

Geography 606

Quantitative Spatial Analysis

Winter 2008

Course Information

Credit Hours: 3

Lecture: Online

Tuesdays 5:30 – 8:00 pm

Website: <http://elms.umd.edu>

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Online office hours: TBA

Course Description

This course is about quantitative analysis of spatial data. It is intended to provide a broad survey of various methods of exploratory statistical data analysis most useful in environmental and social sciences. The course is a mix of theory, methods, and applications geared towards helping students: (1) develop an understanding of the important theoretical concepts in spatial data analysis; and (2) gain practical experience in application of spatial statistics to a variety of social and environmental problems using advanced statistical software. This course covers four broad topical areas: (1) point pattern analysis; (2) area data analysis; (3) continuous data analysis; and (4) multivariate spatial analysis.

Prerequisites

Students are expected to have backgrounds in elementary statistics and introductory GIS.

Course Requirements and Grading

It is strongly encouraged to attend each lecture and actively participate in online discussion board as well as in class. Lab assignments will be given on a weekly basis to help students gain practical experience to answer specific problems. Students need to complete final projects with spatial data in their area of interest using various methods covered in this course. Final grades will be determined by the following items:

- Participation 10%
- Lab assignments 40%
- Final project 50%

Required Text

O'Sullivan, D. and D. J. Unwin (2003) *Geographic Information Analysis*, Wiley & Sons.

Other Useful References

Bailey, T.C. and A. C. Gatrell (1995) *Interactive Spatial Data Analysis*, Addison-Wesley.

Wong, D. W. S. and J. Lee (2005) *Statistical Analysis of Geographic Information*, Wiley & Sons.

Make-up Policy

Assignments must be turned in at the beginning of the class at which they are due. No late assignments will be accepted without prior arrangement. If you have a documented disability and wish to discuss academic accommodations, please contact me immediately.

Academic Integrity

The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

Within our class, students may work together to review class notes and home assignments. However, assignments must be done individually. Each student must turn in his or her own work, from his or her own computer. Any discussion or problem solution must be his or her alone, without assistance from any other person.

Online Learning

This is an online course with occasional in-person experiences. We will meet online at the announced time for a live audio/video lecture. The lecture will be archived for anyone who absolutely must miss the class, but I encourage you to login at the appointed time so that you can ask questions.

Our class will meet within Blackboard, the university's online learning system. Go to <http://elms.umd.edu> to access the course. After you login, our course will be listed in the right column under My Courses. Click on the course link to access the course.

Short videos that illustrate how to use the online learning system are available on the course page. Click the Tutorials button on the left sidebar to access the tutorials.

Hardware and Software Requirements for this course

All students must have a UMD glue account to obtain permissions to access the software in the lab and on the Citrix server. If you have never worked in the Open Lab, contact me to get permission.

We will primarily use ESRI's ArcGIS 9.3 available in the Open Lab and on Citrix. You may use either a PC or a Macintosh computer to access Blackboard. Whichever you choose, it must be equipped with the following hardware:

- Webcam
- Headset (including headphones and microphone)

You will also need the following plug-ins (be sure you have the latest versions):

- Real Media
- Flash Player
- Quicktime for PCs
- Quicktime with the Flip4Mac plugin (for Macs)

- FTP software: we recommend Secure FTP for PC and Fetch for Mac. Both of these are free downloads from <http://helpdesk.umd.edu> -- scroll down and choose Software Downloads. If you choose to use a different FTP software, it must be capable of SFTP (secure uploads).

Support for Online Learning

This method of taking classes is undoubtedly new to some of you, so we have a few tools to make life easier for you.

Email

Both TA and instructor will always be available by email. Use the email link in the sidebar to send us emails at any time. We will try to answer within 24 hours and probably much sooner.

Online office hours

We will both have office hours in a Live Classroom each week. The times will be posted in the Announcements. Use the link in the sidebar to access office hours.

On campus office hours

We will post times when we will be available on campus for face-to-face office hours. The TAs will have lab office hours on periodic Saturday mornings.

Lounge

We have created a place for you to visit with your classmates. This discussion board uses both text and voice. Share everything from discussions about the course material to what you did last weekend. I will look in from time to time but I probably won't respond to anything posted here.

Study Rooms

Several study rooms have been set up for you to form study groups with your classmates. We will not be monitoring these rooms. Remember that the Honor Code specifies that you are free to work together to discuss the assignments but that you must then separately produce an original and independent result.

Tentative Schedule

Dates	Lecture Topics	Assignment
Dec 2	Review of probability theory and elementary statistics Why spatial statistics Characteristics of spatial data	Lab 1
Dec 9	Spatial process Review of Point Pattern Analysis Statistical test for Complete Spatial Randomness (CSR) Lab exercise with ArcGIS Spatial Statistics Tools: Part 1	Lab 2
Dec 16	Advanced Point Pattern Analysis <ul style="list-style-type: none"> • Analysis of multiple events • Space-time cluster Lab exercise with SaTScan	Lab 3
Dec 23	Review of Area Data Analysis Statistical test for spatial autocorrelation Lab exercise with ArcGIS Spatial Statistics Tools: Part 2	Lab 4
Jan 6	Spatial Regression Geographic Weighted Regression (GWR) Lab exercise: GWR	Lab 5
Jan 13	Continuous data analysis Introduction to spatial stochastic process Description of continuous surface Lab exercise using ArcGIS Geostatistical Analyst: Part 1	Lab 6
Jan 20	Variogram modeling Kriging Lab exercise using ArcGIS Geostatistical Analyst: Part 2	Lab 7
Jan 27	Multivariate analysis <ul style="list-style-type: none"> • Principal component analysis • Cluster analysis 	Lab 8
Feb 3	Regression Trees & Classification	
Feb 10	Project presentation	