Spatial Analysis – Fall 2010 Syllabus

Full Class Information: ERE596 – Section 08 SPATIAL ANALYSIS

Instructor:
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Class time: Mondays 1:50 - 4:50 Baker 437

Instructor and TA Office Hours: To be determined

Course Description:
Topics covered in this course include elements of spatial statistics and modeling as applied to single point and continuous data. The triangle visualize-explore-model will be employed with emphasis in the modeling section. Examples of taught methods include: first/second order effects, complete spatial randomness, tessellation, kernel, covariograms and variograms, and several types of kriging.

Note: General programming experience and quantitative background are required. Assignments will use Matlab software package, though no prior knowledge of Matlab is required.

Course Objectives:
The course aims to provide:
- Understanding of the basic principles and concepts in spatial statistics.
- The application of spatial analysis methods to hands-on geographic problems.
- Customization of taught methods as applied to student-chosen problems.

Course Outcomes:
Upon successful completion of the course students will be able to:
- Formulate their own hypotheses on a variety of geographic problems and establish a spatial analysis plan to test multiple hypotheses for each problem.
- Synthesize various statistical methods (e.g. on point data, continuous data) to analyze their hypotheses, critique results from various methods and refine hypotheses as appropriate.
- Apply the two aforementioned goals to geographic problems beyond their strict area of expertise (e.g. a biologist working on a transportation problem).

Note: Becoming an expert in Matlab or any other software is NOT an expected outcome.

Grading:
Homeworks (35%), Midterm (25%), Project (30%), Paper Presentation (10%)

Textbook:
Interactive Spatial Data Analysis (2nd Edition) by Trevor Bailey and Tony Gatrell
Publisher: Prentice Hall, ISBN: 0582244935. Available from Follett's Orange Bookstore

Course Delivery: Class will use BlackBoard for all homeworks, lectures and class updates.

Detailed Course Content:

Students need to start by identifying a spatial problem. They should examine available spatial analysis techniques taught in lectures and establish a plan of action. They should follow the triangle visualize-explore-model. Combinations of methods can be used leading to a variety of results. Students need to evaluate these results and possibly identify a new approach to test.

Sequence of topics and concepts:

**** Introductory material**

**** Single point data**

- Visualize (Dot maps and labeling)
- Explore (First/second order effects, Quadrat, kernel, nearest neighbor, k-function)
- Model (Complete Spatial Randomness)
- Expand VEM concepts to bivariate datasets.

**** Continuous data**

- Visualize (Symbol maps)
- Explore (Moving average, tessellation, kernel, covariograms and variograms)
- Model (Trend surfaces, least squares, kriging (simple, ordinary and universal, block, co-kriging)

**** Combine the above in your project**