School of Science

GEOL 106
Historical Geology

Term: Winter, 2022
Number of Credits: 3

Course Outline

INSTRUCTOR: Mary Samolczyk
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LECTURE TIME: Tuesday and Thursday, 1:00 – 2:30 PM
LECTURE ROOM: A2605
LAB TIME: Wednesday, 1:00 – 4:00 PM
LAB ROOM: T1090
DATES: January 6 – April 12, 2022

COURSE DESCRIPTION

GEOL 106 examines Earth's history from initial formation through to the present-day using evidence found in the geologic record; as well as the corollary development of geological thought and understanding in both Western and indigenous worldviews. The course covers three main themes in Earth history: 1) the concept of deep time; 2) the evolution of plate tectonics; and 3) the biological evolution of Earth using evidence from the fossil record. The growth of the continents, the opening and closing of ocean basins, episodes of large-scale erosion and deposition on the continents, and orogenic (mountain-building) episodes are fundamental geologic topics covered in this course. Students will develop competencies in measuring geologic time using the application of stratigraphic principles, paleontology and radioactive decay.

Life on Earth during the major geological time periods is discussed with a focus on significant evolutionary developments and mass extinctions. Plate tectonics, climate, and relative sea-level are examined as determinants of evolutionary change with particular reference to North America and Western Canada.

This course is designed to provide, in tandem with GEOL 105 (Physical Geology), the first-year geology courses required to enter the second year of a B.Sc. geology program at most institutions.

COURSE REQUIREMENTS

There are no prerequisites for this 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:

1. Demonstrate knowledge and proper use of the geologic time scale, as well as understanding of the history of its development.

2. Describe indigenous perspectives on geologic history, with a specific focus on northwestern Canada. Demonstrate how western scientific perspectives and indigenous oral traditions have contextualized the same geologic developments through different lenses.

3. Demonstrate understanding of the suite of geologic principles used to analyze Earth history and apply those principles to evaluate and interpret the geologic history of specific localities in western Canada.

4. Summarize how Earth's continents and oceans evolve over geologic time and relate this to specific evidence preserved in the rock record.

5. Describe the relationships between plate tectonics and the evolution/extinction of life on Earth, from first life through to the present-day.

6. Identify a variety of invertebrate fossils and discuss how they contribute to 1) geologists' understanding of life during specific geologic time periods and 2) interpretations of Earth history.

7. Summarize the key sedimentological, paleoclimatic, tectonic, and biological lines of evidence that have been used to interpret the history of Earth with a focus on North America and western Canada in particular.

COURSE FORMAT

Weekly breakdown of instructional hours

This course consists of two 90-minute lectures and one 3-hour laboratory period per week. A detailed course schedule will be made available the first week of classes; laboratory activities are complimentary to lecture material. Please note that the course schedule will likely be modified during the term to accommodate lecture topics that may not be finished within the predicted lecture time.

Delivery format

Lectures and labs for the Winter 2022 offering of this course will be delivered in a face-to-face setting (classroom and laboratory). Students are expected to attend each lecture and lab session so that they can ask questions and directly engage with the instructor and their peers. Lectures will not be recorded. Review of any missed material or completion of missed activities is the responsibility of the student. Midterms and exams will be delivered on the Ayamdigut campus.

EVALUATION

Weekly Lab Assignments	35%
Lecture Midterm Exam	15%
Lecture Final Exam	30%
Lecture Assignments	20%
Total	100%

Assignments

This course includes ten laboratory exercises that are due one week from the initial laboratory activity unless otherwise indicated by the instructor. Successful completion of these exercises is critical for understanding and reinforcing lecture material. Two lecture-based assignments will be distributed at the 1/3 and 2/3 marks through the course progression. The instructor may also assign in-class or take-home activities throughout the semester to supplement lecture materials.

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).

Tests

This course has two lecture examinations: a midterm and a final. The midterm exam (1.5 hrs) is conducted during scheduled lecture time; the final exam (3 hrs) is conducted during the final exam period scheduled by the Office of the Registrar.

Missed exams will be assigned a grade of 0% unless re-scheduling for a valid reason is approved and determined in advance of scheduled exam date. If there are known conflicts with exam scheduling, please see the instructor as soon as possible to discuss an alternative examination date.

Late Policy

Any assignments (lab and lecture) submitted past the due date 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).

Any variation from this late policy, for example, where late assignments will not be accepted, will be clearly communicated by the instructor.

COURSE WITHDRAWAL INFORMATION

Refer to the YukonU website for important dates.

TEXTBOOKS & LEARNING MATERIALS

Levin, H.L. and King, D.T. 2017. The Earth Through Time (11th ed.). New York, NY: Wiley. 600 p.

A paper copy of this textbook (loose-leaf) is available at the University bookstore. E-book rental options are available on the publisher's website (https://www.wiley.com/en-us/The+Earth+Through+Time%2C+11th+Edition-p-9781119117063)

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.

TOPIC OUTLINE

Module	Course topic(s)
1	Introduction to historical geology: fundamental geologic principles; introduction to the three major themes in Earth history.
2	Sedimentary rocks and historical geology: relationship between tectonic settings and sedimentary rock types; information provided by colour, texture, and structures in rocks; sea level change in the sedimentary record; stratigraphy and correlation; unconformities.
3	Evolution of life through time: relationships between fossils, past climates and paleogeography; the fossil succession; evolution and the organization of life.
4	Geological concepts of time: relative vs. absolute dating; the geologic time scale; radioactive dating methods; geological hierarchy of chronological periodization.

5	Planetary beginnings and the origin of Earth: the Big Bang, the formation of the solar system and initial accretion of Earth.
6	Evolution and structure of Earth (Archean Eon): differentiation post-accretion; characteristics of the primitive atmosphere; the primitive ocean and early hydrologic cycles; the origin of life.
7	The Proterozoic Eon: geologic and evolutionary highlights of the Paleoproterozoic, Mesoproterozoic, and Neoproterozoic eras—Snowball Earth, transition to an oxygenated atmosphere, evolution of soft-bodied multicellular organisms.
8	The Paleozoic Era: major tectonic events; supercontinent assembly and breakup, Cambrian explosion of life and the proliferation of shelled animals; advent of vertebrates; mass extinctions.
9	The Mesozoic Era: breakup of Pangaea and its implications for Cordilleran geology; formation of epicontinental seas; climate factors; dinosaurs and the rise of mammals, mass extinction at the K-T boundary.
10	The Cenozoic Era: ice ages and paleoclimate; western North American tectonic activity and volcanism; eastern passive margin sedimentation and marine transgressions and regressions; evolutionary advances. Human origins.
12	The Anthropocene: impact of recent human activity on the geologic record.