



8414

METAL DESIGN/FABRICATION &
OXY-ACETYLENE PROCEDURES
(11A)

30S/30E/30M

A Welding Technology Course

8414 METAL DESIGN/FABRICATION & OXY-ACETYLENE PROCEDURES (11A) 30S/30E/30M

Course Description

This course is intended for students who are considering a career in welding. The emphasis is on the design and fabrication of intermediate metal projects, as well as on oxy-acetylene procedures.

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

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

- SLO 11A.1.1.1 Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment.
- SLO 11A.1.1.2 Identify safety and health requirements. (A1.1)
- SLO 11A.1.1.3 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 11A.1.1.4 Identify electrical safety. (A1.3)
- SLO 11A.1.1.5 Identify fire safety. (A1.4)
- SLO 11A.1.1.6 Identify ergonomics. (A1.5)
- SLO 11A.1.1.7 Identify hazard recognition and control. (A1.6)
- SLO 11A.1.1.8 Identify safety requirements as they apply to WHMIS. (A1.9)
- SLO 11A.1.1.9 Describe the identification and control of specified hazards. (A1.10)
- SLO 11A.1.1.10 Identify hazards and describe safe work practices pertaining to welding. (D1A.3)
- SLO 11A.1.1.11 Read, interpret, and communicate safety information (e.g., MSDS sheets, etc.).
- SLO 11A.1.1.12 Safely store and handle compressed gas tanks.
- SLO 11A.1.1.13 Demonstrate an awareness of hazards related to compressed gas.
- SLO 11A.1.1.14 Demonstrate the safe use of compressed air.
- SLO 11A.1.1.15 Demonstrate an understanding of and adherence to *Safe Work Procedures/Job Hazards Analysis* documents for each piece of equipment used.
- SLO 11A.1.1.16 Demonstrate the safe use of a plasma arc cutter.
- SLO 11A.1.1.17 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)

SLO 11A.1.1.18 Describe the hazards of confined space entry. (A1.7)

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 11A.2.1.1 Demonstrate an understanding of metallurgy as it applies to metal design/fabrication and oxy-acetylene welding.

SLO 11A.2.1.2 Select appropriate filler materials to suit base metal.

SLO 11A.2.1.3 Utilize distortion-prevention strategies while welding.

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 11A.3.1.1 Demonstrate the operation and handling of equipment, tools, materials, products, and consumable items.

SLO 11A.3.1.2 Adjust oxy-acetylene equipment for different processes, materials, and thicknesses.

SLO 11A.3.1.3 Troubleshoot equipment settings after welding.

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

SLO 11A.3.2.1 Follow safe procedures for cleaning and storing oxy-acetylene equipment.

SLO 11A.3.2.2 Define terminology associated with stationary machinery. (A3.a1)

SLO 11A.3.2.3 Identify hazards and describe safe work practices pertaining to stationary machinery. (A3.a2)

SLO 11A.3.2.4 Identify types of stationary machinery, and describe their characteristics and applications. (A3.a3)

SLO 11A.3.2.5 Perform the procedures used to set up and operate stationary machinery. (A3.a5)

SLO 11A.3.2.6 Perform the procedures used to inspect and maintain stationary machinery. (A3.a6)

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 11A.4.1.1 Prepare material for metal fabrication and oxy-acetylene procedures.

SLO 11A.4.1.2 Identify types of power sources for welding equipment, and describe their applications and limitations. (D1A.6)

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

SLO 11A.4.2.1 Perform the procedures used to braze/weld using oxy-fuel equipment. (C3.12)

SLO 11A.4.2.2 Sequence welds to minimize distortion, etc.

SLO 11A.4.2.3 Perform 90° cuts using oxy-acetylene.

SLO 11A.4.2.4 Perform circular cuts using oxy-acetylene.

SLO 11A.4.2.5 Perform bevelled cuts using oxy-acetylene.

SLO 11A.4.2.6 Identify welding positions and describe their applications. (D1A.9)

SLO 11A.4.2.7 Perform cuts using a plasma arc cutter.

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

SLO 11A.4.3.1 Perform cleaning procedures (i.e., chipping, grinding) on a project.

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

SLO 11A.4.4.1 Inspect and troubleshoot welding projects.

SLO 11A.4.4.2 Describe the causes of weld defects found in intermediate projects and the methods for their prevention.

GLO 4.5: Perform **cutting** and **gouging**.

No applicable SLOs.

GLO 4.6: 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 11A.5.1.1 Interpret information pertaining to welding on drawings. (D1A.2)
- SLO 11A.5.1.2 Perform a basic sketch of a proposed project.
- SLO 11A.5.1.3 Select appropriate material for project requirements.
- SLO 11A.5.1.4 Measure and lay out material.

GLO 5.2: **Fabricate** metal projects.

- SLO 11A.5.2.1 Cut material for intermediate project, following specific measurements, angles, etc.
- SLO 11A.5.2.2 Perform accurate material preparation and fit-up for intermediate project.
- SLO 11A.5.2.3 Tack material for project.

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

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

- SLO 11A.6.1.1 Define terminology associated with GMAW welding. (D6.1)

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

- SLO 11A.6.2.1 Accurately calculate and measure parts and angles for welding projects.
- SLO 11A.6.2.2 Read, interpret, and communicate welding terminology.
- SLO 11A.6.2.3 Read, interpret, and communicate information found on welding materials (e.g., filler rods, electrodes, etc.).

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

- SLO 11A.6.3.1 Demonstrate an understanding of the uses of electricity in welding (i.e., conductivity, current, voltage, amperage, polarity, AC versus DC).
- SLO 11A.6.3.2 Demonstrate an understanding of the states of matter.
- SLO 11A.6.3.3 Demonstrate an awareness of welding symbols.

- SLO 11A.6.3.4 Demonstrate an awareness of CNC technology.
- SLO 11A.6.3.5 Identify types of communication devices and describe their applications. (A1.a2)

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.

- SLO 11A.7.1.1 Demonstrate an understanding of the ethical concerns in the welding industry as they relate to safety.

Goal 8: Demonstrate **employability skills**.

GLO 8.1: Demonstrate **employability skills**.

- SLO 11A.8.1.1 Demonstrate problem-solving skills.
- SLO 11A.8.1.2 Demonstrate regular attendance and punctuality.
- SLO 11A.8.1.3 Demonstrate accountability for their actions.
- SLO 11A.8.1.4 Demonstrate adaptability and effort.
- SLO 11A.8.1.5 Demonstrate the ability to accept and follow direction and feedback.
- SLO 11A.8.1.6 Demonstrate teamwork skills.
- SLO 11A.8.1.7 Demonstrate the ability to stay on task and effectively use time.
- SLO 11A.8.1.8 Describe effective verbal and non-verbal communication. (A1.a1)
- SLO 11A.8.1.9 Demonstrate critical thinking skills.

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 11A.9.1.1 Appreciate the impact of sustainable practices on human health and well-being.
- SLO 11A.9.1.2 Demonstrate an understanding of the importance of working conditions on human sustainability.

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

- SLO 11A.9.2.1 Demonstrate an understanding of the importance of reducing waste in the welding industry.
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GLO 9.3: Describe the **sustainable business practices** within the welding industry.

SLO 11A.9.3.1 Demonstrate an awareness of the influence of welding on the local economy.

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.**

SLO 11A.10.2.1 Demonstrate an awareness of training and career opportunities in metal design and fabrication.

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 11A.11.1.1 Demonstrate an awareness of the evolution of oxy-acetylene welding.
