

University of Arkansas – Fort Smith
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General Syllabus

GEOL 3404 Structural Geology

Credit Hours: 4

Lecture Hours: 3

Laboratory Hours: 2

Prerequisite: GEOL 3014 Geological Field Methods.

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

Survey of deformational features and their geological significance in the crust of the Earth. Understanding the principles of crustal deformation, plate tectonics, kinematics, stress and strain, and construction of geological maps used in structural analysis.

B. Additional Information

This course is required for the B.S. degree in Geoscience.

II. Student Learning Outcomes

A. Subject Matter

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

1. Analyze tectonic and nontectonic geologic structures.
2. Analyze fold and fault kinematics.
3. Assess brittle structures such as joints, veins, faults, and fault rock.
4. Analyze fracture mechanics and construct Mohr circles.
5. Evaluate stress and strain on faults and ductile structures, such as folds.
6. Identify coaxial, noncoaxial, and superimposed strain paths in relation to folding mechanisms.
7. Determine shear zones related to ductile deformation mechanisms.
8. Evaluate rheology in as it relates to deformation, metamorphism, and geologic time.
9. Classify the major plate tectonic boundaries on the Earth.
10. Interpret the major orogenic events that occurred in the Geologic past.

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. Students 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. Students 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. 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. 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. Brittle structures
- B. Fault systems
- C. Fracture mechanics; Mohr circles
- D. Fault stress; Anderson's theory of faulting
- E. Fault strain; ductile structures
- F. Folding mechanism; noncoaxial and coaxial strain paths
- G. Shear zones; ductile deformation mechanisms
- H. Rheology
- I. Plate tectonics
- J. Geophysical imaging
- K. Orogens