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Spring 2-1-2018

### STAT 544.01: Applied Spatial Statistics

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**Syllabus**  
**STAT 544, Applied Spatial Statistics**  
**Spring 2018, MWF 12:10-1:00pm in Math 311**

**Course Information:**

- **Instructor:** Jon Graham, Math 204, 243-2561, jgraham@mso.umt.edu.
- **Textbook:** None required; readings will be given when appropriate
- **References:**
  1. Interactive Spatial Data Analysis / Bailey & Gatrell (1995)
  2. Statistics for Spatial Data / Cressie (1993)
  3. Stat. Meth. for Spatial Data Analysis / Schabenberger & Gotway (2005)
  4. Introduction to Geostatistics / Kitanidis (1997)
  5. Applied Geostatistics / Isaaks & Srivastava (1989)
  6. Handbook of Spatial Statistics / Gelfand et al. (2010)
  7. Spatial Autocorrelation / Cliff & Ord (1973)
  8. Statistical Analysis of Spatial Point Patterns / Diggle (1983)
- **Office Hours:** To be announced, By appointment
- **Course Webpage:** Accessed through Moodle
- **Grading:** Homework: 35% Midterm: 25% Final Project: 40%
- **Prerequisites:** One year of statistical methods or consent of instructor

**Homework**

Homework will be assigned approximately every two weeks, and will require more than a few days work. The intent is that you will work on homework assignments throughout the period they are assigned. **NO LATE HOMEWORK WILL BE ACCEPTED FOR ANY REASON**, and the lowest homework grade will be dropped. Homework is not only a fairly substantial portion of your grade, but is vital to your success in this class. Working with other students on homework is encouraged, as long as you hand in your own work, and do not simply copy someone else's work. Solutions to all problems will be provided.

**Midterm**

The midterm exam will be cumulative and closed book. More about the exam, including the exact date will be given later. If you cannot make it to an exam, you must let me know **BEFORE** the exam is given.

**Final Project**

A **final project** is required for this course. The project will entail both a written paper and oral presentation. Please come see me by the midterm exam to discuss a topic for your project. You may choose your own topic, or come see me for help selecting one. Final projects will be presented in a poster session to be held from 10:10-12:10pm, Friday, May 11, and final papers will be due by 5:00pm on Friday, May 11.

**Course Material and Objectives**

This course is intended as an introduction to the topic of spatial statistics for graduate students with at least one year of introductory statistics. After an introduction to spatial exploratory methods and

spatial correlation, the course will focus on the three primary areas of spatial analysis methods: geostatistics (variograms, isotropy, kriging, cross-validation, spatial correlation models), area or lattice processes (Moran's I, Geary's C, Markov random fields, CAR models), and spatial point processes (quadrat methods, complete spatial randomness, Ripley's K-function). Throughout the course, the software **R** (and many of its libraries) will be used for classroom demonstrations as well as for homework assignments. **R** is available on all computers in Math 206 (near my office) and is free for download as explained on the **Introduction to R** handout.

My goal in this course is absolutely **NOT** to teach you how to use software for working with Geographic Information Systems (GIS) such as ArcInfo or other specialized software. My goal is to teach you to think about problems involving spatial data and how to address spatial correlations which may be present in your data. You will learn a number of techniques for exploring and analyzing spatial data throughout this course, but the most important thing you should get from this course is an understanding of spatial continuity and its implications on analysis.

Questions are strongly encouraged, both during class and at office hours. If you are lost and confused, please let me know.

### **Important Dates**

**Tuesday, January 30:** last day to add courses by Cyberbear without consent.

**Friday, February 9:** Last day to drop courses/change grading option in Cyberbear.

**Monday, February 19:** President's Day holiday

**Monday, March 26 – Friday, March 30:** Spring Break

**Monday, April 2:** Last day to drop courses. Paper form must be signed by advisor and instructor. A W will appear on your transcript. After this date, drops can only be done by with the Dean's signature.

**Friday, May 4:** Last day of class.

**Friday, May 4:** Last day to change grading option (letter grade to CR/NCR or vice-versa). Requires paper form signed by advisor and instructor.

### **Disability Services**

*The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. We will work with you and DSS to provide an appropriate accommodation.*

### **Academic Honesty**

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary action by the University. All students need to be familiar with the Student Conduct Code. You can find it in the A-Z index on the UM home page.