

GEO-SCI591D Spatial Data Analysis

3 cr, Spring 2008

Course Location: Morrill III 126, Lab in Morrill IV South 271

Lecture Time: Tu 2:30PM - 5:15PM

Instructor: Dr. Qian Yu

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Office Hours: M 2:30-3:30pm W 1:30-2:30pm or by appointment

Purpose: The course covers a broad range of spatial data analysis methods from basic statistics to advanced computational techniques. The topics include point pattern analysis, spatial prediction based on deterministic methods and Geostatistical theory, spatial autocorrelation and regression, and raster analysis. The labs are based on ArcGIS and statistical software.

The goal of this course is to introduce students various quantitative methods, particularly multivariate regression and spatial analysis, used in geographical data and applications; to teach students to understand these concepts and to be able to apply them in geographical problems.

Format: 60% lectures and class discussions, 40% seminars, class exercises including computer lab and project. Take home exercises and lab practice will be assigned to students to get familiar with the concepts discussed in class.

Prerequisite

- Basic statistical knowledge
- Introductory level GIS and know how to use ArcGIS

Required textbook:

David O'Sullivan, David J. Unwin, Geographic Information Analysis, John Wiley & Sons, Inc, Hoboken, New Jersey, ISBN: 978-0-471-21176-1, Hardcover, 448 pages, November 2002

Lab software: ArcGIS and R.

References:

Christopher D. Lloyd, Local Models for Spatial Analysis, CRC Press, 2007.

Bailey TC, Gatrell AC, Interactive spatial data analysis. Harlow, Essex, England: Longman, 1995.

Isaaks EH, Srivastava RM, An Introduction to Applied Geostatistics, Oxford University Press, 1989.

Course Evaluation: Assignment 35%, Class Participation 10%, Project (including presentation and report) 55%

Class schedule and reading

Available at <http://www.geo.umass.edu/courses/geo591d/>. It will be updated with classes progressing.

Notes and assignments in PDF will be published on the SPARK. <https://webct.oit.umass.edu/>

Notices and announcement will be published on SPARK Bulletins for update, schedule change and clarification questions

Class arrangement (Tentative)

	Topic
Jan 29 Lecture 1.	Concepts in spatial data and models
Feb 5 Lecture 2.	Point Pattern Analysis: point pattern measure and test
Feb 12 Lecture 3.	Spatial Prediction: Point interpolation by deterministic methods Thiessen polygons, Trend surface, IDW, Splines, etc
Feb 19	Monday schedule
Feb 26 Lecture 4.	Spatial Prediction: Geostatistics
Mar 4 Lecture 5.	Stationarity, Exploring spatial variation by variogram model, Kriging, etc
Mar 11 Lecture 6.	Area objects and spatial autocorrelation, GLS and spatial autoregressive models
Mar 25 Lecture 7.	Moran's I, Geary's C
Apr 1 Lecture 8.	Raster analysis: Global and local functions
Apr 8 Lecture 9.	
Apr 15 Lecture 10.	Watershed modeling in ArcGIS
Apr 22 Lecture 11.	Modeling in ArcGIS Model builder
Apr 29 Lecture 12.	Projects
May 6 Lecture 13.	
May 13 Lecture 14.	