GEOG 416/616
SPATIAL ANALYSIS IN GEOGRAPHY
Spring '08 Lecture/Lab T/R 11:00-12:15 MS 227 or MS 222

Instructor: Dr. Jill S. Heaton
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Course Description: Understanding spatial patterns is at the core of Geography. The objective of this class is to go beyond descriptive mapping, to explore the realms of quantitative spatial modeling, prediction, and explanation. After briefly reviewing introductory statistical methods, we will proceed to the identification, description, and modeling of spatial relationships. All the necessary software used in class will be available in the Geography computer lab. Tests and assignments will be aimed at keeping students up-to-date during the semester.

Required Text: Class reader provided.

Course Requirements

Students will be graded according to their score on two exams, five quizzes, seven lab assignments, research project (graduates only) and participation.

- *Exams* will be a combination of multiple choice, short answer, essay and exercise questions. Exams are closed book.
- *Quizzes/In Class Exercises* include no more than five questions, and should take no longer than 10-15 minutes. Each quiz covers material presented since the previous test (either Exam or Quiz). Quizzes are closed book.
- *Lab* assignments are designed to be completed in one lab period, though don't be surprised if you find yourself finishing outside of class, I can't predict how fast all of you will work. Lab exercises are due at the beginning of the next scheduled class period. Late work will not be accepted. Make-up work will be given only for an excused absence.
- The *Research project* will ask graduate students to prepare a research paper on a topic of interest to them, and approved by the instructor.
- *Participation* is essential for success in this class and attendance is required. Unexcused absences, as well as repeated tardiness, will affect this portion of the grade. In addition, graduate students will be expected to lead several small discussion groups throughout the semester on assigned journal articles.

Grades derived from:

	Geog 416	**Geog 616**
Exams (2 x 50)	100	100
Quizzes/Exercises (5 x 20)	100	100
Lab (7 x 10)	70	70
Participation	50	50
Research Project	NA	100
TOTAL	**320**	**420**

Grades

93-100% (4.0)	= A	90-92.9% (3.7)	= A-
87-89.9 (3.3)	= B+	83-86.9 (3.0)	= B
80-82.9 (2.7)	= B-	77-79.9 (2.3)	= C+
73-76.9 (2.0)	= C	70-73.9 (1.7)	= C-
67-69.9 (1.3)	= D+	63-66.9 (1.0)	= D
60-63.9 (0.7)	= D-	Below 60% (0.0)	= F

Attendance Policy: Attendance in lecture is vital for you success in this class. As a result NO UNEXCUSED absences will be allowed. Keep in mind that your grade will likely improve just from attending classes and taking notes. Each lecture builds on the previous one, so keep up with the material.
CHEATING will not be tolerated. If you are caught cheating I promise that I will do everything in my power to ensure that you fail the course!

Special Note to Graduate Students

All graduate students are expected to draw upon their experience and knowledge gained elsewhere to enhance the formation of connections between the topics covered in this class as well as related topics not explicitly covered in the course. Exams and quizzes will include extra questions. These questions are aimed at the more advanced aspects of the course subjects. Graduate students are expected to demonstrate a deeper understanding of course material; hence they are graded using higher standards than those employed for undergraduates.

Graduate students have to prepare a research paper on a topic of interest to them, and approved by the instructor. As explained below, the research project provides an opportunity for investigating course topics at an advanced level. The outcome of the research project is a paper written according to the *Guide for Authors* of a peer-reviewed, scientific journal chosen by the student. The goal is to produce a paper worthy of submission.

Graduate Student Research Project Guidelines

Each student will be required to complete an original research project. This will expose students to an unsolved question, and to the challenge of finding the best possible answer by means of creative and critical thinking. A research project implies making new observations, reading the scientific literature, and analyzing data. The outcome of the project will be a research paper. The research project will include the following components:

1. Title
2. Abstract (maximum word count 1000)
3. Dataset identification
   ****Due Week 11 (5%)****
4. Justification (in other words why would someone care)
5. Objectives
6. *Guide for Authors* (per selected journal)
   ****Due Week 12 (5%)****
7. Introduction (i.e. literature review)
8. Methods (i.e. study plan)
9. Literature Cited
   ****Due Week 14 (40%)****
10. Results
11. Discussion/Conclusions
12. Tables and Figures
    ****Due at Week 16 5pm, Friday 11 May (50%)****

Sections 7, 8, 10, and 11 should not collectively exceed more than 20 pages of written text. 12pt, Times New Roman, double spaced.

SPATIAL ANALYSIS GEOG 416/616
SPRING '08 COURSE OUTLINE
T/R 11-12:20

WEEK 1 22 January	**Lecture:** Introduction
24 January	**Lecture:** Basic Principles, Key Concepts and Important Definitions *Supplemental Reading: Ch1 Spatial Analysis for Ecologist*
WEEK 2 29 January	
31 January	**Lecture:** Conventional Statistics 101 *Supplemental Reading: Ch 3 – 4 Primer of Ecological Statistics* **Lab (Take Home Assignment):** Conventional Statistics *TBD*
WEEK 3 05 February	**Lecture:** Exploratory Data Analysis *Supplemental Reading: Ch 4 Quantitative Geography*
07 February	**Lab:** EDA *Lab Manual: GeoDa Exercise 1, 7-10*
WEEK 4 12 February	**Lecture:** Exploratory Spatial Data Analysis
14 February	**Lab:** ESDA *Lab Manual: GeoDa Exercise 11 – 12*
WEEK 5 19 February	**Lecture:** Point Pattern Analysis *Supplemental Reading: Ch 2 Spatial Analysis for Ecologist*
21 February	**Discussion:** *Austin et al. 2005*
WEEK 6 26 February	**Lecture:** Steve Francis, El Dorado County Health Department
28 February	**Discussion:** *Legendre & Fortin 1989* **Lab:** CSR *Lab Manual: Testing for Complete Spatial Randomness*
WEEK 7 04 March	**Lecture:** Testing for Spatial Structure-Spatial Autocorrelation/Dependence (Moran's I, Geary's C, Correlograms)
06 March	**Lab:** Introduction to Crime Stats *Lab Manual: Ch 1 – 4 CrimeStat Manual,*
WEEK 8 11 March	**Lab:** Moran's I, Geary's C, Correlograms *Lab Manual: Ch 1 – 4 CrimeStat Manual,*
13 March	**Lecture:** Describing Spatial Structure I (Semi-variogram/Covariance) *Supplemental Reading: Ch 3 Spatial Analysis for Ecologist*
WEEK 9 18 March	**Lecture:** Describing Spatial Structure II
20 March	**MIDTERM**
WEEK 10 25 March	**SPRING BREAK**
27 March	
WEEK 11 01 April	**Discussion:** *Rossi et al. 1992*
03 April	**Lab:** Geostatistical Analyst *Lab Manual: Modeling surfaces*

WEEK 12	
08 April	**Lab:** Geostatistical Analyst *Lab Manual: Describing surfaces and comparing models*
10 April	**Discussion:** *Wagner & Fortin 2005*
WEEK 13	AAG
15 April	**Discussion:** *Keitt et al. 2002*
17 April	**TBD**
WEEK 14	
22 April	**Lecture:** Spatial Regression Models I (Linear models) *Supplemental Reading: TBD*
24 April	**Lecture:** Spatial Regression Models II (Generalized Linear Models)
WEEK 15	
29 April	**Discussion:** *Dark 2004*
01 May	**Discussion:** *Perry et al. 2002*
WEEK 16	FINALS WEEK STARTS Wednesday
06 May	**Lecture:** Review