Geology (GEOL) 415

Earth's Origin and Early Evolution (Revision 4)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online**. Delivered via Brightspace.
Credits:	3
Area of study:	Science
Prerequisites:	**GEOL 200** and **GEOL 201** or equivalent. Students should feel comfortable with the manipulation of algebraic equations and have a rudimentary knowledge of single-variable differential calculus. Where applied, chemical principles essential for the course are adequately explained, although it would be beneficial for students to have **CHEM 217**.
Precluded:	None
Challenge:	GEOL 415 has a challenge for credit option.

Faculty: Faculty of Science and Technology

Overview

Geology 415: Earth's Origin and Early Evolution explores the evidence for the various processes, events, and materials involved in the formation and evolution of Earth. The course also describes various geochemical tools and techniques used by geologists to reveal and interpret the evidence.

Outline

- Unit 1: Earth in the Solar System
- Unit 2: Geochemical Tools and the Origin of the Elements
- Unit 3: Meteorites
- Unit 4: The Origins of Stars and the Solar System
- Unit 5: The Internal Structure and Composition of Earth

Learning outcomes

Upon successful completion of this course, you should be able to

- describe Kepler's laws of motion and outline how they relate to Newton's laws.
- list the planets in the solar system in order of their distance from the sun and outline describe their composition.
- describe, compare, and contrast asteroids and comets and explain how the physical and chemical characteristics of meteorites provide information about conditions in the early solar system.
- explain how the elements that compose the solar system, Earth, and its organisms originated.

- describe the distinguishing geological features of the terrestrial planets.
- explain how the age of the Earth is known and describe the Rb-Sr, Sm-Nd, and U-Pb isotope systems and how they can be used for dating geological events.
- using the nebular hypothesis, describe how the young solar system including planets emerged and evolved.
- explain the process of differentiation and core formation on Earth and outline why C1 chondrites do not appear to be the building blocks of the Earth.
- sketch the structure of the mantle, explain the seismic discontinuities within the mantle, and outline major events in the early history of the mantle.
- explain the origins of early continental crust and describe how it differs from younger continental crust.

Evaluation

To **receive credit** for GEOL 415, you must obtain an average grade of at least 60 percent for the assignments, a grade of at least 50 percent on each examination, and a course composite grade of at least **D (50 percent)** . The weighting of the composite grade is as follows:

Activity	Weight
5 Assignments (5 x 8%)	40%
Midterm Online Exam	25%
Final Online Exam	35%
Total	**100%**

The **midterm and final examinations** for this course must be requested in advance and written under the supervision of an AU-approved exam invigilator. Invigilators include either ProctorU or an approved in-person invigilation centre that can accommodate online exams. Students are responsible for payment of any invigilation fees. Information on exam request deadlines, invigilators, and

other exam-related questions, can be found at the **Exams and grades** section of the Calendar.

Materials

Physical course materials

The following course materials are included in a course package that will be shipped to your home prior to your course's start date:

Hartmann, W. K. (2005). *Moons & Planets* (5th ed.). Belmont, CA: Brooks/Cole.

Rollinson, H. (2007). *Early earth systems: A geochemical approach*. Malden, MA: Blackwell Publishing.

Other materials

All other course materials can be found at the course website.

Challenge for credit

Overview

The challenge for credit process allows you to demonstrate that you have acquired a command of the general subject matter, knowledge, intellectual and/or other skills that would normally be found in a university-level course.

Full information about **challenge for credit** can be found in the Undergraduate Calendar.

Evaluation

To **receive credit** for the GEOL 415 challenge registration, you must achieve a grade of at least **C- (60 percent)** on the examination.

Activity	Weight
Examination	100%
Total	**100%**

Challenge for credit course registration form

Important links

- **Academic advising**
- **Program planning**
- **Request assistance**
- **Support services at AU**

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery modes may vary from their individualized study counterparts.

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View **previous revision**