Spatial Data Analysis

GEOG 5100

Instructor:

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Class Times:

Days: Monday & Wednesday
Time: 12:45-2:05 PM
Location: Monday – Derby 1080; Wednesday – Derby 135

Course Description:

This is an introductory course in statistical and computational thinking with a special emphasis on problems in the geographical sciences. This course consists of one weekly lecture and one weekly computer lab period.

Course Objectives:

Statistics is the art and science of finding patterns in data. This class teaches you about patterns in data: How to conceptualize patterns and how to use computers to identify them. This is a first course in statistics. Lectures aim to provide an intuitive understanding of statistical concepts. The goal is to teach you how to ***think*** about statistical problems.

The course is taught from ***a computational perspective***. In this class you will develop a fundamental understanding of statistical concepts and tools. And, yes, there will be a few equations involved. However, I don't believe in memorizing formulas or asking you to regurgitate those formulas. Therefore, this course emphasized how to take the statistical concepts you learn in class and use computers to find solutions to real world problems. Computers are machines and they are very good at repetitive tasks like calculating a formula but they're not very good at thinking. In this class we will pair your critical statistical thinking skills with your computer's ability to crunch lots of numbers. ***We will learn how to apply quantitative data to real world problems and accurately state what the data tells us about the problem at hand.***

The objectives of this course are to:

1. Develop "statistical literacy," a working understanding of statistics that can help you to critically evaluate data-driven results in the discipline of geography.
2. Obtain a basic set of statistical tools for data analysis, with an understanding of how to choose which tool to use, how to implement them in statistical software and how to interpret results.
3. Use R to make graphs and maps, and to implement descriptive statistics, conduct hypothesis tests about sample means, and compute regression analysis.
4. Understand problems arising from the use of spatial data

Required Materials:

Statistical Methods for Geography, 4th edition by P.A. Rogerson. 2010, Sage Publications.

This book is very reasonably priced (especially for a statistics book) and is ***required.*** Having good access to the book will be essential to success in this class. Readings will be assigned from the book weekly. Exams will cover material from the book (in addition to lecture material). Lectures will roughly parallel the assigned readings.

There will be a few additional readings available via PDF on the Carmen course website. These are also required and may be discussed in class.

There is an excellent introductory test for R – *Introductory Statistics with R* by P. Dalgaard – that may be helpful throughout the semester. It's available FREE through the OSU libraries: http://osu.worldcat.org/oclc/317883354. Click on the "View eBook" to see the free online version. I will occasionally suggest you read through chapters of this book.

Grading:

Participation:	10%
Labs (8):	40%
R tutorials (2):	5%
Final Exam:	15%
Exams (3):	30%

Participation credit can be earned in two ways 1) participation in class exercises, 2) participation in classroom discussions. I think it goes without saying that you actually have to attend class to earn a solid participation grade.

Labs will be graded for completeness and accuracy. There are 8 lab assignments. We will begin each lab on Friday, and I will provide you with a demo that you can follow. However, it is highly unlikely that you will complete these labs in class. You will need to finish them on your own. Labs are cumulative and missing a lab can have major consequences for your ability to succeed in the class. I do accept late assignments, but a penalty of 10% will be applied to late work.

R Tutorials are an easy way to get a 5% bump in your grade, and a way for you to become more competent with R throughout the semester, which will help with labs and exams. Basically, complete the tutorial and answer a few questions to prove you did it!

Final exam consists of completing a statistical analysis using the R programming language. An example of a final used a few years ago will be posted on Carmen later in the semester.

There will be three **exams** that will test your ability to apply concepts from class. I use smaller exams rather than midterms and a final to see how you're doing throughout the class. Quizzes are short – if you've studied and kept up with the material in class, they should take you no more than 15-20 min to complete. The first quiz will largely be conceptual, but as the semester goes on you will need to use R to answer many of the questions. *This means it is important to study your programming as well as the statistical concepts in class!*

I will use the scale below to calculate final grades. Note that grades are rounded and determined to 1 decimal place.

Grade	Point Range (out of 100)
A	94 - 100
A-	90 – 93.9
B+	87 – 89.9
B	84 – 86.9
B-	80 – 83.9
C+	77 – 79.0
C	70 – 76.9
D	60 – 69.9
E	59 or lower

Attendance:

Attendance in all classes and labs is mandatory. Consistent attendance is absolutely crucial to success in this class. Attendance will be taken at the beginning of each class session. Excused absences require documented evidence (doctor's note, etc.). **Note that after three (3) unexcused absences, your final grade will begin to drop by a percentage point per unexcused absence!**

Expectations and Etiquette:

I expect everyone to be respectful of class colleagues, the instructor and TA. Class disruptions and side conversations should be kept to a minimum. This includes turning off your cell phone ringer when you enter the class. In my view, talking or using an electronic device in class shows a lack of respect for me but more importantly the people sitting near you who are paying tuition to learn (about things other than your personal life). **Laptops and mobile devices should not be used in the classroom (except on specific dates)**. I will work very hard to make sure that the class operates smoothly but computers sometimes misbehave, please be patient. I understand that this is a difficult class and that sometimes life is even less cooperative than computers. If you have a personal emergency, I will do my best to help you through the class, however ***under no circumstances can you excel in this class without doing ALL of the work it requires***.

University Policies:

Disabilities:

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: **slds@osu.edu**; 614-292-3307; **slds.osu.edu**; 098 Baker Hall, 113 W. 12th Avenue.

Religious observances:

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please let me know if you need to miss class for religious purposes.

Classroom Etiquette:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Academic Misconduct:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.