

GEOG 0094 - GEOSPATIAL ANALYSIS

Catalog Description

Prerequisite: Completion with grade of "C" or better or concurrent enrollment in GEOG 90 or 91B

Hours: 54 lecture

Description: Geospatial analysis reveals patterns, relationships, and trends that solve real-world challenges. With GIS tools, students create surface contours, derive slopes, calculate flow direction, draw watersheds, determine line of sight and identify hotspots. GIS modeling and extensions are used. (CSU)

Course Student Learning Outcomes

- CSLO #1: Recall how to transform coordinate grid systems, projections and datum to align all displayed GIS layers.
- CSLO #2: Assess appropriate approaches to spatial modeling on a case-by-case basis.
- CSLO #3: Perform classifications, clusters, and weighted overlays in conjugation with statistical analysis.
- CSLO #4: Create surfaces using Spatial Analyst or 3D Analyst.
- CSLO #5: Rank attributes with color intensity using raster modeling.

Effective Term

Fall 2021

Course Type

Credit - Degree-applicable

Contact Hours

54

Outside of Class Hours

108

Total Student Learning Hours

162

Course Objectives

1. Construct comprehensive framework or model to address stated problems.
2. Transform coordinate, projections and datums for display purposes.
3. Assess different approaches to spatial modeling.
4. Evaluate type of raster analysis to achieve stated objectives or anticipated results;
5. Generate basic water-based analysis results, such as flow direction.
6. Perform classifications, clusters, weighted overlays in conjunction with statistical analysis.
7. Create surfaces, using extensions such as 3D analyst; DEM creation and use.
8. Build a raster suitability model using ranking method with color intensification schemes; and integrate with other geo-spatial analysis.

9. Using spatial statistics, such as tracking criminal activity, transform into a hot spot model and map. May use 2D or 3D to represent patterns.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Projects
 - Example: Build 3-D terrain DEM model or TIN for visualization purposes using appropriate tools to create an attractive map. Grading will be based upon accuracy and presentation, which may be Web based maps.
- Skill Demonstrations
 - Example: Demonstrate mastery of geo-processing visualization tool or specialized extension to perform specific objectives, such as deriving contours, aspect and slope from DEM elevation models in a mapping project. Instructor will measure success by student being able to create the most common type of map, in this case, GIS layers with south facing slopes that are steep and prone to severe fire hazards, used as an example for a GIS layout.

Repeatable

No

Methods of Instruction

- Lecture/Discussion
- Distance Learning

Lecture:

1. Instructor lecture that emphasizes logical progression of framing the question and how to break down the problem. In small groups, students will diagram these steps in sequential bubbles to create a working model. Evaluate what raster or vector data are needed, as well as how both kinds of data are stored in a database.
2. Instructor lecture on geo-spatial data followed by students solving problems by visualizing, querying, creating, editing, analyzing, and presenting geo-spatial data in both 2D and 3D using extensions. Example would be to work with crime data to spatially analyze crime patterns.

Distance Learning

1. Instructor creates a series of exercises related to creating terrain models using Digital Elevation Models (DEMs) or similar data. Example: Create terrain models to show how wildfire would likely travel up steep slopes. The lecture describing DEMs will be delivered through a slide lecture presentation on a LMS platform. Likewise, the instructor may use videos uploaded into LMS for students to watch the instructor demonstrate DEM modeling. Student complete project to create their own terrain model using DEMs for other locations and applications, such as flooding zones, then incorporate into a final project.

Typical Out of Class Assignments

Reading Assignments

1. Read the introductory chapter, to investigate different applications of spatial modeling to answer specific questions, such as mapping the distributional trend for a set of crimes that might identify a relationship to particular physical features (a string of bars or restaurants, a particular boulevard, and so on) and be prepared to discuss in class. 2. Read the "A Guide to GIS Analysis," to determine the most effective means to map density (dot map, raster surfaces, density by polygon) by comparing other similar applications and be prepared to discuss in class.

Writing, Problem Solving or Performance

1. Exploratory data analysis (EDA) Looking at spatial statistics, explore data that reveal geographic patterns. Specifically use tools such as a histogram to identify outliers and manipulate class divisions to flesh out objectives such as high & low data values, hot spot analysis, detect the unexpected, locate mean center, calculate deviational ellipses, etc. 2. Create Topographic Surfaces Using a Digital Elevation Model (DEM) and related GIS data layers, manipulate ESRI Spatial Analyst extension to derive contours, slopes, aspect, and prominent ridgelines to ascertain high risk or hazardous fire areas useful to determine home insurance rates.

Other (Term projects, research papers, portfolios, etc.)

1. Final analysis project to include in mapping portfolio.

Required Materials

- Getting to Know ArcGIS Pro 2.6
 - Author: Michael Law and Amy Collins
 - Publisher: ESRI Press
 - Publication Date: 2020
 - Text Edition: 3rd
 - Classic Textbook?:
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.