GIST 12: INTRODUCTION TO GEOSPATIAL TECHNOLOGY

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	4
Hours:	3 lecture, 3 laboratory per week (72 total per quarter)
Advisory:	This is an introductory level course in the applications of GIST, and assumes no prior knowledge of the discipline; concurrent or prior enrollment in GEOG 11 or GIST 11 recommended; 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
    i. The GIST industry
    ii. Definition of GIS
    iii. Geospatial information systems (GIS, GNSS, RS) and their components
    iv. Professional applications of GIST
    v. GIS software: proprietary and open source
    vi. GIS hardware
    vii. GNSS hardware
    viii. RS hardware
b. Understanding geospatial data
    i. Types of data
    ii. Vector and raster systems
    iii. Scale, resolution, map projection
    iv. Coordinate systems
    v. Using metadata to correctly apply spatial reference information
c. Displaying geospatial data
    i. Basics of cartographic design
        1. Map composition
        2. Color selection
        3. Thematic map display
    ii. Designing for different output products (web, hardcopy)
d. Acquiring and working with geospatial data
    i. Identify sources of GIS data, including analog and digital sources
    ii. The importance of metadata
    iii. Using metadata to interpret attribute data
    iv. Geocoding
e. Global Navigation Satellite Systems
    i. How GNSS systems work
    ii. How GNSS data is acquired
    iii. How GNSS data is integrated into a geospatial project
    iv. Georeferencing
f. Remote sensing and image classification
    i. How remotely sensed imagery is acquired
    ii. Uses of remotely sensed imagery in GIS
    iii. Interpret false color aerial photography
    iv. Heads up digitizing techniques
g. Geospatial analysis
    i. Vector to raster, raster to vector conversions and error propagation
    ii. Query, edit and maintain a geospatial database
    iii. Spatial analysis techniques, including map algebra, overlays, buffering, interpolation and surface analysis, network analysis and modeling
h. Designing and implementing a GIS
    i. User needs assessment
    ii. Database design and management
    iii. Acquiring digital and analog data
    iv. Query, edit and maintain a geospatial database

v. 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
   i. Vector and raster systems
   ii. Scale, resolution, map projection
   iii. Coordinate systems
b. Geospatial data
   i. Georeferencing
   ii. Using GPS
   iii. Geocoding
   iv. Heads-up digitizing
   v. Analog and digital data sources, including aerial photography
   vi. Using and creating metadata
c. Spatial analysis
   i. Quantitative and statistical methods; map algebra
   ii. Formulating geographic questions
   iii. GIS as a modeling tool
d. Plan, evaluate and execute a GIS project
   i. Identify a problem and conduct a user needs assessment
   ii. Outline a strategy to solve the problem
   iii. Locate relevant data sources
   iv. Identify hardware and software needed
   v. Design and evaluate a plan to acquire the data
   vi. Incorporate data into a GIS
   vii. Apply principles of spatial analysis
   viii. Present results

Special Facilities and/or Equipment

1. PC computer facilities and ESRI's ArcGIS software (or comparable vector and raster GIS software). Computer laboratory will also need internet access.
2. When taught via Foothill Global Access, ongoing access to computer with email software and hardware; email address.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Examinations
Laboratory projects
Oral presentation

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture presentations
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, 6th ed.. 2019.

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

a. Weekly reading assignments from text and outside sources ranging from 30-60 pages per week.
b. 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 or Drafting/CADD or Environmental Technologies or Forestry/ Natural Resources