



9155
APPLIED MINING
ENGINEERING (12D)

40S/40E/40M

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Course Description

This course provides students with the opportunity to synthesize and apply all of the knowledge, skills, and values they have learned in previous courses. The curriculum introduces detailed processes in mining, including development of mineshafts, ore extraction and hauling, ore processing, and future trends in mining. Students will learn the basic concepts of structures and loads and how they apply to the physical aspects of the mining process. Environmental impact is an important aspect of this course as are ethical practices as they relate to the environment and First Nations concerns. Topics include the following:

- civil engineering as a profession
- a study of the use and handling of explosives
- importance and implication of proper ground support
- engineering properties of common rock types
- defining the location of shafts for mine development
- activities involved in mine haulage
- methods used in mine ventilation and dewatering
- the principles of ore processing
- theoretical future mining methods
- environmental concerns as applied to mines and the mining industry
- the physics of structures used in mining activities including mathematical analysis to solve problems

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

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

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

SLO 12D.1.1.7 Explain the factors included in and the importance of mine maintenance.

SLO 12D.1.1.8 Demonstrate an understanding of the importance of mine rescue teams and their training.

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 12D.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.

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.

No applicable SLOs.

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**.

SLO 12D.8.2.1 Describe the methods of mine development.

SLO 12D.8.2.2 Describe the importance and implications of proper ground support.

SLO 12D.8.2.3 Describe the engineering properties of common rock types and how this affects decisions on mining methods.

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

SLO 12D.8.3.1 Describe the methods of mine production.

SLO 12D.8.3.2 Describe the principles defining methods used in mine ventilation.

SLO 12D.8.3.3 Describe the principles of dewatering.

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**.

SLO 12D.9.1.1 Demonstrate an understanding of the geologic characteristics determining the location and types of shafts for a mine development.

SLO 12D.9.1.2 Demonstrate an understanding of the different types of activities involved in mine haulage.

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 12D.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 12D.10.2.1 Demonstrate an understanding of structural loads, and apply mathematical resolution to simple problems associated with load.

SLO 12D.10.2.2 Explain stress and strain qualitatively, and apply mathematical analysis only to solve basic problems involved in load distribution.

SLO 12D.10.2.3 Demonstrate a working knowledge of the function of beams and columns, as well as the forces that are applied to them, and apply mathematical methods to solve problems associated with them.

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

SLO 12D.10.3.1 Define and describe qualitatively moment and structural equilibrium.

SLO 12D.10.3.2 Describe the elements and apply methods of coplanar force resolution.

SLO 12D.10.3.3 Explain qualitatively the purpose of free body diagrams (FBD), and draw a FBD with labelled force vectors.

SLO 12D.10.3.4 Describe couples and the form and function of supports.

SLO 12D.10.3.5 Perform analyses of members.

SLO 12D.10.3.6 Describe the historical context leading to the use of trusses in construction, and analyze different types of trusses.

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.

SLO 12D.11.1.1 Describe the potential of future mining methods that are grounded in the principles of sustainability and feature "cradle-to-grave" visioning.

SLO 12D.11.1.2 Discuss the importance of environmental concerns as applied to mines and the mining industry.

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 12D.11.2.1 Discuss, using a case study, the economic and social effects of mine closure on a community.

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

SLO 12D.11.3.1 Discuss, using examples or a case study, business practices that promote the long-term viability of mines and mining complexes.

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 12D.12.1.1 Demonstrate an awareness of the ethical and legal standards as they pertain to the mining industry.

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

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

SLO 12D.13.1.1 Demonstrate regular and punctual attendance.

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

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

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

SLO 12D.13.1.5 Demonstrate teamwork skills.

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

SLO 12D.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 12D.13.2.1 Discuss the diversity of cultures in society.

SLO 12D.13.2.2 Demonstrate an understanding of the importance of consultation with local cultures in all aspects of the mining process.

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

SLO 12D.13.3.3 Demonstrate an understanding of the business operation of a mine complex.

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

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

SLO 12D.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 12D.14.1.1 Demonstrate an understanding of the mining industry as it pertains to the field of mining engineering.

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 12D.14.2.1 Describe mining engineering as a profession.

SLO 12D.14.2.2 Describe civil engineering as a profession.

SLO 12D.14.2.3 Demonstrate an understanding of educational and career opportunities involving mining engineering technology in Canada.

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

SLO 12D.14.3.1 Demonstrate an understanding of the physical demands and possible dangers involved in mining engineering.

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 12D.15.1.1 Describe the history, technological progression, and emerging trends in mining.
