GEOG A190: DIGITAL MAPPING: INTRODUCTION TO GIS

Item	Value
Curriculum Committee Approval Date	10/07/2020
Top Code	220600 - Geography
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Associate Science Local General Education (GE)	• Area 4 Social and Behavioral Sciences (OSD)

Course Description

This course introduces students to the unique concepts and practical uses of Geographic Information Systems (GIS) technology and ArcGIS software. Students will be taught how to retrieve and apply data in their chosen academic area of interest for selected GIS applications. The course implements advanced computer technology, aerial photography, topographic maps, satellite imagery, and Global Positioning Systems (GPS) data. Classroom activities provide students with applications from various fields including Geography, Geology, Environmental Science, Biology, Anthropology, Public Health, Business, Marketing, Political Science, and Economics. ADVISORY: CIS A100. Transfer Credit: CSU. C-ID: GEOG 155.**C-ID:** GEOG 155.

Course Level Student Learning Outcome(s)

1. Student will identify, analyze and interpret spatial information for the earth using GIS.
2. Student will understand how to represent the spatial distributions, processes and controls of the features for the earth's features from the global to local scale using GIS.

Course Objectives

- 1. Operate in the GIS desktop environment.
- 2. Organize and categorize GIS data.
- 3. Explain the distortions and uses of various map projections.
- 4. Identify types of geographic data.
- 5. Utilize various standard geographic grids.
- 6. Demonstrate basic cartographic skills.
- 7. Classify geographic data.
- 8. Add themes.
- 9. Use spatial analysis to combine and edit geographic data.
- 10. Locate sources of GIS data.
- 11. Manage GIS files and workspaces.
- 12. Modify the user interface.
- 13. Create a new function in GIS using existing scripts.

Lecture Content

I. Introduction and Basic Concepts A. Windows Navigation 1. Network file system 2. Accessing laboratory exercises B. GIS Terminology and Overview 1. Definition of GIS 2. Spatial data 3. Database attributes 4. Computer cartography C. Essential elements of a GIS system 1. Hardware requirements 2. Software requirements D. ArcMap Environment 1. View window nb sp; 2. Layout window II. Exploring ArcMap A. Displaying map data B. Navigating a map C. Opening a map document D. Identifying features E. Using basic toolsIII. Exploring ArcCatalog A. Browsing map data B. Searching for map data C. Adding data to ArcMap D. Interacting with data E. Working with map layersIV. Creating and Editing Data A. Creating shapefiles B. Digitizing, modifying, and editing features C. Editing feature attribute values D. Exporting data E. Using features construction tools F. Splitting and merging features G. Creating x/y data from an Excel spreadsheet V. Base Maps, Coordinate Systems, and Map Projections A. Defining a map projection B. Projecting data for display C. Geographic grids D. Latitude and Longitude E. State Plane coordinate system F. Universal Transverse Mercator coordinate system G. Converting digital data to a uniform projection and scale H. Working with coordinate systems and projections VI. Types of Geographic Data and Representations A. Vector Data 1. Point features 2. Line features 3. Area features 4. GPS data features p; 5. Geoprocessing vector data B. Raster Data 1. Aerial photographs 2. Topographic images 3. Satellite images 4. Google Earth images C. Attribute files 1. Adding new variables 2. Calculating new variables D. Introduction to converting data from raster to vector and vector to raster VII. Cartographic Principles and Map Design A. Map composition essentials 1. Map scales nbsp; 2. Scale bar 3. Legend 4. Neatline 5. Inset maps 6. Title 7. North arrow 8. Adding standard map elements B. Cartographic Symbology 1. Point 2. Line 3. Polygon 4. Text 5. Color 6. Graphics 7. Custom symbology C. Map Layout and Design 1. Laying out the page 2. Creating a cartographically-accurate map 3. Adding final touches to the map 4. Setting the print and page options 5. Making maps for presentation VIII. Data Collection Database Management A. Internet browsing B. Recognizing and identifying valid sources of GIS data C. Working with compressed files D. Changing file sizes E. File and workspace organization F. Creating and editing Metadata IX. Spatial Data Analysis A. Database queries based on spatial data operations B. Creating buffers C. Overlaying data D. Clipping layers E. Dissolving layers F. Exporting data G. Joining and relating data H. Global Positioning Systems (GPS) data collection and input I. Additional types of spatial analysis 1. Interpolation and surface analysis 2. Network analysis 3. GIS applications in decision making 4. 3-D Modeling 5. Calculating attribute values X. GIS Applications A. Business B. Environmental C. Urban Planning D. Government E. Marketing F. User needs assessment XI. Final Project Design A. Asking geographic questions B. Identifying a problem of a geospatial nature C. Solving problems with GIS D. Locating relevant geographic data sources E. Designing and evaluating a plan to acquire relevant geographic data sources F. Analyzing data by using tools and queries G. Applying geographic knowledge in a specific application H. Presenting results XII. Guest Lectures A. Geology B. Anthropology C. Biology D. Sociology E. Public Health F. Business XIII. Labeling Features A. Using dynamic labels B. Setting rules for placing labels C. Using interactive labeling D. Creating annotation XIV. Querying Data A. Identifying features B. Selecting features C. Finding features D. Hyperlinking features XV. Building Geodatabases A. Creating a personal geodatabase B. Creating feature classes C. Adding fields and domains

XVI. Geocoding A. Creating an address locator B. Geocoding address locations C. Examining geocoding results D. Matching addresses E. Re-matching addresses F. Troubleshooting problems and issues XVII. Georeferencing A. Georeference aerial photos B. Georeference topographic images C. Digitizing features from a georeferenced image XVIII. GPS Uses and Applications A. Working with GPS equipment in the field B. GPS survey of Orange Coast College and environs C. Plotting GPS points, polygons, and lines from survey data D. GPS/GIS integration and plotting coordinates XIX. Classification Representation of Spatial Data A. Classification Methods 1. Quantiles 2. Equal Interval 3. Natural Breaks 4. Standard Deviation 5. Graduated Symbols B. Color Standards XX. Modifying User Interfaces and Customizing ArcGIS A. Adding and deleting buttons and colors B. Creating new toolbars C. Creating new templates D. Adding GIS functions E. Finding scripts for programming F. Add and modify commands G. Creating new menus and shortcuts

Lab Content

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Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

1. Computer projection 2. Lecture and discussion 3. Laboratory assignments and hands-on activities illustrating lecture topics 4. Collaborative assignments and peer reviews 5. Handouts of current GIS literature and applications

Reading Assignments

Reading supplemental articles and exploring online resources and materials (2 hours/week total)

Writing Assignments

Working on written assignments and completing a final project in a professional proposal format. (2 hours/week total)

Out-of-class Assignments

Working on class assignments, interacting with maps and displaying map data, completing a final map series, and completing a final project in a professional proposal format. (2 hours/week total)

Demonstration of Critical Thinking

Evaluation of computer laboratory exercises. Written assignments and project proposals. Oral presentations. Peer review of maps and projects. Short answer/essay examinations. Practical examinations. Final project demonstrating introductory knowledge and application of GIS.

Required Writing, Problem Solving, Skills Demonstration

Evaluation of computer laboratory exercises. Written assignments and project proposals. Oral presentations. Peer review of maps and projects. Short answer/essay examinations. Practical examinations. Final project demonstrating introductory knowledge and application of GIS.

Eligible Disciplines

Geography: Master's degree in geography OR bachelor's degree in geography AND master's degree in geology, history, meteorology, or oceanography OR the equivalent OR see interdisciplinary studies. Master's degree required.

Textbooks Resources

1. Required Ormsby, T. et. al.. Getting to Know ArcView GIS, ed. Redlands: ESRI Press, 2018 Rationale: - 2. Required Gorr, W. and Kurland, K.. "GIS Tutorial 1: Basic Workbook, 4 ed. Redlands: ESRI Press, 2010 Rationale: - 3. Required Brewer, C.. Designing Better Maps: A Guide for GIS Users, 2005 ed. Redlands: ESRI Press, 2002 Rationale: - 4. Required Bolstad, P. . GIS Fundamentals: A First Textbook on Geographic Information Systems, 4 ed. White Bear: Eider Press, Inc, 2012 Rationale: -