



8489

ADVANCED METAL DESIGN/
FABRICATION (12C)

40S/40E/40M

A Welding Technology Course

8489 ADVANCED METAL DESIGN/FABRICATION (12C) 40S/40E/40M

Course Description

This course is intended for students who are intending to pursue a career in welding. The emphasis is on the design and fabrication of advanced metal projects.

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

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

- SLO 12C.1.1.1 Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment.
- SLO 12C.1.1.2 Identify safety and health requirements. (A1.1)
- SLO 12C.1.1.3 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 12C.1.1.4 Identify electrical safety. (A1.3)
- SLO 12C.1.1.5 Identify fire safety. (A1.4)
- SLO 12C.1.1.6 Identify ergonomics. (A1.5)
- SLO 12C.1.1.7 Identify hazard recognition and control. (A1.6)
- SLO 12C.1.1.8 Describe the hazards of confined space entry. (A1.7)
- SLO 12C.1.1.9 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)
- SLO 12C.1.1.10 Identify safety requirements as they apply to WHMIS. (A1.9)
- SLO 12C.1.1.11 Describe the identification and control of specified hazards. (A1.10)
- SLO 12C.1.1.12 Read, interpret, and communicate safety information (e.g., MSDS, etc.).
- SLO 12C.1.1.13 Safely store and handle compressed gas tanks.
- SLO 12C.1.1.14 Discuss hazards related to compressed gas.
- SLO 12C.1.1.15 Demonstrate the safe use of compressed air.
- SLO 12C.1.1.16 Demonstrate an understanding of and adherence to *Safe Work Procedures Job Hazards Analysis* documents for each piece of equipment that is used.
- SLO 12C.1.1.17 Identify hazards and describe safe work practices pertaining to GMAW welding. (D6.2)

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| SLO 12C.1.1.18 | Demonstrate an understanding of the worker's responsibility to refuse unsafe work. |
| SLO 12C.1.1.19 | Identify hazards and describe safe work practices pertaining to SMAW welding. (D3.2) |
| SLO 12C.1.1.20 | Identify hazards and describe safe work practices pertaining to plasma arc cutting and gouging. (D1.b1.a2) |
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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.

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| SLO 12C.2.1.1 | Select appropriate filler materials to suit base metal. |
| SLO 12C.2.1.2 | Demonstrate an awareness of physical and mechanical properties of different types of steel. |
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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.

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| SLO 12C.3.1.1 | Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in advanced metal design/fabrication. |
| SLO 12C.3.1.2 | Identify plasma arc equipment and accessories, and describe their applications. (D1.b1.a4) |
| SLO 12C.3.1.3 | Describe the procedures used to set up, adjust, and shut down plasma arc equipment. (D1B1.a5) |
| SLO 12C.3.1.4 | Describe the procedures used to inspect and maintain plasma arc equipment. (D1B1.a6) |
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GLO 3.2: Demonstrate the safe and appropriate **maintenance** and **storage** of equipment, materials, and consumable items.

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| SLO 12C.3.2.1 | Practise the cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in advanced metal design/fabrication. |
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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 12C.4.1.1 Prepare material and equipment for advanced project.

SLO 12C.4.1.2 Identify MCAW and FCAW welding processes, and describe their characteristics and applications. (D1A.5c & d)

SLO 12C.4.1.3 Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW fillet welds on low carbon steel in all positions. (D6.a.3)

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

SLO 12C.4.2.1 Perform welds in an advanced welding project.

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

SLO 12C.4.3.1 Perform post-welding procedures for advanced projects.

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

SLO 12C.4.4.1 Inspect and troubleshoot advanced project welds.

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

SLO 12C.4.5.1 Define terminology associated with plasma arc cutting and gouging. (D1B1.a1)

SLO 12C.4.5.2 Describe the plasma arc cutting and gouging process and its applications. (D1B1.a3)

SLO 12C.4.5.3 Describe the procedures used to cut using plasma arc equipment. (D1B1.a7)

SLO 12C.4.5.4 Describe the procedures used to gouge using plasma arc equipment. (D1B1.a8)

SLO 12C.4.5.5 Perform plasma arc cutting and gouging operations. (D1B1.a9)

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 12C.5.1.1 Demonstrate awareness of pattern development.
 - SLO 12C.5.1.2 Demonstrate an awareness of geometric construction.
 - SLO 12C.5.1.3 Identify basic isometric and oblique drawings.
 - SLO 12C.5.1.4 Develop a shop drawing of a metals project.
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GLO 5.2: Fabricate metal projects.

- SLO 12C.5.2.1 Cut, prep, and tack the five basic weld joints.
 - SLO 12C.5.2.2 Fabricate advanced metal projects.
 - SLO 12C.5.2.3 Cut material for an advanced project, following specific measurements, angles, etc.
 - SLO 12C.5.2.4 Perform material preparation and fit-up for an advanced project.
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Goal 6: Describe and apply the transferable **cross-curricular** knowledge and skills.

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

No applicable SLOs.

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

No applicable SLOs.

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

- SLO 12C.6.3.1 Demonstrate an awareness of the use of information and communication technology in creating electronic portfolios and searching for employment.
- SLO 12C.6.3.2 Read, interpret, and communicate welding symbols.
- SLO 12C.6.3.3 Read and interpret blueprints and welding symbols.
- SLO 12C.6.3.4 Identify types of trades related to documentation, and describe their applications and procedures for use. (A1.a3)

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 12C.7.1.1 Demonstrate ethics by practising quality workmanship.
- SLO 12C.7.1.2 Identify codes and standards pertaining to welding. (D1A.4)

Goal 8: Demonstrate **employability skills**.

GLO 8.1: Demonstrate **employability skills**.

- SLO 12C.8.1.1 Demonstrate problem-solving skills.
- SLO 12C.8.1.2 Demonstrate critical thinking skills.
- SLO 12C.8.1.3 Demonstrate regular attendance and punctuality.
- SLO 12C.8.1.4 Demonstrate accountability for their actions.
- SLO 12C.8.1.5 Demonstrate adaptability, initiative, and effort.
- SLO 12C.8.1.6 Demonstrate the ability to accept and follow direction and feedback.
- SLO 12C.8.1.7 Demonstrate teamwork skills.
- SLO 12C.8.1.8 Demonstrate the ability to stay on task and effectively use time in class and shop environments.
- SLO 12C.8.1.9 Demonstrate the ability to communicate respectfully and effectively with teachers and students.

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.

No applicable SLOs.

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

- SLO 12C.9.2.1 Demonstrate an awareness of the impact of welding work sites on the environment.

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

No applicable SLOs.

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

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

SLO 12C.10.1.1 Demonstrate an awareness of the scope of metal design and fabrication.

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

SLO 12C.10.2.1 Demonstrate an awareness of employment opportunities in metal design/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 12C.11.1.1 Demonstrate an awareness of technological progression and emerging trends in metal design and fabrication.
