



8841

EXPLORATION OF MACHINING
TECHNOLOGY (9)

15S/15E/15M

10S/10E/10M

A Machining Technology Course

8841: EXPLORATION OF MACHINING TECHNOLOGY (9)

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

Course Description

This is an optional course intended for students who wish to sample machining technology. Students develop skills and knowledge necessary to perform basic calculations, basic machine and work set-up, and basic cutting of material in a safe, efficient, and responsible manner through the application of practical projects. An appreciation for the machining program is fostered through a safe, active, exciting, and informative learning environment.

Goal 1: Describe and apply appropriate **health and safety** practices as they relate to the **maintenance of a safe workplace.**

GLO 1.1: Create and maintain a **safe working environment** in machining technology.

- SLO 9.1.1.1 Identify safety and health requirements. (A1.1)
- SLO 9.1.1.2 Identify personal protective equipment (PPE) and PPE procedures. (A1.2)
- SLO 9.1.1.3 Identify appropriate safety procedures for working with electricity. (A1.3)
- SLO 9.1.1.4 Identify appropriate safety procedures to reduce fire hazards. (A1.4)
- SLO 9.1.1.5 Identify ergonomically correct procedures to avoid injury (e.g., stress, strain). (A1.5)
- SLO 9.1.1.6 Identify hazard recognition and control. (A1.6)
- SLO 9.1.1.7 Describe the hazards of confined-space entry. (A1.7)
- SLO 9.1.1.8 Identify first aid/cardiopulmonary resuscitation (CPR). (A1.8)
- SLO 9.1.1.9 Identify safety requirements as they apply to the WHMIS. (A1.9)
- SLO 9.1.1.10 Describe the identification and control of specified hazards. (A1.10)
- SLO 9.1.1.11 Identify types of personal protective equipment (PPE), and describe their applications. (A2.1)
- SLO 9.1.1.12 Describe the procedures used to care for and maintain PPE. (A2.2)
- SLO 9.1.1.13 Identify types of fire extinguishing equipment, and describe their applications and procedures for use. (A2.3)

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| SLO 9.1.1.14 | Identify workplace hazards, and describe safe work practices and equipment. (A2.4) |
| SLO 9.1.1.15 | Identify and interpret workplace safety and health regulations. (A2.4) |
| SLO 9.1.1.16 | Identify hazards, and describe safe work practices pertaining to fluids and coolants. (A8.2) |
| SLO 9.1.1.17 | Identify hazards, and describe safe work practices pertaining to hand and power tools. (B1.1) |
| SLO 9.1.1.18 | Demonstrate understanding and adherence to safe work procedures/job hazards analysis documents for each piece of equipment, tool, and consumable that they use. |
| SLO 9.1.1.19 | Demonstrate understanding and adherence to safe practices and procedures for facilities, processes, tools, and equipment found in machining technology. |
| SLO 9.1.1.20 | Discuss worker's responsibility to refuse unsafe work. |
| SLO 9.1.1.21 | Demonstrate use of personal protective equipment (PPE) and adherence to PPE procedures used in machining technology. |
| SLO 9.1.1.22 | Demonstrate the safe use of compressed air. |
| SLO 9.1.1.23 | Practise appropriate cleaning and maintenance of the machining technology area and equipment for the promotion of a safe work/learning environment. |
| SLO 9.1.1.24 | Practise appropriate safe behaviour to ensure personal safety, as well as the safety of others. |
| SLO 9.1.1.25 | Demonstrate an understanding of the machinist's responsibility to maintain and clean equipment and tools. |
| SLO 9.1.1.26 | Develop appropriate safety habits. |
| SLO 9.1.1.27 | Demonstrate a safe, clean, organized, and uncluttered work area. |
| SLO 9.1.1.28 | Explain the purpose/importance and use of accident report forms. |
| SLO 9.1.1.29 | Identify hazards, and describe safe work practices pertaining to being present in a machine shop. |
| SLO 9.1.1.30 | Identify machine-shop-related safety concerns. |
| SLO 9.1.1.31 | Practise safe set-up/operation of tools used. |

GLO 1.2: Demonstrate knowledge of the **Trade Safety Awareness Manual.**

(www.gov.mb.ca/tce/apprent/apprentice/trade_safety/)

No applicable SLOs.

Goal 2: Understand **terminology, abbreviations, symbols, and acronyms** related to machining technology.

GLO 2.1: Understand **terminology, abbreviations, symbols, and acronyms** related to machining technology.

- SLO 9.2.1.1 Define *machinist*.
- SLO 9.2.1.2 Define *safety* as it pertains to machining.
- SLO 9.2.1.3 Define *RPM* as it pertains to machining.
- SLO 9.2.1.4 Define *workmanship* as it pertains to machining.

Goal 3: Understand **technical drawings**.

GLO 3.1: Understand **technical drawings**.

- SLO 9.3.1.1 Produce basic paper-and-pencil sketch of project.
- SLO 9.3.1.2 Interpret and extract information from drawings. (A6.3)
- SLO 9.3.1.3 Identify basic line types found on drawings.
- SLO 9.3.1.4 Identify parts of the title block.

Goal 4: Demonstrate **layout and planning**.

GLO 4.1: Demonstrate **planning and layout procedures**.

- SLO 9.4.1.1 Calculate layout dimensions and reference points. (C3.4)
- SLO 9.4.1.2 Identify basic layout tools that are used in a machine shop.
- SLO 9.4.1.3 Use planning worksheets for projects.
- SLO 9.4.1.4 Identify and use tools required to perform basic layout.
- SLO 9.4.1.5 Perform basic layout. (C3.9)
- SLO 9.4.1.6 Use layout dye.

Goal 5: Use **measurement and quality control tools**.

GLO 5.1: Use **measurement and quality control tools**.

- SLO 9.5.1.1 Define *measurement*.
- SLO 9.5.1.2 Interpret rulers up to 1/32 of an inch.
- SLO 9.5.1.3 Interpret micrometers to three decimal places.
- SLO 9.5.1.4 Measure with fractional ruler.

Goal 6: Identify basic elements of metallurgy.**GLO 6.1: Identify basic elements of metallurgy.**

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| SLO 9.6.1.1 | Identify basic metallurgy. |
| SLO 9.6.1.2 | Define metallurgy. |
| SLO 9.6.1.3 | Identify requirements of various metal products. |
| SLO 9.6.1.4 | Compare aluminum and carbon steel. |

Goal 7: Understand tools, equipment, and accessories.**GLO 7.1: Identify tools, equipment, accessories, and work-holding devices.**

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| SLO 9.7.1.1 | Identify basic hand tools. |
| SLO 9.7.1.2 | Identify standard machine tools. |
| SLO 9.7.1.3 | Identify common hand tools. |
| SLO 9.7.1.4 | Identify common measuring tools. |
| SLO 9.7.1.5 | Identify common work-holding devices. |

GLO 7.2: Use tools, equipment, accessories, and work-holding devices.

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| SLO 9.7.2.1 | Describe the procedures used to inspect, maintain, and store hand tools. (B1.3) |
| SLO 9.7.2.2 | Perform the procedures used to inspect, maintain, and store hand tools. (B1.4) |
| SLO 9.7.2.3 | Describe the procedures used to inspect, maintain, and store power tools and equipment. (B1.6) |
| SLO 9.7.2.4 | Perform procedures used to inspect, maintain, and store power tools and equipment. (B1.7) |
| SLO 9.7.2.5 | Describe the procedures used to produce threads using taps and dies. (A4.10) |
| SLO 9.7.2.6 | Perform procedures used to cut or tap a thread. (A4.11) |
| SLO 9.7.2.7 | Use files. |
| SLO 9.7.2.8 | Use hacksaw. |
| SLO 9.7.2.9 | Use bench vise. |
| SLO 9.7.2.10 | Use punch and ball peen hammer. |
| SLO 9.7.2.11 | Use chisels. |
| SLO 9.7.2.12 | Use screwdrivers. |
| SLO 9.7.2.13 | Use wrenches. |

- SLO 9.7.2.14 Develop an understanding of hand tools in machining technology.
- SLO 9.7.2.15 Identify techniques used to troubleshoot tools.
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GLO 7.3: Identify techniques used to **troubleshoot** and **predict potential problems**.

- SLO 9.7.3.1 Develop an understanding of hand tools in machining technology.
- SLO 9.7.3.2 Identify techniques used to troubleshoot tools.
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Goal 8: Describe and demonstrate the transferable **cross-curricular** knowledge and skills as they pertain to machining technology.

GLO 8.1: Apply **mathematical knowledge and skills** related to machining technology.

- SLO 9.8.1.1 Solve problems involving fractions and decimals.
- SLO 9.8.1.2 Solve problems involving metric and imperial measure.
- SLO 9.8.1.3 Solve problems involving length, perimeter, circumference, volume, area, mass, angles, ratio, and percentage.
- SLO 9.8.1.4 Convert between imperial and metric measurements.
- SLO 9.8.1.5 Use formulas to accurately calculate data for use in machining operations.
- SLO 9.8.1.6 Accurately calculate and measure parts and angles.
- SLO 9.8.1.7 Perform mathematical calculations, conversions, and measurements, as required for the project.
- SLO 9.8.1.8 Perform basic arithmetic with ruler fractions.
- SLO 9.8.1.9 Perform basic arithmetic with decimal measurements.
- SLO 9.8.1.10 Identify the importance of mathematics in machining.
- SLO 9.8.1.11 Identify math formulas.
- SLO 9.8.1.12 Identify charts used to obtain data for machining operations.
- SLO 9.8.1.13 Identify reference books used to obtain data for machining operations.

Goal 9: Demonstrate an awareness of **education and career opportunities** in machining technology and associated occupations.

GLO 9.1: Describe **education and career opportunities** in machining technology

SLO 9.9.1.1 Describe the structure and scope of the trade. (A3.1)

SLO 9.9.1.2 Discuss future courses in machining technology.

Goal 10: Describe the **history, technological progression, and emerging trends** in machining technology.

GLO 10.1: Describe the **history, technological progression, and emerging trends** in machining technology.

SLO 9.10.1.1 Explore the history of machine tools.

Goal 11: Demonstrate **employability skills** related to machining technology.

GLO 11.1: Demonstrate **employability skills** related to machining technology.

SLO 9.11.1.1 Demonstrate regular attendance and punctuality.

SLO 9.11.1.2 Demonstrate accountability by taking responsibility for their actions.

SLO 9.11.1.3 Demonstrate adaptability and effort.

SLO 9.11.1.4 Demonstrate the ability to accept and follow directions and listen to feedback.

SLO 9.11.1.5 Demonstrate the ability to stay on task and make effective use of time in class and shop environments.

SLO 9.11.1.6 Demonstrate the ability to communicate respectfully and effectively.

SLO 9.11.1.7 Demonstrate being responsible to oneself and to the facility.

SLO 9.11.1.8 Demonstrate behaviour appropriate to the workplace.

SLO 9.11.1.9 Demonstrate neat personal appearance and proper hygiene.

SLO 9.11.1.10 Prepare/revise a personal resumé specific to an application to an employer of machinists.

Goal 12: Demonstrate awareness of the **ethical and legal standards** as they pertain to machining technology.

GLO 12.1: Demonstrate awareness of the **ethical and legal standards** as they pertain to machining technology.

No applicable SLOs.

Goal 13: Demonstrate awareness of **sustainability** as it pertains to machining technology.

GLO 13.1: Demonstrate awareness of **human sustainability** on machinists.

SLO 9.13.1.1 Identify human sustainability.

GLO 13.2: Describe machining technology's sustainability practices and impact on the environment.

SLO 9.13.2.1 Identify environmental sustainability.

SLO 9.13.2.2 Discuss the impact of environmental sustainability.

GLO 13.3: Demonstrate awareness of the **business sustainability** of a machining technology facility.

SLO 9.13.3.1 Identify business sustainability.