GIST 11: INTRODUCTION TO MAPPING & SPATIAL REASONING

Foothill College Course Outline of Record

Effective Term:	Summer 2025
Units:	4
Hours:	4 lecture per week (48 total per quarter)
Advisory:	This is an introductory level course in the applications of GIST, and assumes no prior knowledge of the discipline; Elementary Algebra or equivalent recommended; not open to students with credit in GEOG 11.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area 1B: Oral Communication & Critical Thinking
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable
Cross-Listed:	GEOG 11

Student Learning Outcomes

- Demonstrate the use of geographic technologies to analyze real world problems and make informed, data driven decisions.
- Describe how to access different sources of data, describe the process of creating data with different geographic technologies, and discuss the fundamental concepts of data quality.
- Evaluate cartographic products in terms of their aesthetic design and ability to communicate information.

- Identify, explain, and interpret spatial patterns and relationships, such as how places are similar and different, the nature of transitions between places, and how places are linked at local, regional, and/or global scales.
- Describe how paper maps and Geospatial Technology can be used for geographic inquiry.
- Describe how GIS&T helps to solve problems of a spatial context.
- Interpreting maps and data.

Description

Introduction to the fundamental concepts of geospatial technology, including Geographic Information Systems (GIS), Remote Sensing (RS) and Global Positioning Systems (GPS), map reading, and cartography. Exploration of how geospatial technologies are used in addressing human and environmental issues and can promote sustainability.

Course Objectives

The student will be able to:

1. Describe how paper maps and geospatial technology can be used for geographic inquiry.
2. Describe the historical development of GIST.
3. Describe how GIST helps to solve problems of a spatial context.
4. Interpret maps and mapped data.
5. Evaluate cartographic products in terms of their aesthetic design and ability to communicate information.
6. Demonstrate the use of geographic technologies to analyze real world problems and make informed, data driven decisions.
7. Describe how to access different sources of data, describe the process of creating data with different geographic technologies, and discuss the fundamental concepts of data quality.
8. Identify, explain, and interpret spatial patterns and relationships, such as how places are similar and different, the nature of transitions between places, and how places are linked at local, regional, and/or global scales.

Course Content

1. Introduction to geospatial technology
    a. Describe and provide examples of applications of geospatial technology
    b. Discuss the components of geospatial technology, including remote sensing, GIS, GPS and its relationships to other fields
    c. Discuss the historical origins of the geospatial technology industry
    d. Discuss codes of professional ethics and rules of conduct for geospatial professionals
2. Introduction to spatial reasoning
    a. Identify, explain, and interpret spatial patterns and relationships
    b. Describe the scientific method, including the formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of a hypothesis
3. Projections and coordinate systems
    a. Describe characteristics and appropriate uses of common geospatial coordinate systems
    b. Discuss the roles of several geometric approximations of the earth's shape, such as geoids, ellipsoids, and spheres
    c. Describe characteristics and appropriate uses of common map projections
4. Cartography
    a. Demonstrate proficiency in map reading and interpretation
    b. Demonstrate how the selection of data classification and/or symbolization techniques affects the message of the thematic map
    c. Critique the design of a given map in light of its intended audience and purpose
    d. Analyze the relationship between scale and the level of geographic detail in a representation
    e. Employ cartographic design principles to create effective and visually compelling printed and online maps
5. Geospatial data
    a. Identify and describe basic types of maps and geographic data used with a GIS, and how data is collected in the field
    b. Compare and contrast raster and vector data structures and operations
    c. Give examples of how GIS has been used in the modeling of physical and human processes, including environmental and sustainability issues

d. Discuss the art and science of representing real-world phenomena in GIS

6. Data quality
    a. Discuss the elements of geospatial data quality, including spatial accuracy, resolution, precision, and fitness for use
    b. Discuss the concept of uncertainty, and the ways in which it arises from imperfect representation of geographic phenomena
7. Methods of spatial analysis
    a. Use geospatial software tools to perform basic GIS analysis functions
    b. Demonstrate the use of web mapping tools to study and develop possible solutions to real world problems
8. Satellite positioning and other measurement systems
    a. Describe the principles behind GPS, and some of its applications, including recreational, mapping, and surveying
    b. Describe the basic components and operations of the Global Navigation Satellite System (GNSS), including the Global Positioning System and similar systems
9. Remote sensing and photogrammetry
    a. Explain the difference between active and passive sensors, citing examples of each and how they are deployed
    b. Differentiate the several types of resolution that characterize remotely-sensed imagery, including spatial, spectral, radiometric, temporal, and extent
    c. Aerial and satellite imagery interpretation
    d. Use the concept of the "electromagnetic spectrum" to explain the difference between optical sensors, microwave sensors, multispectral and hyperspectral sensors
    e. Define "orthoimagery" in terms of terrain correction and georeferencing
    f. Demonstrate ways how remotely-sensed imagery can be incorporated into a GIS
10. Trends in geospatial technology
    a. Describe geoportals that allow remotely stored data to be discovered and accessed
    b. Discuss future trends in geospatial technology

Lab Content

Not applicable.

Special Facilities and/or Equipment

1. Classroom with individual student computers with internet access
2. Instructor workstation with internet access and digital projector
3. When offered via distance learning, a course management system such as Canvas

Method(s) of Evaluation

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

Quizzes
Problem sets
Tests
Projects

Method(s) of Instruction

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

Lecture
Cooperative learning exercises
Hands-on exploratory computer activities
Discussions

Representative Text(s) and Other Materials

Kimerling, Jon, Aileen R. Buckley, Phillip C. Muehrcke, and Juliana O. Muehrcke. Map Use: Reading Analysis Interpretation, 8th ed.. 2016.

Although this text is older than the suggested "5 years or newer" standard, it remains a seminal text in this area of study.

Types and/or Examples of Required Reading, Writing,

and Outside of Class Assignments

1. Weekly reading assignments from the textbook and objective quizzes
2. Written assessments that determine student's mastery of course learning outcomes (SLOs)
3. Map analysis based project

Discipline(s)

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