: Describe and apply **health and safety** practices.

GLO 1.1: Demonstrate adherence to **safe practices** and **procedures**.

- | | |
|-------------|--|
| SLO 9.1.1.1 | Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment. |
| SLO 9.1.1.2 | Identify safety and health requirements. (A1.1) <ul style="list-style-type: none">■ overview of the <i>Workplace Safety and Health Act</i><ul style="list-style-type: none">– rights and responsibilities of employees under the <i>Act</i>– rights and responsibilities of employers under the <i>Act</i>– rights and responsibilities of supervisors under the <i>Act</i>■ fourteen (14) regulations■ codes of practice■ guidelines■ right to refuse<ul style="list-style-type: none">– explanation of right to refuse process– rights and responsibilities of employees– rights and responsibilities of employers– rights and responsibilities of supervisors under the <i>Act</i> |
| SLO 9.1.1.3 | Identify personal protective equipment (PPE) and PPE procedures. (A1.2) <ul style="list-style-type: none">■ employer and employee responsibilities as related to PPE■ standards: CSA, ANSI, and guidelines■ work protective clothing and danger if it fits poorly■ importance of selecting and using appropriate gloves to suit task (e.g., chemicals, cold/hot items, slivers, etc.) |

- standards and requirements regarding selection/use of appropriate headwear
- eye protection—comparison/contrast eyeglasses, industrial safety glasses, and safety goggles
- foot protection—when required according to safety standards
- hearing protection
 - hazards of various noise levels (hearing protection must be worn)
 - laws
 - types of hearing protection
- respiratory protection—types; selection
- fall protection—Manitoba requirements Standards Guidelines
 - ANSI (U.S.A. standards), etc.
- ladders and scaffolding
- safety principles for working with or around industrial trucks site specific (forklifts, pallet trucks, etc.)

SLO 9.1.1.4

Identify electrical safety. (A1.3)

- effects of electric current on the human body
- three factors that affect the severity of an electric shock
- the effects of electrical arcs/blasts on the human body and on equipment
- hazards/precautions regarding working with energized equipment

SLO 9.1.1.5

Identify fire safety. (A1.4)

- types of fires
- types of firefighting equipment
- classifications of fire extinguishers (A, B, and C)
- location of fire extinguishers and fire exits
- fire alarms and drills

SLO 9.1.1.6

Identify ergonomics. (A1.5)

- definition of ergonomics and conditions that may affect the body
 - working postures
 - repetition
 - force

- lifting
- special hazards and precautions regarding materials handling
- special hazards/precautions regarding lifting, carrying, and setting down a load
- tools
- identify tool and safety equipment
- causes of hand tool accidents
- equipment

SLO 9.1.1.7

Identify hazard recognition and control. (A1.6)

- safe-work practices
- basic risk assessment
- injury prevention and control measures
- identification of hazards involved in pneumatic tool use and explanation of how to guard against them

SLO 9.1.1.8

Identify safety requirements as they apply to WHMIS. (A1.9)

- WHMIS as a system
- provincial regulation under the *Safety and Health Act*
 - each province has a WHMIS regulation
- *Federal Hazardous Products Act*
- WHMIS generic training:
 - WHMIS defined and the format used to convey information about hazardous materials in the workplace
 - information found on supplier and workplace labeling using WHMIS
 - hazardous materials in accordance with WHMIS
 - compliance with government safety standards and regulations
- description of WHMIS (include varieties of WHMIS certification)
 - typology of WHMIS labels, symbols, and classifications
 - scope and use of Materials Safety Data Sheets (MSDS)

| | |
|--------------|--|
| SLO 9.1.1.9 | Describe the identification and control of specified hazards. (A1.10) <ul style="list-style-type: none"> ■ basic control measures (injury prevention) ■ safe work procedures ■ explanation on the importance of industrial housekeeping ■ employer responsibilities ■ how and where to store materials ■ safety measures related to walkways, stairs and floor openings ■ traffic–pathway protection of workers and persons |
| SLO 9.1.1.10 | Identify hazards and describe safe work practices pertaining to welding. (D1.3) <ul style="list-style-type: none"> ■ personal ■ shop/facility ■ fire and explosion ■ equipment ■ ventilation/fumes ■ storage, handling, and transportation |
| SLO 9.1.1.11 | Read, interpret, and communicate safety information (e.g., MSDS sheets, etc.). |
| SLO 9.1.1.12 | Safely store and handle compressed gas tanks. |
| SLO 9.1.1.13 | Demonstrate an awareness of hazards related to compressed gas. |
| SLO 9.1.1.14 | Demonstrate the safe use of compressed air. |
| SLO 9.1.1.15 | Demonstrate an understanding of and adherence to <i>Safe Work Procedures/Job Hazards Analysis</i> documents for each piece of equipment used. |
| SLO 9.1.1.16 | Demonstrate the safe use of a plasma arc cutter. |

GLO 1.2: Demonstrate knowledge of the ***Trade Safety Awareness Curriculum for Level 1 Apprentices.***

No applicable SLOs.

Goal 2: Demonstrate an understanding of **metallurgy**.

GLO 2.1: Demonstrate an understanding of **metallurgy** as it applies to welding.

SLO 9.2.1.1 Demonstrate an understanding of metallurgy as it applies to welding.

SLO 9.2.1.2 Select appropriate filler materials to suit base metal.

Goal 3: Demonstrate the **identification, operation, maintenance, and storage** of **equipment, materials, and consumable items**.

GLO 3.1: Demonstrate the **identification** and **operation** of equipment, materials, and consumable items.

SLO 9.3.1.1 Demonstrate the operation and handling of equipment, tools, materials, products, and consumable items.

SLO 9.3.1.2 Identify types of hand tools, and describe their applications and procedures for use. (A3.2)

SLO 9.3.1.3 Identify types of power tools, and describe their applications and procedures for use. (A3.4)

- electric
 - hydraulic
 - pneumatic
-

GLO 3.2: Demonstrate the safe and appropriate **maintenance** and **storage** of equipment, materials, and consumable items.

SLO 9.3.2.1 Practise the appropriate cleaning maintenance, and storage of welding equipment, tools, materials, products, and consumable items.

GLO 3.3: Demonstrate an awareness of **hoisting, lifting, and rigging** procedures.

No applicable SLOs.

GLO 3.4: Demonstrate an awareness of **access equipment**.

No applicable SLOs.

Goal 4: Demonstrate an understanding of **welding processes** and exhibit competence in those processes.

GLO 4.1: Demonstrate **pre-welding** procedures.

- | | |
|-------------|---|
| SLO 9.4.1.1 | Identify GMAW welding processes, and describe their characteristics and applications. |
| SLO 9.4.1.2 | Prepare material and equipment for welding. |
-

GLO 4.2: Demonstrate **ability to weld**.

- | | |
|-------------|--|
| SLO 9.4.2.1 | Perform the procedures and techniques used to deposit a weld bead using GMAW welding equipment. (D6.9) |
| SLO 9.4.2.2 | Identify hazards and describe safe work practices pertaining to oxy-fuel cutting, gouging, and welding. (C3.2) |
| SLO 9.4.2.3 | Identify oxy-fuel equipment and accessories, and describe their applications and limitations. (C3.4) <ul style="list-style-type: none">■ cutting■ gouging■ welding■ brazing/braze-welding■ heating |
| SLO 9.4.2.4 | Set up, operate, and shut down oxy-fuel equipment. (C3.13) |
-

GLO 4.3: Perform **post-welding** procedures.

- | | |
|-------------|---|
| SLO 9.4.3.1 | Perform cleaning procedures (i.e., chipping, grinding). |
|-------------|---|
-

GLO 4.4: **Inspect** and **troubleshoot** welding projects.

- | | |
|-------------|---|
| SLO 9.4.4.1 | Demonstrate an awareness of weld defects. |
|-------------|---|
-

GLO 4.5: Perform the **Manitoba Welder Practical Examinations**.

No applicable SLOs.

Goal 5: Demonstrate an understanding of **metal design and fabrication**.

GLO 5.1: **Design** metal projects.

- | | |
|-------------|--|
| SLO 9.5.1.1 | Demonstrate an awareness of design in welding. |
|-------------|--|
-

GLO 5.2: Fabricate metal projects.

- SLO 9.5.2.1 Cut material for an introductory project following broad measurements, angles, etc.
 - SLO 9.5.2.2 Perform basic material preparation and fit-up.
 - SLO 9.5.2.3 Tack material.
-

Goal 6: Describe and apply the transferable **cross-curricular** knowledge and skills.

GLO 6.1: Apply knowledge and skills from the **language arts**.

- SLO 9.6.1.1 Define terminology associated with GMAW welding. (D6.1)
 - SLO 9.6.1.2 Define terminology associated with oxy-fuel cutting, gouging, and welding. (C3.1)
-

GLO 6.2: Demonstrate the **mathematics** skills related to welding.

- SLO 9.6.2.1 Demonstrate an understanding of basic measurement skills.
-

GLO 6.3: Demonstrate knowledge of **other subject areas**.

No applicable SLOs.

Goal 7: Follow the **ethical** and **legal standards** that pertain to the welding industry.

GLO 7.1: Demonstrate an awareness of the **ethical** and **legal expectations** of welders.

No applicable SLOs.

Goal 8: Demonstrate **employability skills**.

GLO 8.1: Demonstrate **employability skills**.

- SLO 9.8.1.1 Demonstrate problem-solving skills.
- SLO 9.8.1.2 Demonstrate regular attendance and punctuality.
- SLO 9.8.1.3 Demonstrate accountability for their actions.
- SLO 9.8.1.4 Demonstrate adaptability and effort.
- SLO 9.8.1.5 Demonstrate the ability to accept and follow direction and feedback.
- SLO 9.8.1.6 Demonstrate teamwork skills.

| | |
|-------------|---|
| SLO 9.8.1.7 | Demonstrate the ability to stay on task and effectively use time. |
| SLO 9.8.1.8 | Describe effective verbal and non-verbal communication. (A1.a.1) |

Goal 9: Demonstrate an awareness of **sustainability** as it pertains to the welding industry.

GLO 9.1: Describe the impact of **human sustainability** on the health and well-being of welders.

| | |
|-------------|--|
| SLO 9.9.1.1 | Demonstrate an understanding of sustainability as it relates to human health and well-being. |
|-------------|--|

GLO 9.2: Describe the welding industry's **sustainability practices** and impact on the environment.

| | |
|-------------|---|
| SLO 9.9.2.1 | Identify the welding industry's sustainability practices and impact on the environment. |
|-------------|---|

GLO 9.3: Describe the **sustainable business practices** within the welding industry.

| | |
|-------------|--|
| SLO 9.9.3.1 | Identify industries where welding is used. |
|-------------|--|

Goal 10: Demonstrate an understanding of the **structure** and **scope** of welding.

GLO 10.1: Describe the **scope** of welding.

No applicable SLOs.

GLO 10.2: Describe **apprenticeship, post-secondary,** and **employment opportunities.**

No applicable SLOs.

Goal 11: Demonstrate an understanding of the **evolution, technological progression, and emerging trends** in welding.

GLO 11.1: Demonstrate an understanding of the **evolution, technological progression, and emerging trends** in welding.

SLO 9.11.1.1 Demonstrate an awareness of the evolution of welding, including its technological progression and emerging trends.
