

University of Arkansas - Fort Smith
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General Syllabus

GEOS 32003 Geochemistry

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisites: CHEM 14203/14201 College Chemistry II/Lab or consent of instructor

Effective Catalog: 2020-21

I. Course Information

A. Catalog Description

Theory and application of chemical principles to geological studies, including distribution and movement of major and trace elements, radiogenic and stable isotopes, geochronology, and chemical equilibrium in geologic systems.

II. Student Learning Outcomes

A. Subject Matter

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

1. Analyze and interpret the chemical compositions of rocks, minerals, and waters.
2. Evaluate the accuracy and precision of geochemical data sets.
3. Apply basic thermodynamic principles to investigate reactions between minerals and fluids in igneous and metamorphic environments.
4. Perform basic geochronological calculations using radiogenic isotopes.
5. Understand how stable isotopes are used to trace the movements of surface and groundwater, and to study igneous and metamorphic processes.
6. Read and interpret common phase diagrams encountered in geologic studies.

B. University Learning Outcomes (ULO)

This course will enhance student abilities in the following areas.

Analytical Skills

Critical Thinking Skills

Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. The student will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

Communication Skills (written and oral)

Students will communicate proficiently. The student will compose coherent documents appropriate to the intended audience and effectively communicate orally in a public setting.

Ethical Decision Making

Students will model ethical decision-making processes. The students will identify ethical dilemmas and affected parties and will apply ethical frameworks to resolve a variety of ethical dilemmas.

Global & Cultural Perspectives

Students will reflect upon cultural differences and their implications for interacting with people from cultures other than their own. The students will demonstrate understanding or application of their discipline in a global environment and will demonstrate how their discipline impacts or is impacted by different cultures.

III. Major Course Topics

- A. Abundance and distribution of elements in the solar system and earth
- B. Analytical methods
- C. Thermodynamics and phase diagrams
- D. Mineral equilibria in igneous and metamorphic systems
- E. Stable and radiogenic isotopes
- F. Geochronology
- G. Aqueous geochemistry