University of Arkansas – Fort Smith
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General Syllabus

GEOL 4224 Hydrogeology

Credit Hours: 4 **Lecture Hours:** 3 **Laboratory hours:** 2

Pre-requisite: CHEM 1413/1411 College Chemistry II/Lab or consent of instructor

Effective Catalog: 2020-21

I. Course Information

A. Catalog Description

Stresses quantitative problem solving in groundwater settings and provides a balance between physical and chemical hydrogeology. The occurrence and movement of ground water in a variety of geologic settings will be examined through numerous case studies and laboratory work.

B. Additional Information

This course is an elective for the B.S. degree in Geoscience.

II. Student Learning Outcomes

A. Subject Matter

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

1. Analyze and interpret properties of aquifers.
2. Evaluate the accuracy and precision of groundwater data sets.
3. Apply basic thermodynamic principles to investigate groundwater flow to wells and through rock.
4. Perform basic field methods to analyze groundwater systems.
5. Understand how stable isotopes are used to trace the movements of groundwater.

B. University Learning Outcomes (ULO)

This course will enhance student abilities in the following areas.

Analytical Skills

The student will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

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.

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. Water and the elements of the hydrologic cycle
B. Properties of aquifers
C. Principles of groundwater flow
D. Groundwater flow to wells
E. Soil moisture and groundwater recharge
F. Regional groundwater flow
G. Geology of groundwater occurrence
H. Water chemistry
I. Water quality and groundwater contamination
J. Groundwater development and management
K. Field methods and groundwater models