University of Arkansas - Fort Smith
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General Syllabus

GEOS 23143 Minerals and Rocks

Credit Hours: 3 **Lecture Hours:** 3 **Laboratory Hours:** 0

Prerequisite: CHEM 14103/14101 College Chemistry I/Lab or consent of the instructor

Prerequisite or Co-requisite: GEOS 23131 Minerals and Rocks Laboratory

Effective Catalog: 2020-2021

I. Course Information

A. Catalog Description

The study of solid materials that make up the Earth's crust including minerals, rocks, and sediments. Major topics include rock and mineral composition, texture, and structure, including geologic environments of formation. Rock and mineral hand specimen classification and identification techniques are emphasized.

B. Additional Information

This is a course intended for geology minors, science majors and education majors, and may also be taken to meet a lower level elective requirements in other degree programs.

II. Student Learning Outcomes

A. Subject Matter:

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

1. Define a mineral, geologically, and explain the difference between elements, minerals, and rocks.
2. List and define mineral physical properties and describe how these properties are used to identify minerals.
3. Explain mineral classification and how minerals are classified based on chemical composition.
4. Compare and contrast felsic and mafic silicate minerals.
5. Visualize and draw crystalline mineral structures.

6. Define the rock cycle and explain how igneous, sedimentary, and metamorphic rocks form.
7. Classify and identify igneous rocks using the QAP/FAP triangles.
8. Compare and contrast volcanic and plutonic igneous rocks.
9. Describe Bowen's Reaction Series and explain how it is used to identify common igneous rocks.
10. Explain why weathering and erosion are crucial in the formation of sedimentary rocks.
11. Classify and identify detrital and chemical sedimentary rocks.
12. Determine the depositional environments that identified detrital and chemical rocks formed.
13. Compare and contrast contact and regional metamorphism.
14. Explain how foliated and non-foliated metamorphic rocks form.

B. University Learning Outcomes:
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. Basic concepts of atoms and bonding.

B. Physical and chemical properties of minerals.
C. Economically valuable minerals; gemstones.
D. Rock forming silicates: felsic and mafic minerals.
E. Non-silicate mineral classification.
F. Optical and crystalline properties of minerals.
G. The Rock Cycle; formation of igneous, sedimentary, and metamorphic rocks.
H. Plate tectonics and volcanism.
I. Analysis and classification of igneous rocks; aphanitic and phaneritic identification.
J. Weathering, erosion, and depositional environments; facies and terranes.
K. Analysis and classification of sedimentary rocks.
L. Metamorphism; orogenic events associated with plate tectonics.
M. Analysis and classification of metamorphic rocks.