



**I. COURSE DESCRIPTION:** This course will give students an overview of geological processes and the formation of mineral and petroleum resources. Surface and sub-surface mining techniques to extract non-renewable resources will be discussed generally as well as their effect on the environment. The focus of the course will be on environmental considerations of mineral extraction to mitigate environmental impact.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. Identify and describe various geological processes responsible for the formation of mineral and petroleum resources.

Potential Elements of the Performance:

- describe the difference between igneous, sedimentary and metamorphic rocks and their formation
- explain the importance of various rock formations to mineral formation and exploration
- list mineral groups and describe their properties and differences
- classify geological features for their mineral potentials

2. Identify surface and sub-surface mining techniques.

Potential Elements of the Performance:

- list and describe the various classes of surface mining techniques
- list and describe the various classes of sub-surface mining techniques
- describe the steps in mining techniques
- explain the uses and purpose for each technique
- describe considerations in the use of each mining technique

3. Identify and describe a variety of environmental effects each mining technique has the potential to generate.

Potential Elements of the Performance:

- list a variety of impacts from mining that could adversely affect the environment
- identify specific environmental impacts from various mining techniques
- describe the mechanisms and processes that result in the environmental impact
- identify their cause(s)
- describe methods to mitigate the environmental impact

4. Identify potential environmental impacts from various stages of mining.

Potential Elements of the Performance:

- list the stages of mine development from exploration through decommissioning
  - identify environmental concerns from each stage
  - identify best practices to mitigate their adverse impacts
5. Identify mitigation strategies and best practices to minimize environmental impacts from mining activities

Potential Elements of the Performance:

- identify benefits and drawbacks of different mitigation strategies for each class of environmental impacts
  - discuss their advantages and disadvantages
  - list factors that affect the costs (direct, life cycle, full cost and externalities) of various mitigation strategies and considerations and best practices
  - describe the full cost accounting approach for a cost benefit assessment of mitigation strategies
6. Identify and discuss case study examples of good and poor environmental mining practices

Potential Elements of the Performance:

- describe the environmental impacts from several different mineral resource mining techniques
  - explain how these have been mitigated
  - identify differences between and costs/benefits of various mitigation techniques
7. Describe and discuss relationships between the environmental impacts of mining and sustainable development

Potential Elements of the Performance:

- describe how environmental impacts of mining affect people and societies (beneficial and adverse)
- describe the life cycle of a mine
- explain the significant environmental challenges of mining
- describe driving factors for mineral extraction and mining and their relationships to sustainable development
- differentiate and describe the roles mining performs in sustainable development
- explain the life cycles of consumer artefacts from a mining perspective

**III. TOPICS:**

1. Geologic processes and the formation of mineral and petroleum resources
2. Surface mining techniques
3. Sub-surface mining techniques
4. Environmental impacts through the mine life cycle

5. Environmental impact mitigation and best practices
6. Mining and sustainable development

#### IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

#### V. EVALUATION PROCESS/GRADING SYSTEM:

class participation – 15%  
 course assignments – 10%  
 term assignment – 40%  
 final exam – 35%

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	

W Student has withdrawn from the course  
without academic penalty.

## **VI. SPECIAL NOTES:**

### Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

## **VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located on the portal form part of this course outline.