

University of Arkansas - Fort Smith
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General Syllabus

GEOS 32104 Principles of Remote Sensing

Credit Hours: 4

Lecture Hours: 3

Laboratory Hours: 2

Prerequisite: GEOS 11003 Introduction to Geographic Information Systems

Effective : 2026

I. Course Information

A. Catalog Description

An in-depth discussion of the fundamental concepts of remote sensing of the environment, introducing various sensor systems such as optical, infrared, microwave, LIDAR, and in situ sensors. It covers how remote sensing is applied to study a wide range of subjects, including vegetation, water, urban landscapes, soils, minerals, and geomorphology. Students will gain practical experience through laboratory exercises with GIS software and field spectroscopy and will also learn to address basic remote sensing problems and techniques.

II. Student Learning Outcomes

A. Subject Matter

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

1. Use remote sensing tools.
2. Compare spectral spatial measurement systems used in remote sensing.
3. Distinguish error sources in remote sensing.
4. Demonstrate in situ calibration techniques for remote sensing with Hyperspectral - and LiDAR-based systems.
5. Demonstrate hyperspectral and LIDAR data processing.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking - Students will identify problems/issues and develop solutions/analysis in agricultural and industrial applications to trouble-shoot and develop solutions.

Communication Skills (written and oral)

Students will communicate proficiently. The student will demonstrate the ability to read and comprehend information through application of theoretical information obtained from course written materials to practical application.

III. Major Course Topics

- A. Introduction to Remote Sensing
- B. Spectral characteristics of materials
- C. High-order positioning systems
- D. Challenges and limitations of UAS in remote sensing
- E. Data collection and geo-referencing
- F. Sources of error and calibration
- G. Agricultural remote sensing with hyperspectral helicopter
- H. Infrastructure remote sensing with LiDAR
- I. Processing hyperspectral imagery and LiDAR data