

University of Arkansas - Fort Smith
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General Syllabus

GEOS 30103 Foundations of Geospatial Data Analysis

Credit Hours: 3

Lecture Hours: 2

Laboratory Hours: 2

Prerequisite: GEOS 11003 Introduction to Geographic Information Systems

Effective Catalog: 2026-2027

I. Course Information

A. Catalog Description

This course introduces students to the problem-solving aspects of GIS through data and spatial analysis. It provides hands-on experience with various GIS analysis techniques, developing concepts like map outputs for GIS projects, fundamentals of raster and 3D data, and creating real-world applications. Students gain proficiency in GIS analysis by applying the skills learned to analyze issues of local, national, and global significance. The curriculum establishes a strong foundation, preparing students to engage in advanced spatial analysis with a focus on practical application.

II. Student Learning Outcomes

A. Subject Matter

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

1. Discuss the concepts and define terminology associated with advanced GIS analysis.
2. Analyze datasets using the appropriate types of tools and technology.
3. Demonstrate the use of data preparation for spatial analysis.
4. Examine elements of spatial databases for projections and mapping.
5. Determine appropriate 3D data for use in the creation of 3D maps.
6. Assemble and prepare geoprocessing tools to develop analysis for real-world data.
7. Construct maps and online digital products for presentations.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Quantitative Reasoning - The student will develop spatial analysis and georeferencing skills to apply appropriate solutions to spatial measurements and geostatistics.

Global & Cultural Perspectives

Students will reflect upon cultural differences and their implications concerning GIS analysis with people from cultures other than their own.

III. Major Course Topics

- A. Online GIS applications for publishing data and maps
- B. Elements of map design and advanced labeling of features
- C. Creation of custom scales, density maps and quantitative attributes
- D. Map outputs for GIS projects and building story maps
- E. Data importing and modification for geodatabases
- F. Introduction to Python expressions and SQL query criteria
- G. Spatial data projections, vector data formats and geoprocessing
- H. Feature digitization and working with CAD drawings
- I. Buffers and cluster analysis for spatial data
- J. Hillshades and kernel density for raster GIS
- K. 3D GIS including Z-enabled features and TIN surfaces
- L. Fundamentals of Operations Management involving Graffiti Mapping and Removal Systems