Geology (GEOL) 319

Structural Geology: The Architecture of Earth's Continental Crust

(Revision 4)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online** with a **Home Lab**. This course is charged a **lab fee**.
Credits:	3
Area of study:	Science
Prerequisites:	**GEOL 200** and **GEOL 201** or equivalent. Students should have a working knowledge of elementary geometry.
Precluded:	None
Challenge:	GEOL 319 has a challenge for credit option.
Faculty:	Faculty of Science and Technology

Overview

Geology 319 is designed to familiarize you with the structure and evolution of Earth's continental crust. This knowledge is useful for a variety of purposes, from petroleum and mineral exploration, to finding groundwater, to controlling pollution, to deciding where to build homes. The course is delivered in two, interdependent parts, in which sections often build on previous sections. These parts include theory, in which students will study the results and synthesis of structural geological studies, and practice, in which students will learn how to use the tools of structural geology (e.g., geological maps and a geological compass).

Outline

Theory (Study Guide)

- Unit 1: An Introduction to Earth's Ever-Changing Crust
- Unit 2: Basic Techniques for Interrogating the Rock Record
- Unit 3: Stress, Strain, and Deformation
- Unit 4: Faults
- Unit 5: Folds: Waves of Solid Rock
- Unit 6: Nonorogenic Structures
- Unit 7: Case Study of the North American Cordillera

Practice (Lab Manual)

- Lab Unit 1: Using Geological Maps: Part 1
- Lab Unit 2: Using Geological Maps: Part 2
- Lab Unit 3: The Stereonet: A Three-Dimensional Graphical Calculator
- Lab Unit 4: Solving Problems of Structural Geometry
- Lab Unit 5: Displacement on Faults
- Lab Unit 6: Fold Orientation: Structural Clues

- Lab Unit 7: Introduction to the Geological Compass

Learning outcomes

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

- explain where the forces that create geological structures come from and outline the difference between primary and secondary structures.
- describe the process of orogeny and explain the role of orogeny in building Earth's continental crust.
- use the principles of stratigraphy to interpret geological history from geological cross-sections.
- distinguish between different forms of rock deformation and explain how rock deformation is measured, including how to calculate deformation measures.
- detail brittle, ductile, elastic, inelastic, and rigid responses of rocks as well as concepts of stress and strain, joints and faults, cleavage, foliation and lineation.
- describe the effects of faulting, including earthquakes and changes in topography.
- explain the different conditions under which folds form and differentiate between anticline, syncline, antiform, and synform.
- explain how to use cleavage surfaces to investigate folds and how folds can influence topography.
- describe the different kinds of geological intrusions and the stress regimes in which they can occur.
- explain the tectonic evolution of North America and outline North American orogens.

Evaluation

To **receive credit** for GEOL 319, you must score an average of at least 60 percent on the assignments and score at least 50 percent on each of the two parts of the final examination. The weighting of the composite grade is as follows:

Activity	Weight
7 Assignments (6% each)	42%
Final Exam: Part I: Theory	33%
Final Exam: Part II: Lab	25%
Total	**100%**

To learn more about assignments and examinations, please refer to Athabasca University's **online Calendar** .

Materials

Davis, G. H., & Reynolds, S. J., & Kluth, C.F. (2012). *Structural Geology of Rocks and Regions*, 3rd ed. New York: John Wiley & Sons. (Print)

Marshak, S., & Mitra, G. (1988). *Basic Methods of Structural Geology*. Englewood Cliffs, NJ: Prentice Hall. (Print)

Other materials

The course materials include a Study Guide, Laboratory Manual, Assignment Manual, and a Course Manual. Students require the use of lab kits which can be borrowed from the Athabasca University Library. Students will also have to provide some of their own supplies including coloured pencils, a protractor, a drafting compass, at least one drafting triangle, tracing paper, and both metric and English scales.

Special Course Features

This course is only available online.

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 319 challenge registration, you must achieve a grade of at least **D (50 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**

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View **previous revision**