



9146

MINING ENGINEERING
TECHNOLOGY (10)

20S/20E/20M

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Course Description

This course is a broad, introductory overview of mining, the mining industry, and mining engineering technology. Students are introduced to

- mine safety
- the origins of the universe, solar system, and planet earth
- the structure of planet earth
- formation and classification of rocks
- surveying
- exploration
- mine development and production
- mining industry's sustainability practices
- human sustainability for workers in the mining industry
- sustainable business practices
- ethical and legal standards
- mine engineering as a profession
- mining as an industry

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

GLO 1.1: Describe and apply appropriate **health and safety** practices.

- SLO 10.1.1.1 Demonstrate an understanding of hazards in the mining industry.
 - SLO 10.1.1.2 Discuss and demonstrate safe work practices.
 - SLO 10.1.1.3 Demonstrate an understanding of air quality hazards.
 - SLO 10.1.1.4 Discuss and demonstrate safe work practices related to air quality.
 - SLO 10.1.1.5 Create and maintain a safe and organized work environment.
 - SLO 10.1.1.6 Discuss procedures for reporting hazards.
 - SLO 10.1.1.7 Demonstrate knowledge of first aid/CPR.
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GLO 1.2: Demonstrate an awareness of safety as it pertains to the **Trade Safety Awareness Manual.**

- SLO 10.1.2.1 Explain the importance of trade safety and health in reducing injuries and fatalities to young employees in Manitoba. (TSA 1)
- SLO 10.1.2.2 Describe the rights and responsibilities of employees, employers, and supervisors under the *Workplace Safety and Health Act*. (TSA 2)
- SLO 10.1.2.3 Describe the steps to use in the Right to Refuse process. (TSA 3)
- SLO 10.1.2.4 Explain how and where to find information on workplace safety and health. (TSA 4)
- SLO 10.1.2.5 Demonstrate how to handle a potentially dangerous work situation. (TSA 5)
- SLO 10.1.2.6 Explain the S.A.F.E. acronym. (TSA 6)
- SLO 10.1.2.7 Define workplace safety and health hazards. (TSA 7)
- SLO 10.1.2.8 Give examples of trade-specific workplace safety and health hazards. (TSA 8)
- SLO 10.1.2.9 Give examples of five types of safety and health hazards. (TSA 9)
- SLO 10.1.2.10 Define workplace safety and health risk. (TSA 10)
- SLO 10.1.2.11 Give examples of trade-specific workplace safety and health risks. (TSA 11)
- SLO 10.1.2.12 Explain the principles of hazard recognition and control as they apply to the specific trade. (TSA 12)
- SLO 10.1.2.13 Explain the Workplace Hazardous Material Information System (WHMIS). (TSA 13)
- SLO 10.1.2.14 Match the WHMIS hazardous materials symbols and their meanings. (TSA 14)
- SLO 10.1.2.15 Describe the importance of the Material Safety Data Sheets (MSDS). (TSA 15)
- SLO 10.1.2.16 Describe the importance of using personal protective equipment (PPE). (TSA 16)
- SLO 10.1.2.17 Demonstrate proper selection and use of a variety of PPE and fall protection systems. (TSA 17)
- SLO 10.1.2.18 Outline the safety principles for working on and around electrical equipment. (TSA 18)
- SLO 10.1.2.19 Outline workplace fire safety principles. (TSA 19)
- SLO 10.1.2.20 Identify the hazards in confined spaces and the preparation needed to work in a confined space. (TSA 20)

Goal 2: Demonstrate the identification, selection, use, and maintenance of **tools, equipment, materials, and consumables.**

GLO 2.1: Demonstrate the identification, selection, use, and maintenance of **tools, equipment, materials, and consumables.**

SLO 10.2.1.1 Demonstrate the identification, selection, use, and maintenance of tools, equipment, materials, and consumables.

Goal 3: Demonstrate an understanding of the theories related to the **origins of the universe, solar system, and planet earth.**

GLO 3.1: Demonstrate an understanding of the theories related to the origins of planet earth, particularly with respect to geology.

SLO 10.3.1.1 Demonstrate an awareness of the theories related to the origins of the universe, solar system, and planet earth.

Goal 4: Demonstrate the ability to provide basic descriptions of the **layered structure of planet earth, the dynamic processes that affect it, and the evidence** that supports our current understanding.

GLO 4.1: Demonstrate the ability to provide basic descriptions of the **layered structure of the earth, the dynamic processes that affect it, and the evidence** that supports our current understanding.

SLO 10.4.1.1 Illustrate by use of a diagram an understanding of the structure of planet earth.

Goal 5: Identify the environment that allows for the formation of **minerals** that are important to the mining sector, as well as the basic characteristics of those minerals.

GLO 5.1: Demonstrate a basic understanding of the formation of **minerals**, and the ability to identify common minerals and their characteristics.

No applicable SLOs.

Goal 6: Demonstrate an understanding of the formation of **rocks** and how their formation is related to their characteristics and identification.

GLO 6.1: Demonstrate an understanding of the environment that allows for the formation of common **rocks**, and relate their characteristics to their identification.

SLO 10.6.1.1 Describe in basic terms the formation of igneous, metamorphic, and sedimentary rocks.

SLO 10.6.1.2 Identify some igneous, metamorphic, and sedimentary rocks.

Goal 7: Use various **surveying** techniques to describe and map potential ore bodies in a field setting.

GLO 7.1: Use various **surveying** techniques in land surveying.

SLO 10.7.1.1 Demonstrate understanding of surveying.

SLO 10.7.1.2 Discuss the role of surveying in mining engineering technology.

SLO 10.7.1.3 Measure, using the Pythagorean theorem, a large right-angle shape.

SLO 10.7.1.4 Use a grid system to produce a contour plan of a given area.

GLO 7.2: Use various surveying techniques in **hydrographic surveying**.

No applicable SLOs.

GLO 7.3: Use various surveying techniques in **mine surveying**.

No applicable SLOs.

Goal 8: Demonstrate an understanding of **exploration, development, and production** of mineral resources from a position of environmental stewardship and sustainability.

GLO 8.1: Demonstrate an understanding of common **exploration** techniques, with attention to the principles of **sustainable practices**.

SLO 10.8.1.1 Describe the exploration process with particular emphasis on impacts in sensitive natural areas.

SLO 10.8.1.2 Explain the importance and demonstrate the use of geological maps in the exploration for economic minerals.

SLO 10.8.1.3 Demonstrate the ability to stake a mining claim.

- SLO 10.8.1.4 Describe the methods and purposes for sampling an ore body.
- SLO 10.8.1.5 Calculate the assay value of cores and sludges, as well as the tonnage in an ore-body sampled by drill holes, and estimate total deposit value.
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GLO 8.2: Demonstrate an understanding of mine **development** with an emphasis on **environmental responsibility**.

- SLO 10.8.2.1 Describe the various surface and underground mining methods.
- SLO 10.8.2.2 Demonstrate an understanding of a mine layout.
- SLO 10.8.2.3 Describe methods of mine development.
- SLO 10.8.2.4 Describe major mining systems and the engineering implications for each.
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GLO 8.3: Demonstrate an understanding of **mine production** and its place within the overall **life cycle** of a mine operation.

- SLO 10.8.3.1 Describe current methods of mine production, and assess their level of environmental responsibility (include a particular emphasis on reclamation planning).
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Goal 9: Demonstrate an understanding of the processes used in **accessing, recovering, transporting, and processing ore**.

GLO 9.1: Demonstrate an understanding of the processes used in **accessing, recovering, transporting, and processing ore**.

No applicable SLOs.

Goal 10: Describe and demonstrate the transferable **cross-curricular** knowledge and skills relevant to mining engineering technology.

GLO 10.1: Read, interpret, and communicate information relevant to mining engineering technology.

- SLO 10.10.1.1 Read, interpret, and communicate information.
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GLO 10.2: Apply the knowledge and skills from **mathematics** relevant to mining engineering technology.

- SLO 10.10.2.1 Demonstrate proficiency in the **mathematics** required in mining engineering technology.
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GLO 10.3: Apply the knowledge and skills from **the sciences** relevant to mining engineering technology.

No applicable SLOs.

GLO 10.4: Apply the knowledge and skills from **information and communication technology** (ICT) relevant to mining engineering technology.

SLO 10.10.4.1 Demonstrate an awareness of the use of ICT in mining engineering technology.

Goal 11: Demonstrate an awareness of **sustainability principles** as they influence mining engineering technology.

GLO 11.1: Describe the mining industry's **sustainability practices** and impact on the environment.

SLO 10.11.1.1 Discuss the mining industry's sustainability practices and impact on the environment (with particular emphasis on reclamation planning).

GLO 11.2: Describe the impact of **human well-being as a sustainability priority** among those employed in the mining sector and the individuals and communities affected by mining practices.

SLO 10.11.2.1 Describe human well-being from the position of sustainability practices.

SLO 10.11.2.2 Describe ergonomically appropriate procedures to avoid injury.

SLO 10.11.2.3 Discuss risk factors for hearing loss.

SLO 10.11.2.4 Discuss procedures to minimize hearing loss.

GLO 11.3: Describe **sustainable business practices** within the mining industry.

SLO 10.11.3.1 Define, using examples or a case study, and discuss the concept of sustainable business practices.

Goal 12: Demonstrate an awareness of the **ethical and legal standards** as they pertain to the mining industry.

GLO 12.1: Demonstrate an awareness of the **ethical and legal standards** that pertain to the mining industry.

SLO 10.12.1.1 Explain the filing of exploration programs for staking mineral rights.

SLO 10.12.1.2 Describe the details of regulations that govern mines and mining.

Goal 13: Demonstrate fundamental **employability skills**.

GLO 13.1: Demonstrate **fundamental employability skills**.

- SLO 10.13.1.1 Demonstrate regular and punctual attendance.
 - SLO 10.13.1.2 Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.
 - SLO 10.13.1.3 Demonstrate accountability by taking responsibility for their actions.
 - SLO 10.13.1.4 Demonstrate adaptability, initiative, and effort.
 - SLO 10.13.1.5 Demonstrate teamwork skills.
 - SLO 10.13.1.6 Demonstrate the ability to stay on task and effectively use time in class and work environments.
 - SLO 10.13.1.7 Demonstrate the responsible use of wireless communication devices.
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GLO 13.2: Demonstrate an awareness of **cultural proficiency** and its importance in the workplace.

No applicable SLOs.

GLO 13.3: Demonstrate an understanding of the **business operation** of a mine complex.

- SLO 10.13.3.1 Discuss the requirements for mining complexes to generate profits in order to continue operating.
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GLO 13.4: Demonstrate **critical thinking skills**.

- SLO 10.13.4.1 Discuss the need for critical thinking.
 - SLO 10.13.4.2 Discuss the need for problem-solving skills.
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Goal 14: Demonstrate an understanding of the **mining industry**.

GLO 14.1: Demonstrate an understanding of the scope of the mining industry as it functions in Canada today in an international context.

- SLO 10.14.1.1 Demonstrate an understanding of the scope of mining engineering technology.
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GLO 14.2: Demonstrate an understanding of the **educational and career opportunities**, as well as **industry, professional, and trade associations**, related to mining engineering technology.

SLO 10.14.2.1 Demonstrate an understanding of the scope of careers in the mining industry.

GLO 14.3: Demonstrate an understanding of **working conditions** in mining.

SLO 10.14.3.1 Describe working conditions related to different occupations in the mining industry.

Goal 15: Demonstrate an awareness of the **evolution, technological progression, and emerging trends** in mining.

GLO 15.1: Describe the **history, technological progression, and emerging trends** in mining.

SLO 10.15.1.1 Describe the historical development of mining.