GEOG 494/594 Spatial Analysis

Course Overview

In recent years, vast amounts of spatial data have become available, but analytical tools are needed to understand what it means in a geographic context. In this course students will learn variety of spatial analysis techniques that can be used to transform spatial data into geographic understanding.

Students will learn about specific topics including descriptive spatial analysis, probability theory, spatial sampling, inferential spatial analysis, spatial interpolation, spatial correlation and geographic regression. Equally important, students will learn how to determine which techniques are suited to particular geographic questions as well as their limitations. We will discuss the mathematics underpinning many of the methods, but the focus of the course is for students to develop an intuitive understanding of the various methods we learn, not to memorize mathematical details.

To implement the methods we learn in class, students will use the scientific and statistical programming language R. R is straightforward to learn and no previous programming experience is required to excel in the course.

Lectures focus on the geographic theory and mathematical foundations of each method, while labs provide an opportunity for students to become familiar with R and how to implement the methods we learn in lecture.

Students who successfully complete this course will develop a personal toolkit to help them understand and analyze spatial data in a larger geographic context. They will also become familiar the overarching concepts and terminology of spatial analysis, providing them the technical literacy required to actively participate in scientific research employing a range of spatial analytical approaches.

Instructor

Michael Nelson
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Condon 160/161
Office Hour: Wednesday 2:00 to 4:00 pm

GTF

Geoffrey Johnson

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Office Hour: Monday 11:00 am - 1:00 pm

Lectures

Tuesdays and Thursdays @ 1:00pm to 1:50pm in McKenzie 121.

Labs

Monday 2:00 pm to 3:50 pm in McKenzie 445 or

Tuesday 2:00 pm to 3:50 pm in McKenzie 445.

Textbooks

Required: Rogerson, P. 2015. Statistical Methods for Geography. Sage, Thousand Oak, CA.

Course software

RStudio (Links to an external site.)Links to an external site.

Expected Learning Outcomes

Students who successfully complete this course will be able to:

- Evaluate geographical questions and determine the appropriate spatial analysis tools.
- Analyze geographic data to characterize spatial patterns of observations and spatial relationships between variables.
- Analyze and interpolate observational spatial data in order to create continuous surfaces.
- Implement a suitable spatial analytical workflow to address geographical questions.
- Demonstrate proficiency in using the scientific programming language R to conduct spatial analysis.
- Demonstrate familiarity with the concepts and terminology of spatial analysis in order to understand current scientific research in spatial analysis.
- Effectively communicate their own work in spatial analysis using the language of scientific writing.

Estimated Student Workload

Each week students will attend two 1-hour lectures and one 2-hour lab. During the term you will complete four assignments and a final project, as well as ten weekly exercises.

Assignments help students learn to implement spatial analytical methods. The creation of assignment deliverables provides the students an opportunity to practice effective scientific communication.

Lab time will be devoted to helping students become proficient with the methods covered in the course and how to implement them in the R language. Labs are a valuable resource for students, providing them structured time with the lab instructor to acquire the skills and techniques needed to characterize spatial patterns, interpolate spatial data, as well as become proficient in using R to conduct spatial analysis.

In addition to time spent in the classroom and in labs, students are expected to spend approximately seven hours each week outside of class allocated to preparing for lectures and completing assignments and lab exercises.

Grading

Assignments (4)	= 50%*
Final Project	= 20%
Midterm	= 15%
Final	= 15%

*Each assignment is worth 12.5% of final grade.

This course will be fully compliant with the GTFs in Graduate-Level Courses policy as outlined on the Graduate School webpage (http://gradschool.uoregon.edu/gtf/gtf-related-policies/grad-level-GTF). The GTFs will not be from the same cohort as potential graduate students enrolled in the 500-level courses. In addition, the GTFs will not be involved in grading of graduate students.

Grading Rubric

A+ (97% and greater) Only used when a student's performance significantly exceeds all requirements and expectations for the class. Typically very few to no students receive this grade.
A (90% to <97%) Excellent grasp of material and strong performance across the board, or exceptional performance in one aspect of the course offsetting somewhat less strong performance in another. Typically no more than a quarter of the students in a class receive this grade, fewer in lower-division classes.
B (80% to <90%) Good grasp of material and good performance on most components of the course. Typically this is the most common grade.
C (70% to <80%) Satisfactory grasp of material and/or performance on significant aspects of the class.

D (60% to <70%) Subpar grasp of material and/or performance on significant aspects of the class.
F (<60%) Unacceptable grasp of material and/or performance on significant aspects of the class.