



9154

ADVANCED SURVEYING FOR
MINING ENGINEERING
(12C)

40S/40E/40M

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Course Description

Students will expand the knowledge and skills acquired in 9149 Surveying for Mining Engineering. It provides students with exposure and hands-on operation of an engineer's transit and total surveying station. The curriculum focuses on field studies of land, highway, hydrographic, and mine surveying. Topics include the following:

- building, property, and site layout
- route surveying
- role of mine surveying in the mining process
- theory related to the operation of EDM (electronic surveying) equipment
- performing and plotting surveys both on land and underground
- use of the geographic information and global positioning systems
- interpretation of topographic information from aerial photos
- preparing cross-section maps from topographical maps and constructing topographical maps from field data

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

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

- SLO 12C.1.1.1 Demonstrate an understanding of hazards found in the mining industry.
- SLO 12C.1.1.2 Discuss and demonstrate safe work practices.
- SLO 12C.1.1.3 Demonstrate an understanding of air quality hazards.
- SLO 12C.1.1.4 Discuss and demonstrate safe work practices related to air quality.
- SLO 12C.1.1.5 Create and maintain a safe and organized work environment.
- SLO 12C.1.1.6 Discuss procedures for reporting hazards.

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 12C.2.1.1 Demonstrate the identification, selection, use, and maintenance of tools, equipment, materials, and consumables.

SLO 12C.2.1.2 Demonstrate an understanding of the theory of operation of EDM equipment.

SLO 12C.2.1.3 Perform assigned field surveys using a GPS system.

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 12C.7.1.1 Demonstrate an understanding of land surveying.

SLO 12C.7.1.2 Complete a property description.

SLO 12C.7.1.3 Perform building and site layout.

SLO 12C.7.1.4 Demonstrate an understanding of route surveying.

SLO 12C.7.1.5 Demonstrate the ability to lay out a curve by deflection angles.

SLO 12C.7.1.6 Prepare a route cross-section.

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

SLO 12C.7.2.1 Demonstrate an understanding of hydrographic surveys and their function.

SLO 12C.7.2.2 Demonstrate an understanding of flood stages and the resulting stream changes.

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

SLO 12C.7.3.1 Demonstrate an understanding of the role of mine surveying.

SLO 12C.7.3.2 Explain mine surveying operations.

SLO 12C.7.3.3 Demonstrate an understanding of how to establish control points and benchmarks.

SLO 12C.7.3.4 Draw and update plans from toping operations.

SLO 12C.7.3.5 Perform and plot a closed loop survey using electronic methods.

SLO 12C.7.3.6 Perform and plot a closed loop survey involving triangulation.

SLO 12C.7.3.7 Perform and plot an open survey in a trilateration system.

SLO 12C.7.3.8 Locate points by intersection and resection.

- SLO 12C.7.3.9 Perform a re-survey to establish existing points.
- SLO 12C.7.3.10 Demonstrate an understanding of the function of Geographic Information Systems (GIS).
- SLO 12C.7.3.11 Demonstrate an understanding of the role of the Global Positioning System (GPS) in current surveying techniques.
- SLO 12C.7.3.12 Demonstrate an understanding of the acquisition, processing, and use of aerial photographs.
- SLO 12C.7.3.13 Demonstrate the ability to interpret topographic information from aerial photos using stereoscopy.
- SLO 12C.7.3.14 Demonstrate an understanding of the function of topographic mapping.
- SLO 12C.7.3.15 Prepare cross-section maps from topographical maps.
- SLO 12C.7.3.16 Construct a topographical map from field data.

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 12C.10.1.1 Read, interpret, and communicate information relevant to mining engineering technology.

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

SLO 12C.10.2.1 Perform volume calculations in secured and unsecured areas.

SLO 12C.10.2.2 Calculate areas of cross-sections and volumes of earthwork.

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.

No applicable SLOs.

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.

No applicable SLOs.

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

No applicable SLOs.

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.

No applicable SLOs.

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

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

SLO 12C.13.1.1 Demonstrate regular and punctual attendance.

SLO 12C.13.1.2 Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 12C.13.1.3 Demonstrate accountability by taking responsibility for their actions.

SLO 12C.13.1.4 Demonstrate adaptability, initiative, and effort.

SLO 12C.13.1.5 Demonstrate teamwork skills.

SLO 12C.13.1.6 Demonstrate the ability to stay on task and effectively use time in class and work environments.

SLO 12C.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.

SLO 12C.13.2.1 Discuss different ways of knowing found within cultures, including the view that rocks can be animate.

SLO 12C.13.2.2 Discuss how people's culture affects their values and behaviour.

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

No applicable SLOs.

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

SLO 12C.13.4.1 Discuss the need for critical thinking.

SLO 12C.13.4.2 Discuss the need for problem-solving skills.

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 12C.14.1.1 Demonstrate an understanding of the mining industry as it pertains to surveying.

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 12C.14.2.1 Describe surveying as a profession.

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

SLO 12C.14.3.1 Demonstrate an understanding of the physical demands involved in 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 12C.15.1.1 Describe the history, technological progression, and emerging trends in surveying in mining contexts.

