



School of Science  
**GEOL 112**  
**Introduction to the Mineral Exploration and Mining Industries**  
Term: Winter 2022  
Number of Credits: 3

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## Course Outline

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**INSTRUCTOR:** Dr. Joel Cubley

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**PHONE:** (867) 456-8605

**OFFICE LOCATION:** A2513 (A-Wing)

**OFFICE HOURS:** Tuesday 10-11 am or upon request

**CLASS DATES:** January 7 – April 23, 2022 (Fridays 9 am – 12 pm)

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### COURSE DESCRIPTION

This course traces the mineral resource sector from grassroots mineral exploration through to underground and open-pit extraction and the processing and marketing of mining products. The environmental impact of mining and sustainable mining techniques is introduced, as well as the monitoring and remediation techniques that follow mine closure. This course also provides an introduction to First Nations in the Yukon and the history, land agreements, and regulations that influence their relationship with the mining industry.

Guest speakers supplement course curriculum with local expertise and raise awareness of active projects and industry developments in Yukon. GEOL 112 serves as a valuable foundation for students and practitioners in a wide range of science and policy fields that require a base-level of understanding concerning the mining industry.

### COURSE REQUIREMENTS

There are no prerequisites for this introductory course.

### EQUIVALENCY OR TRANSFERABILITY

Receiving institutions determine course transferability. Find further information at:

<https://www.yukonu.ca/admissions/transfer-credit>

## LEARNING OUTCOMES

Upon successful completion of the course, students will be able to:

- Identify the various stages in the mine cycle, from exploration to mineral extraction and refinement to mine closure and remediation. Students should be able to demonstrate an understanding of the requirements for technical and environmental studies that bridge these segments of the mine cycle.
- Compare and analyze different methods of extracting minerals in both surface and underground mining operations and describe the subsequent processing techniques that separate and refine ore.
- Describe how metals and industrial minerals are sold into the marketplace, as well as the factors involved in setting mineral prices. In addition, students should be able to demonstrate an understanding of how companies raise capital to fund mining activities.
- Describe the main issues surrounding closure and reclamation of a mine site and be able to apply that knowledge to make preliminary recommendations for currently active mining operations.
- Identify the primary characteristics of main deposit types and the ore minerals generally associated with those deposits.
- Assess the impact of mining operations on the natural and human environment and describe the main sources of environmental pollution.
- Demonstrate a fundamental awareness of the interplay between mining companies and Yukon First Nations, and the rights and responsibilities of both partners.

## COURSE FORMAT

### Weekly breakdown of instructional hours

This course has three hours of scheduled instruction per week. Students can expect to spend an additional 2-3 hours per week on background reading and course assignments, with additional time required for exam preparation.

### Delivery format

This course will be delivered online using the Zoom videoconferencing platform. Most material will be delivered in a synchronous format and it is important that students prioritize attending the synchronous lectures so that they do not fall behind in the course. It is up to the discretion of the instructor whether synchronous lectures will be recorded for exam revision; it is not intended that recordings should be the primary means of student engagement in the course. Asynchronous materials and activities may be utilized where appropriate given course material.

## EVALUATION

Class Participation	15%
Theory Assignments	25% (5% each)
Midterm Exam	20%
Current Events and Technology Presentations	10% (5% each)
Final Exam	30%
Total	100%

### Attendance & Participation

Fifteen percent (15%) of the course grade is attached to class attendance or participation. It is important that students are present and engaged to gain the knowledge necessary to successfully complete assignments and examinations.

### Assignments

Students will be given five (5) lecture assignments based on assigned reading that is intended to reinforce the concepts introduced in lecture. These assignments will serve as a focal point for class discussion and peer interaction. Students will also prepare two oral presentations on mining-related current events that will be presented to the class on a date assigned by the instructor.

Lecture assignments are due at the start lecture on the date assigned by the instructor. Late assignments will be graded based on the following scheme: a deduction of 10% per day up until a total deduction of 50% is reached, following that, assignments must be submitted prior to the date that the instructor hands back the graded assignment (set by the instructor), unless otherwise indicated by the instructor.

Students are expected to complete background textbook readings in advance of each classroom lecture. Recommended readings are provided in the topic outline table below. Readings will require ~1-2 hours per week outside of class.

### Exams

This course has two exams: a midterm exam and a final exam. Both exams will be delivered online on Moodle; specifics surrounding format, duration, etc. will be conveyed in lecture prior to the exams themselves.

Any student who is absent from a test or exam for legitimate reasons will be eligible to write a deferred exam. Please note that excuses such as car trouble, vacation travel, oversleeping, and misreading the test schedule are not considered legitimate reasons and do not qualify the student for a deferred exam. For missed exams, the student must contact the instructor within 48 hours of the missed exam by phone or email. For missed final exams, students must contact the instructor to discuss an appropriate course of action. Any deferred exams will be scheduled by the Chair of the School of Science.

## COURSE WITHDRAWAL INFORMATION

Refer to the YukonU website for important dates.

## **TEXTBOOKS & LEARNING MATERIALS**

Stevens, Robert. 2019. *Mineral Exploration and Mining Essentials* (2<sup>nd</sup> edition). Pakawau GeoManagement Inc. ([www.miningessentials.com](http://www.miningessentials.com))

Students will require a computer with a stable internet connection. A headset with a microphone is recommended. Lab instruction will take place on campus using face-to-face instruction.

## **ACADEMIC INTEGRITY**

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities.

## **ACADEMIC ACCOMMODATION**

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website). It is the student's responsibility to seek these accommodations by contacting the Learning Assistance Centre (LAC): [LearningAssistanceCentre@yukonu.ca](mailto:LearningAssistanceCentre@yukonu.ca).

## TOPIC OUTLINE

Module	Topic	Recommended Reading
1	Industry Overview: mine life cycle; commodities; funding sources; participant organizations.	Ch. 1 (p. 1 - 13)
2	Mineral Deposits: formation; terminology; deposit types.	Ch. 3 (p. 47-108)
3	Mineral Exploration I: properties and stages; exploration agreements.	Ch. 4 (p. 113-130)
4	Mineral Exploration II: exploration techniques; geophysical methods; diamond drilling	Ch. 4 (p. 130 - 167)
5	Mineral Resources and Reserves: factors in estimation; recovery; grade and tonnage.	Ch. 5 (p. 170 – 186)
6	Economic Assessments: pre-feasibility and feasibility studies.	Ch. 5 (p. 186 – 197)
7	Surface Mining: types; mine layout; stripping ratios; production cycles; placer mining.	Ch. 6 (p. 199 - 214)
8	Underground Mining: mine layout; access; mining methods; production cycle.	Ch. 6. (p. 215 – 229)
9	Mineral Processing: crushing and grinding; smelting; flotation; heap-leaching, etc.	Ch. 7 (p. 230 – 251)
10	Environmental Considerations: closure and reclamation; environmental hazards; community considerations.	Ch. 8 (p. 253 – 274)