

C-ID Descriptor

Introduction to Geographic Information Systems and Techniques, with Lab

Descriptor Details

- **Descriptor Title:** Introduction to Geographic Information Systems and Techniques, with Lab
- **C-ID Number:** 155
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General Description

Study of Geographic Information Systems (GIS) science and its applications to spatial data management. Identification and acquisition of GIS data. Assessment of vector and raster systems, scale, resolution, map projection, coordinate systems, georeferencing and Global Positioning Systems (GPS). Spatial analysis and modeling with GIS.

Prerequisites

No information provided

Corequisites

No information provided

Advisories

No information provided

Content

1. **Fundamental Concepts in Geographic Information Systems**

- a. Definition of GIS
- b. Vector and raster systems
- c. Scale and resolution
- d. Map projections and coordinate systems
- e. Applications of GIS
- f. Basics of cartographic design

2. GIS Data Sources

- a. Identify sources of GIS data
- b. Metadata
- c. Georeferencing and Global Positioning Systems (GPS)
- d. Converting digital data to a uniform projection and scale.
- e. Vector-to-raster and raster-to-vector data conversions, error propagation

3. Designing and Implementing a GIS

- a. User needs assessment
- b. Database design and management
- c. Fundamentals of data storage
- d. Database management
- e. Input of data with GPS
- f. Digitizing, scanning, editing and output

4. Spatial Analysis

- a. Map algebra
- b. Buffering
- c. Interpolation and surface analysis
- d. Network analysis
- e. Applications in Decision-Making
- f. Modeling

Lab Activities

Utilize GIS software in laboratory activities to meet objectives of course content. Laboratory activities include, but are not limited to:

1. Plan, evaluate and execute a GIS project

- a. Identify a problem of a geospatial nature
- b. Outline a strategy to solve the problem
- c. Locate relevant data sources

- d. Design and evaluate a plan to acquire the relevant data sources
- e. Incorporate data sources into a Geographic Information System and execute strategy to solve a geospatial problem
- f. Apply principles of spatial analysis
- g. Present results

Objectives

At the conclusion of this course, the student should be able to:

- Define Geographic Information Systems (GIS)
- Identify and evaluate GIS data sources and the importance of metadata.
- Demonstrate the process of converting analogue data to digital data for use in a GIS
- Identify, compare and contrast vector and raster GIS.
- Evaluate the capabilities of various GIS software programs.
- Apply cartographic principles of scale, resolution, projection and data management to a problem of a geographic nature.
- Apply spatial analysis functions on a GIS to solve a Geospatial problem.

Evaluation Methods

Objective and subjective midterm and final examinations. Reports or projects, laboratory activities using GIS software.

Textbooks

Getting to know ArcGIS, (ESRI)

GIS Systems and Science, (Longely et al)

GIS Fundamentals: A First Textbook on Geographic Information Systems, (Boldstad)

An Introduction to Geographical Information Systems, (Heywood et al)

Or other college level text as selected by the instructor