

**University of Arkansas – Fort Smith**  
**5210 Grand Avenue**  
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**479–788–7000**

## **General Syllabus**

### **GEOL 3103 Paleoclimatology**

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: BIOL 1153 Biological Science or GEOL 2263/2261 Historical Geology/Laboratory

Effective Catalog: 2018~2019

#### **I. Course Information**

##### **A. Catalog Description**

Examine Earth's climate variability and change, including the influence of human activity on such change, and the interactions between climate and the global environment. Topics include climate classifications, methods of paleoclimate determination, global warming and greenhouse effect, acid rain, and ozone depletion.

##### **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. Assess the parts of the atmosphere, hydrosphere, cryosphere and their effects on climate.
2. Identify the atmospheric phenomena around us.
3. Determine the impact of weather and climate on all life.
4. Determine all of the solar system variables in determining changes in climate (e.g., precession, axial tilt, sun's intensity, etc.).
5. Determine how air pressure, Coriolis effect, and friction effect atmospheric circulation.
6. Identify and assess how plate tectonics have contributed to changing climates on the Earth's surface.
7. Determine the basic properties of light energy.
8. Determine how the greenhouse effect works.
9. Identify and explain how scientists are able to use indirect evidence to study paleoclimates.
10. Evaluate the use of ice cores, isotopes, tree rings, plant leaves in climate determination.

11. Determine how long-term climate data is collected and analyzed.
12. Determine the difference between short-term climate variability and long-term climate change.
13. Utilize statistical analysis from atmospheric data processing.
14. Identify the many interactions in the climate system that climate is a complex system consisting of many components.
15. Evaluate how humans are changing the weather inadvertently through air pollution, heat production, and land alteration.
16. Assess what are the realities in the climate and global change debate and what ideas may have less credibility.

## **B. University Learning Outcomes**

This course will enhance students' 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. Composition and vertical structure of the Atmosphere
- B. Moisture in the atmosphere, changes of state
- C. Temperature, pressure distribution
- D. Energy, temperature, heat transfer
- E. General Circulation and Secondary Circulations
- F. Radiation and light
- G. Seasonal and daily temperature variations
- H. Why the Earth has seasons (orbital parameters in relation to the Sun)
- I. Climate types

- J. Climate, Köppen and other classifications types
- K. Causes of climate change
- L. Climate through the Earth's geological past
- M. Methods of paleoclimate determination
- N. The Human influence on climate change