APPLIED SCIENCE AND MANAGEMENT DIVISION
GEOL 112
3 Credit Course
Winter, 2021

COURSE OUTLINE

GEOL 112

INTRODUCTION TO THE MINERAL EXPLORATION AND MINING INDUSTRIES

3 CREDITS

PREPARED BY: Joel Cubley, Instructor/Coordinator, Earth Sciences
DATE: February 17, 2020

APPROVED BY: Stephen Mooney, Acting Dean, Applied Science and Management
DATE: February 18, 2020

APPROVED BY ACADEMIC COUNCIL: March 11, 2020
RENEWED BY ACADEMIC COUNCIL: Click or tap to enter a date

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Academic Council, Governance Office
Academic Council MyYC: Policies, Procedures and Forms

INTRODUCTION TO THE MINERAL EXPLORATION AND MINING INDUSTRIES

INSTRUCTOR:	**OFFICE HOURS:**
OFFICE LOCATION:	**CLASSROOM:**
E-MAIL:	**TIME:**
TELEPHONE:	**DATES:**

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.

PREREQUISITES

There are no prerequisites for this introductory course.

EQUIVALENCY OR TRANSFERABILITY

This course is recently re-developed, and its transferability is still being evaluated. Receiving institutions always determine course transferability. Further information and assistance with transfers may be available from the School of Science.

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

This course consists of a single three-hour session per week. Each session combines lecture presentations with hands-on exercises and class discussion. Students *may* be able to join class through Zoom or another videoconferencing platform at the discretion of the instructor.

ASSESSMENTS:

Attendance & Participation

Students are not marked on their class attendance or participation, but 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.

Tests
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.

EVALUATION:

Theory Assignments	30% (6% each)
Midterm Exam	25%
Current Events Presentations	10% (5% each)
Final Exam	35%
Total	100%

REQUIRED TEXTBOOKS AND MATERIAL
Stevens, Robert. 2019. *Mineral Exploration and Mining Essentials* (2nd edition). Pakawau GeoManagement Inc. (www.miningessentials.com)

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/ Admissions & Registration web page.

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when a student submits work for credit that includes the words, ideas, or data of others, without citing the source from which the material is taken. Plagiarism can be the deliberate use of a whole piece of work, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Students may use sources which are public domain or licensed under Creative Commons; however, academic documentation standards must still be followed. Except with explicit permission of the instructor, resubmitting work which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukoncollege.yk.ca/yfnccr.

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 College Academic Regulations (available on the Yukon College website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC): lac@yukoncollege.yk.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	Midterm Exam	
7	Economic Assessments: pre-feasibility and feasibility studies.	Ch. 5 (p. 186 – 197)
8	Surface Mining: types; mine layout; stripping ratios; production cycles; placer mining.	Ch. 6 (p. 199 - 214)
9	Underground Mining: mine layout; access; mining methods; production cycle.	Ch. 6. (p. 215 – 229)
10	Mineral Processing: crushing and grinding; smelting; flotation; heap-leaching, etc.	Ch. 7 (p. 230 – 251)
11	Environmental Considerations: Closure and Reclamation; Environmental Hazards; Community Considerations.	Ch. 8 (p. 253 – 274)

*All readings from Stevens (2019).