GIST 52: GEOSPATIAL DATA ACQUISITION & MANAGEMENT

Foothill College Course Outline of Record

Effective Term:	Summer 2022
Units:	4
Hours:	3 lecture, 3 laboratory per week (72 total per quarter)
Advisory:	This is an intermediate level course in GIS, and assumes solid understanding of GIST and the ability to use industry standard software; successful completion of GEOG 11 or GIST 11 and GEOG 12 or GIST 12 strongly recommended; not open to students with credit in GEOG 52.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Demonstrate the process of converting analogue data to digital data for us in GIS.
- Identify and discuss GIS data sources.
- Create new GIS databases.

Description

Study of Geographic Information Systems (GIS) science and its applications to spatial data management. Data acquisition using GPS, digitizing and scanning techniques. Data management. Editing and verifying. Raster data manipulation and importing. Database management. Advanced queries and database manipulation.

Course Objectives

The student will be able to:

1. Describe the concepts and applications of remote sensing, GPS, and affiliated data capture technologies.
2. Demonstrate the process of field data collection, and converting analogue data to digital data for use in a GIS.
3. Demonstrate the ability to compile existing data, collect, record, and utilize spatial data and databases.
4. Evaluate Data Base Management Systems (DBMS) of specific GIS software and explain how to convert data between different formats.
5. Create new GIS databases.
6. Plan, evaluate and execute an original GIS project.

Course Content

1. Basics of geospatial data
    a. Data organization and formatting
    b. Vector and raster data formats
    c. Hierarchal, network, and relational databases
2. Database design
    a. Differences between a georelational and object-based data model
    b. Methods to collect, create and process spatial data
    c. Database storage and interoperability
3. Database schema implementation
    a. Database subtypes and domains

b. Primary and foreign keys

c. Data validation

d. Relational databases

e. Conversion between databases

4. Vector data structure

a. Vector data geometry

b. Topological and non-topological features

c. Topological relationship with a vector dataset

5. Spatial data quality

a. How to collect, record and utilize spatial data in a variety of environments

b. How to create metadata

c. Edit location errors from spatial data sources

d. Identify sources of spatial data error

e. Challenges associated with vector and raster data aggregation

6. Raster data structure

a. Methods of raster storage including run-length-encoding and quad-trees

b. Attribute management

7. Data sources

a. Scanning

b. Heads up digitizing

c. GPS

d. Geocoding

e. Public and private sources of data

8. Plan, evaluate and execute an original GIS project

a. Identify an original 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. Present assessment of results

Lab Content

Hands-on exercises relating to:

1. Designing and implementing a GIS
    a. Database design and management
    b. Fundamentals of data storage
    c. Database management
    d. Input of data with GPS
    e. Digitizing, scanning and editing
    f. Geospatial data resources
2. GIS data sources
    a. Identify sources of digital GIS data
    b. Converting digital data to a uniform projection and scale
    c. Vector-to-raster and raster-to-vector data conversions, error propagation and database management
3. Plan, evaluate and execute an original GIS project
    a. Identify an original 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. Present assessment of 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:

Exam
Laboratory projects
Outside class project
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

1. Weekly reading assignments from text and outside sources ranging from 30-60 pages per week.
2. Weekly lecture covering subject matter from text assignment with extended topic information. Class discussion is encouraged.
3. 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