



9149

SURVEYING FOR MINING
ENGINEERING (11B)

30S/30E/30M

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Course Description

This course focuses on surveying as it pertains to mining. Curriculum content focuses on introducing students to the principles of accuracy and precision in measuring distance and levelling. The course provides students with exposure and hands-on experience with operating surveying tools. Basic math skills (specifically trigonometry) are required. Topics include the following:

- identification, selection, use, and maintenance of tools and equipment
- using basic surveying instruments including surveying tape, Brunton compass, transit, and total station
- measurement units and the importance of precision
- various types of surveys and plotting plans based on data collected
- mapping ore bodies
- the use of ICT as it relates to surveying

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

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

- SLO 11B.1.1.1 Demonstrate an understanding of hazards in the mining industry.
- SLO 11B.1.1.2 Discuss and demonstrate safe work practices.
- SLO 11B.1.1.3 Demonstrate an understanding of air quality hazards.
- SLO 11B.1.1.4 Discuss and demonstrate safe work practices related to air quality.
- SLO 11B.1.1.5 Create and maintain a safe and organized work environment.
- SLO 11B.1.1.6 Discuss procedures for reporting hazards.
- SLO 11B.1.1.7 Discuss and demonstrate health and safety practices related to surveying.

GLO 1.2: Demonstrate an awareness of safety as it pertains to the **Trade Safety Awareness Manual**.

No applicable SLOs.

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 11B.2.1.1 Demonstrate the identification, selection, use, and maintenance of surveying instruments.
- SLO 11B.2.1.2 Demonstrate the correct operation of levelling equipment.
- SLO 11B.2.1.3 Demonstrate the correct operation of a compass with respect to topographic mapping.
- SLO 11B.2.1.4 Complete a closed loop traverse using a Brunton compass.
- SLO 11B.2.1.5 Demonstrate knowledge of and the correct operation of an engineer's transit.

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.

No applicable SLOs.

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.

No applicable SLOs.

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.

No applicable SLOs.

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 11B.71.1 Describe the relationship between drafting and surveying.
 - SLO 11B.71.2 Demonstrate an understanding of field procedures to determine and establish distance.
 - SLO 11B.71.3 Perform simple surveying operations using the tape alone.
 - SLO 11B.71.4 Demonstrate methods to avoid obstructions when chaining, using random lines, offsets, and triangles.
 - SLO 11B.71.5 Conduct and illustrate a pole and chain, and offset surveys.
 - SLO 11B.71.6 Conduct and illustrate a closed differential levelling survey.
 - SLO 11B.71.7 Recognize the errors in levelling and how to manage them.
 - SLO 11B.71.8 Conduct a differential levelling survey in a tunnel.
 - SLO 11B.71.9 Use a grid system to produce a contour plan of a given area.
 - SLO 11B.71.10 Stake out a required contour line.
 - SLO 11B.71.11 Demonstrate knowledge of the principles and purposes of compass surveying.
 - SLO 11B.71.12 Demonstrate the procedures for computing survey traverse networks.
 - SLO 11B.71.13 Compute the bearings of survey traverse lines from angular observations.
 - SLO 11B.71.14 Compute the angle to set off a known baseline to establish a required bearing.
 - SLO 11B.71.15 Compute an open traverse direct from field notes.
 - SLO 11B.71.16 Conduct a closed loop traverse.
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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**.

No applicable SLOs.

GLO 8.2: Demonstrate an understanding of mine **development** with an emphasis on **environmental responsibility**.

No applicable SLOs.

GLO 8.3: Demonstrate an understanding of **mine production** and its place within the overall **life cycle** of a mine operation.

No applicable SLOs.

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 11B.10.1.1 Read, interpret, and communicate information found on drafting instruments.

GLO 10.2: Apply the knowledge and skills from **mathematics** relevant to mining engineering technology.

SLO 11B.10.2.1 Demonstrate an understanding of measurement units and the importance of precision in surveying.

SLO 11B.10.2.2 Demonstrate an understanding of the mathematics required in surveying.

SLO 11B.10.2.3 Demonstrate proficiency in trigonometric functions.

GLO 10.3: Apply the knowledge and skills from **the sciences** relevant to mining engineering technology.

SLO 11B.10.3.1 Demonstrate an understanding of expansion and contraction of materials when subjected to temperature change.

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

SLO 11B.10.4.1 Demonstrate the use of ICT to conduct surveys and plot plans.

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.

No applicable SLOs.

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 11B.11.2.1 Discuss long-term health hazards related to field surveying.

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

SLO 11B.11.3.1 Discuss, using a case study, the economic and social effects of mine closure on a community.

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 11B.12.1.1 Discuss the ethical requirements related to surveying.

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

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

SLO 11B.13.1.1 Demonstrate regular and punctual attendance.

SLO 11B.13.1.2 Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 11B.13.1.3 Demonstrate accountability by taking responsibility for their actions.

SLO 11B.13.1.4 Demonstrate adaptability, initiative, and effort.

SLO 11B.13.1.5 Demonstrate teamwork skills.

SLO 11B.13.1.6 Demonstrate the ability to stay on task and effectively use time in class and work environments.

SLO 11B.13.1.7 Demonstrate the responsible use of wireless communication devices.

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 11B.13.3.1 Discuss the requirements for businesses to function efficiently in order to continue operating.

GLO 13.4: Demonstrate **critical thinking skills**.

SLO 11B.13.4.1 Discuss the need for critical thinking skills required to conduct surveys and plot plans.

SLO 11B.13.4.2 Discuss strategies that can be used to solve problems encountered while conducting surveys and plotting plans.

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.

No applicable SLOs.

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 11B.14.2.1 Discuss the level of physical fitness required by field surveyors.

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

SLO 11B.14.3.1 Describe working conditions related to surveying.

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 11B.15.1.1 Describe the history, technological progression, and emerging trends in mining engineering technology surveying.

