GIST 12: INTRODUCTION TO GEOSPATIAL TECHNOLOGY

Foothill College Course Outline of Record

Heading	Value
Units:	4
Hours:	3 lecture, 3 laboratory per week (72 total per quarter)
Advisory:	GEOG 11 or GIST 11; not open to students with credit in GEOG 12.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable
Cross-Listed:	GEOG 12

Student Learning Outcomes

- Define a Geographic Information System.
- Identify, compare and Contrast vector and raster GIS.
- Apply cartographic principles of scale, resolution, projection, data management and spatial analysis to a geographic nature using a GIS.

Description

Study of Geospatial Technology, including Geographic Information Systems (GIS), Global Positioning Systems (GPS), cartography, remote sensing, and spatial analysis. Application of Geographic Information Systems (GIS) science to spatial data management. Assessment of vector and raster systems, scale, resolution, map projection, coordinate systems and georeferencing. Identification and acquisition of spatial data.

Course Objectives

The student will be able to:
A. Define Geographic Information Systems (GIS) and describe the fundamental concepts of Geographic Information Systems and Technology
B. Identify, compare and contrast vector and raster GIS
C. List and evaluate the capabilities of various GIS programs
D. Discuss the importance of metadata
E. Demonstrate how to access different sources of data
F. Demonstrate the process of creating data
G. Discuss the fundamental concepts of data quality
H. Apply cartographic principles of scale, resolution, projection and data management to a problem of a geographic nature
I. Apply spatial analysis functions on a GIS to investigate a geospatial problem

Course Content

A. Fundamental concepts of Geographic Information Science & Technology
1. The GIST industry
2. Definition of GIS
3. Geospatial information systems (GIS, GNSS, RS) and their components
4. Professional applications of GIST
5. GIS software: proprietary and open source
6. GIS hardware
7. GNSS hardware
8. RS hardware
B. Understanding geospatial data
1. Types of data
2. Vector and raster systems
3. Scale, resolution, map projection
4. Coordinate systems
5. Using metadata to correctly apply spatial reference information
C. Displaying geospatial data
1. Basics of cartographic design
a. Map composition
b. Color selection
c. Thematic map display
2. Designing for different output products (web, hardcopy)
D. Acquiring and working with geospatial data
1. Identify sources of GIS data, including analog and digital sources
2. The importance of metadata
3. Using metadata to interpret attribute data
4. Geocoding
E. Global Navigation Satellite Systems
1. How GNSS systems work
2. How GNSS data is acquired
3. How GNSS data is integrated into a geospatial project
4. Georeferencing
F. Remote sensing and image classification
1. How remotely sensed imagery is acquired
2. Uses of remotely sensed imagery in GIS
3. Interpret false color aerial photography
4. Heads up digitizing techniques
G. Geospatial analysis
1. Vector to raster, raster to vector conversions and error propagation
2. Query, edit and maintain a geospatial database
3. Spatial analysis techniques, including map algebra, overlays, buffering, interpolation and surface analysis, network analysis and modeling
H. Designing and implementing a GIS
1. User needs assessment
2. Database design and management
3. Acquiring digital and analog data
4. Query, edit and maintain a geospatial database
5. Application of geospatial analysis techniques to solve problems and produce cartographic output

Lab Content

Hands-on exercises relating to:
A. Fundamental concepts in Geographic Information Science
1. Vector and raster systems
2. Scale, resolution, map projection
3. Coordinate systems
B. Geospatial data
1. Georeferencing
2. Using GPS
3. Geocoding
4. Heads-up digitizing
5. Analog and digital data sources, including aerial photography
6. Using and creating metadata
C. Spatial analysis
1. Quantitative and statistical methods; map algebra
2. Formulating geographic questions

3. GIS as a modeling tool
D. Plan, evaluate and execute a GIS project
1. Identify a problem and conduct a user needs assessment
2. Outline a strategy to solve the problem
3. Locate relevant data sources
4. Identify hardware and software needed
5. Design and evaluate a plan to acquire the data
6. Incorporate data into a GIS
7. Apply principles of spatial analysis
8. Present results

Special Facilities and/or Equipment

PC computer facilities and ESRI's ArcGIS software (or comparable vector and raster GIS software). Computer laboratory will also need internet access.

Method(s) of Evaluation

A. Examinations
B. Laboratory projects
C. Oral presentation

Method(s) of Instruction

Lecture presentations and classroom discussion. Demonstrations and hands-on exercises. Reading assignments.

Representative Text(s) and Other Materials

Bolstad, Paul. GIS Fundamentals: A First Text on Geographic Information Systems.5th ed. Eider Press, 2016.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Reading assignments: Weekly reading assignments from text and outside sources ranging from 30-60 pages per week.

B. Lecture: Weekly lecture covering subject matter from text assignment with extended topic information. Class discussion is encouraged.

C. Hands-on exercises and demonstrations: Weekly computer exercises. Each exercise covers assigned reading and lecture topics.

Discipline(s)

Geography, Drafting/CADD, Environmental Technologies, Forestry/Natural Resources