

Spatial Analysis

GPHY 855, Fall 2011

Department of Geography, Queen's University

Instructor: **Dr. DongMei Chen**

Office: Mackintosh-Corry Hall, Room D125

Phone: (613) 5336045

E-mail: chendm@queensu.ca

Office hours: Tuesday 1 – 2 pm, Thursday 1 - 2pm or by appointment.

Class lectures: Tuesday 10am – 1pm MC E310

Course Description:

This course examines the scientific methods used to derive useful information from spatial data. Emphasis will be placed on different types of data analysis models (vector, raster, network, and surface) used in GIS and methodologies for integrating various spatial analysis and modeling techniques with GIS for environmental/urban/social-economic/health applications (e.g. watershed and hydrology analysis, land use/cover classification, dynamic urban growth models, location-allocation models. health service). Practical applications and theoretical/technical aspects of related issues will be introduced and discussed. Students are required to read papers and develop a research project.

Course Content and Schedule (*Provisional*)

Week	Class Topics - Presenter	Lab activity and assignments
1	Course Introduction - Chen	
2	Spatial data, information, and GIS - Chen	
3	The problems of spatial analysis - Chen	Spatial Analysis extension (data interpolation)
4	Vector-based and Raster-based analysis - Chen	Terrain analysis and visualization
5	Surface Analysis and network Analysis - Chen	Hydrology modeling
6	Dr. Getis's visit (Spatial stats, and disease modeling)	
7	Exploratory Spatial Data Analysis, The Modifiable Areal Unit Problem	Network analysis
8	Scale and generalization; Sampling and interpolation	Project outline due
9	Uncertainty and error modeling in GIS	
10	Dynamic modeling	
11	Ecological and environmental modeling in GIS	
12	Research Project Presentation	

Prerequisites

Basic statistics and mathematics, GIS knowledge

Evaluation and Grading

Lab exercises and reading assignments: 25%

Final Exam: 20%

Class discussion and presentation: 15%; Final research project: 40%

Final Quiz: The purpose of the final exam will be to ensure that students are comprehending and assimilating the lecture and reading materials.

Reading assignments: Students are required to read the articles assigned and write a 1-2 page summary for each topic.

Lab and assignments: Students will perform hands-on lab exercises involving different applications of spatial analysis in GIS environment. A brief (2-5 page) summary of the lab results and analysis will be required for each student.

Seminar presentations: After the first few meetings, there will be weekly seminar discussions following a brief introduction of that week's topic by the instructor. Each student will be responsible for leading at least one of the discussions during the semester. Prior to leading the discussion, the student will be responsible for finding and reading five to seven research articles that pertain to their topic. They will then select three of these articles for more in-depth analysis. *There three articles will be orally summarized to the class (about 5-15 minutes for each article) and then discussed further in an open forum. Copies of bibliographic information, abstract and pertinent graphics should be distributed at the time of the discussion.* All students are required to come to class having read the assigned articles and prepared to discuss the questions. Participation in the discussion is required and goes toward the participation portion of your final grade. The lecture is intended, as much as possible, to be an interactive environment. Please feel free at any time during lecture to ask a question or make a comment. Conversely, you are expected to respond to discussion questions asked in class.

Research Project: The objective of the project is to perform a small study that involves some type of spatial analysis for a geographic problem that you are interested in. The emphasis here is either to analyze some spatial relationship(s) or distribution(s), or to analyze the accuracy and/or efficiency of specific methods, or spatial problems that you learn from this course. You can conduct your research project using any GIS, RS, Spatial analysis or other packages that you feel comfort with. An outline covering the topic and procedures for the study is due in the eighth week, and may require subsequent iteration. Each student will summarize the procedures and results of the study in a thirty-minute presentation on the last week of class meeting. A 15-20 page final report of background, procedures, finding and results is due by 4pm, Dec. 9, 2011.

readings

Reading materials will be signed each week and you will also be expected to make use of materials placed on-line.