Syllabus GEOG2920: Spatial Analysis

About this course

Welcome to GEOG 2920, Spatial Analysis in GIS! In this class we will focus on problem-solving and decision-making using geospatial analysis techniques. These skills are used in many industries and will make you a more powerful GIS user. We are in an era of Big Data and GIS power users are at the forefront connecting people and helping to understand our Earth and the challenges we all face.

The structure of the course will be a combination of computer exercises utilizing ArcGIS Pro, readings from various fields about Spatial Analysis, and a project which will showcase your skills and creativity. We will have two short written exams where you can demonstrate your proficiency and literacy in the subject. Throughout the class, we'll address the college-wide learning outcomes listed below.

This course introduces students to problem-solving and decision-making using geoprocessing techniques to spatially analyze data that cannot be easily understood with typical databases. This course will analyze existing data to create new data and information about the spatial and temporal world we live in. In this course, we will explore various topics related to spatial analysis and gain hands-on skills for applying these techniques.

Course Learning Outcomes

· Apply the knowledge and skillsets of spatial analysis to map where things are spatially using spatial and non-spatial data.

· Apply the knowledge and skillsets to spatially analyze quantities, classes, categories, clusters, and density.

· Apply the knowledge and skillsets to analyze data within overlaying datasets spatially.

· Apply the knowledge and skillsets to spatially analyze what is nearby a geographic location using geoprocessing techniques.

· Apply the knowledge and skillsets to measure spatial and temporal change spatially.

· Apply the knowledge and skillsets to measure the geographic distribution of physical and cultural features on the earth's surface.

· Apply the knowledge and skillsets needed to measure spatial patterns and clusters geographically.

· Apply the knowledge and skillsets needed to present results from spatial analysis using appropriate visualizations for the intended audience.

Course Structure

The workload in this course will be approximately split between the following categories:

Tutorials (in-class 'labs')………………………………………………….45%

Homework (maps and study questions)…………………………….15%

Topical Reading and Discussions………………………………………..15%

Exams………………………………………………………………………………..10%

Project………………………………………………………………………………….15%

Textbook

· No textbook required for this course

· We will utilize a variety of Open Educational Resources (OER) online

1. De Smith, M. J., Goodchild, M. F., & Longley, P. (2007). Geospatial analysis: a comprehensive guide to principles, techniques and software tools. Troubador publishing ltd. www.spatialanalysisonline.com
2. Brown, C., Harder, C. (2016). The ArcGIS Imagery Book. New View. New Vision. ESRI Press. https://learn.arcgis.com/en/arcgis-imagery-book/#home-overview

· Excerpts and readings from peer reviewed journals provided through the Library.

· All data and assignments will be provided by the instructor.

Late Work

The techniques learned in this class build upon one another, so falling behind can have a severe impact. Late work will be accepted with a 10% penalty per day. No late work will be accepted past 10 days, or past the end of the semester. Please contact your instructor ahead of time if special circumstances arise.

Attendance

Attendance and seating will be recorded per SLCC guidelines, following all Covid-19 recommendations. Maintaining good attendance is key to success in this course. Class discussions and computer lab time are critical for mastering the Learning Outcomes of Spatial Analysis.

Collaboration and Academic Dishonesty

Science is, by its nature, a collaborative endeavor, and thrives on the sharing and refinement of ideas. In this class you are encouraged to collaborate on in-class activities and homework assignments. Academic dishonesty, however, happens when you start passing off someone else's ideas as your own. All cases of academic dishonesty will be reported.

Course Grade Structure

Final grades will be awarded on the following scale:

A = 100-94% A- = 93-90%

B+ = 89-87% B = 86-84% B- = 83-80%

C+ = 79-77% C = 76-74% C- = 73-70%

D+ = 69-67% D = 66-64% D- = 63-60%

E = <60%

Course Calendar-

*Subject to Change with notice

Week 1: Introduction to Spatial Analysis

Week 2: Mapping Where Thigs Are

· Working with Categories, Controlling displayed values, Limiting values to display

· Reading Topic: Indigenous Resources

Week 3: Mapping the Most and Least

· Mapping quantities, Choosing classes, Creating a map series, Working with charts

· Reading: Environmental management and protection

Week 4: Mapping Density

· Displaying density for analysis, Creating dot density maps, Creating a density surface

· Reading: Understanding Archaeological Resources

Week 5: Finding What's Inside

· Overlaying datasets for analysis, Finding features partially inside

· Reading: GIS for municipalities

Week 6: Midterm

Week 7-8: Finding What's Nearby

· Selecting features nearby, Creating buffer features, Clipping features, Quantifying nearness, Creating distance surfaces, Calculating cost along a network

· Reading Topic: GIS for Emergency Management

Week 9: Mapping Change

· Mapping change in location, Mapping change in location and magnitude, Mapping percentage change in value

· Reading Topic: Mapping the Spread of Communicable Disease

Week 10: Measuring Geographic Distribution

· Calculating centers, Adding weights to centers, Calculating standard distance, Calculating a standard deviational ellipse, Calculating the linear directional mean

· Reading Topic: Using GIS to understand and address educational inequity

Week 11: Analyzing Patterns

· Using average nearest neighbor, Identifying the clustering of values, Checking for multi-distance clustering, Measuring spatial autocorrelation

· Reading: Political Redistricting

Week 12: Identifying Clusters

· Performing cluster and outlier analysis, Performing hot spot analysis

· Reading Topic: Crime Analysis

Week 13-15: Final Project and Final Exam