



School of Science  
**GEOL 105**  
**Physical Geology**  
Term: Fall 2021  
Number of Credits: 3

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## Course Outline

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**INSTRUCTOR:** Dr. Joel Cubley

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**OFFICE LOCATION:** A2513

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

**OFFICE HOURS:** Tuesday/Thursday, 2:30-3:30 pm

**CLASSROOMS:** A2603 (lecture); T1090 (laboratory)

**DATES:** September 7, 2021 to December 18, 2021

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### COURSE DESCRIPTION

Physical Geology (GEOL 105) is an introduction to the origin, structure, and composition of Earth. The course uses the unifying theory of plate tectonics to frame the presentation of a broad suite of geoscience processes affecting the earth. Topics covered include atomic structure and minerals; igneous, sedimentary and metamorphic rocks; weathering, erosion and depositional processes; earth composition and structure; volcanism, earthquakes, and rock deformation. Hands-on laboratory exercises focus on rock and mineral identification, basic outcrop description, and geologic map reading, construction, and analysis.

Physical Geology (GEOL 105), when paired with Historical Geology (GEOL 106), provide the standard first year of geoscience courses in most B.Sc. degree programs.

### COURSE REQUIREMENTS

Prerequisite(s): 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>

College of the Rockies – GEOL 105 (3)

Simon Fraser University – EASC 101 (3)

Thompson Rivers University – GEOL 1110 (3)

Trinity Western University – GEOL 109 (3)

University of British Columbia – EOSC 110 (3) and EOSC 111 (1)

University of British Columbia Okanagan – YU GEOL 105 + GEOL 106 = UBCO EESC 111 + EESC 121 (6)

University of Fraser Valley – GEOG 1XX (3)

University of Northern British Columbia – SCIE 1XX (3)

University of Victoria – EOS 120 (1.5)

Vancouver Island University – GEOL 111 (4)

## LEARNING OUTCOMES

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

- identify and classify basic rocks and minerals in hand sample.
- use basic geoscience terminology in describing lithologies, structures and geologic processes.
- connect earth processes to earth cycles, such as the rock cycle and tectonic cycle, and define the time scales at which different cycles operate.
- apply geological and geophysical principles and concepts to solving geologic problems on a number of scales.
- describe the geologic history of a region based on field exposures, maps, cross sections, rock samples, and photographs.

## COURSE FORMAT

### Weekly breakdown of instructional hours

This course consists of two 90-minute lectures and one three-hour lab period per week. The lecture schedule included in this course outline details the major topics covered and when those topics will be presented throughout the course. Please note that this schedule will likely be modified throughout the term, as some topics may not be finished within the predicted lecture time.

It is expected that this course will require 3-4 hours/week of homework and additional reading. It is important to note that the time required will vary by individual.

### Delivery format

Lectures for the Fall 2021 offering of this course will be delivered in a “HyFlex” format in which course material is delivered both in-person and online at the same time by the same faculty member. Students can then choose for each and every class meeting whether to show up for class in person or to join it online. In-person lectures will be delivered in room A2603 on the Ayamdigut (Whitehorse) campus; the real-time stream of these lectures will be available on Zoom.

Students have the option of enrolling in either face-to-face (F2F) or online laboratory sections. Face-to-face instruction will be offered at the Ayamdigut (Whitehorse) campus on Wednesday afternoons from 1-4 pm; active social distancing and personal protective measures will be in place. It is strongly recommended that students who can participate in the face-to-face section choose this option. For students in the F2F section, access to the laboratory space and lab materials (e.g. rock sample suites) will be limited to the duration of the scheduled lab section unless arrangements are made with the instructor.

Students enrolled in the online laboratory section of the course will be sent a laboratory kit containing any geological materials needed for lab completion. Students may be required to obtain and use standard home materials (e.g. salt, vinegar) not included in the laboratory kit. Laboratory instructions and worksheets will be provided digitally on the Moodle course page. Online students will be required to meet with their lab

instructor once per week on Zoom to discuss the upcoming lab assignment and their progress on previous exercises. Online labs are not self-paced; each week's lab is due at the start of the next lab section.

## EVALUATION

Weekly lab assignments (10)	30% (3% each)
Midterm lecture exam	20%
Final lecture exam	25%
Biweekly review quizzes (5)	10% (2% each)
Lecture assignments and learning assessments (5)	15% (3% each)
Total	100%

## Assignments

Weekly lab exercises will be due at the start of the following lab section. This allows the instructor to provide ongoing feedback throughout the course and help ensure learner improvement from one assignment to the next. For online students, weekly laboratory assignments will be made available on the morning of the F2F laboratory offering (Wednesday), and the window for submission without penalty will close at midnight on the following Wednesday.

In addition to laboratory exercises, students will participate in three in class lecture "learning assessments" to help reinforce critical concepts. These are timed group exercises intended to stimulate discussion and collaboration between students. Students must complete these learning assessments during the scheduled lecture time (see course schedule) unless prior arrangements are made with the instructor.

Two take-home lecture assignments will also be administered over the course of the semester. These assignments focus on getting students to engage with and appreciate the geologic landscape in their own area. These assignments will require presentation of findings/observations to course peers using the course forums on Moodle.

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).

## Examinations

This course has two lecture examinations, a midterm and a final. The midterm exam is conducted during scheduled lecture time; the final exam is conducted during the final exam period scheduled by the Office of the Registrar. The midterm lecture exam is a 1.5-hour exam; the final exam is designed to take 3 hours.

Missed exams will be assigned a grade of 0% unless re-scheduling for a valid reason is approved and determined in advance of the scheduled exam date. 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 Chair of the School of Science. Any deferred exams will be scheduled by the Chair.

## **Quizzes**

Readings from the textbook will be assigned to support lecture instruction. Review quizzes will be administered on Moodle on a biweekly basis; material in these quizzes can be drawn from both lecture and textbook material. The quizzes are short (5-7 multiple choice questions) and should be viewed as an incentive to stay current with textbook readings

## **COURSE WITHDRAWAL INFORMATION**

Refer to the YukonU website for important dates.

## **TEXTBOOKS & LEARNING MATERIALS**

This course utilizes an open-source textbook offered through the BC Campus Open Ed project.

*Earle, S. 2019. Physical Geology (2<sup>nd</sup> ed.). British Columbia (BC) Open Campus.*

The textbook may be accessed at: <https://opentextbc.ca/physicalgeology2ed/>

Students who plan to participate from an off-campus location will require a computer with a stable internet connection. A headset with microphone is also recommended.

## **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).

## LECTURE TOPIC OUTLINE

<i>Week</i>	<i>Date</i>	<i>Lecture</i>	<i>Lecture Topics</i>	<i>Recommended Resources</i>
1	Sept. 7	1	Course introduction and introduction to plate tectonics	Chapter 1, Chapter 10
	Sept. 9	2	Plate Tectonics: development of the theory	
2	Sept. 14	3	Plate Tectonics: driving forces for plate motion	Learning Assessment #1: Plate Tectonics
	Sept. 16			
3	Sept. 21	4	Minerals	Chapter 2
	Sept. 23	5	Minerals	
4	Sept. 28	6	Igneous rocks and processes (intrusive)	Chapter 3
	Sept. 30	7	Igneous rocks and processes (extrusive)	Chapter 4
5	Oct. 5	8	Weathering, erosion and soil formation	Chapter 5
	Oct. 7	9	Sedimentary rocks and processes: rock types	Chapter 6
6	Oct. 12	10	Sedimentary rocks and processes: depositional environments and sedimentary structures	
	Oct. 14	11	Metamorphic rocks and processes: types of metamorphism	
7	Oct. 19	12	Metamorphic rocks and processes: types of metamorphism	Learning Assessment #2: Rock Cycle
	Oct. 21			
8	Oct. 26		Midterm exam review	Midterm exam (in class)
	Oct. 28			
9	Nov. 2	13	Rock deformation and geological structures: stress and strain	Chapter 12
	Nov. 4	14	Rock deformation and geological structures: folding and faulting	
10	Nov. 9	15	Geologic time: relative and absolute dating techniques; geologic time scale	Chapter 8
	Nov. 11		Remembrance Day (No Class)	
11	Nov. 16		Learning Assessment #3: Geologic Time	Chapter 11
	Nov. 18	16	Earthquakes: plate tectonic controls, classification, measurement (Part I)	
12	Nov. 23	17	Earthquakes: plate tectonic controls, classification, measurement (Part II)	
	Nov. 25	18	Introduction to geophysics and the Earth's interior	Chapter 9
13	Nov. 30	19	Geology of the oceans	Chapter 13
	Dec. 2	20	Energy resources	Chapter 20
14	Dec. 7	21	Mineral Resources	
	Dec. 9			

## LABORATORY TOPIC OUTLINE

<i>Week</i>	<i>Topic</i>
1	Introduction to geology of the Whitehorse area (field trip)
2	Geologic mapping Part I (Whitehorse Copper Belt)
3	Geologic mapping Part II (Whitehorse Copper Belt)
4	Mineral identification and classification
5	Igneous rock identification and classification
6	Sedimentary rock identification and classification
7	Metamorphic rock identification and classification
8	Yukon earthquake location (EQLocate)
9	Structure contours and outcrop patterns
10	Virtual field trip and geologic time (K-T Boundary)