Community & Environmental Sociology/Sociology 977
Spatial Data Analysis
Spring 2012
Katherine Curtis
Class Meeting: 301 Ag Hall, Labs 3218 SS
316B Ag Hall/4424 Social Sciences
Class Hours: Thursdays, 1:20-3:15P
608-890-1900
Office Hours: Thursdays, 3:30-4:30P
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Course Objectives.
This course is a graduate-level seminar on conceptual motivations and technical approaches for analyzing spatially arrayed data for social science research. There are two joint objectives to this course: to gain a conceptual understanding of the role of space in sociological processes and to become technically proficient with various methods used to analyze spatial processes.

The seminar focuses largely on methods of analyzing and modeling variables measured over an irregular configuration of areal units. Other important classes of spatially-referenced data, such as point patterns, flows and continuous fields, and methods of analysis specific to them are addressed less thoroughly. This course is not a seminar in spatial econometrics, per se, although we will draw from this work. Further, this course is not a seminar in geographic information systems/science (GIS), per se, although we will become familiar with GIS tools and software in the course.

Prerequisites.
Some prior experience with census data and with GIS software is useful, but neither is a prerequisite. What is a prerequisite for this course is a solid understanding of multivariate statistics and some experience with advanced regression analysis. It also is important that you have some familiarity with matrix notation and matrix algebra. If you suspect that you do not have a sufficient grounding in statistics, it is your responsibility to gain the necessary knowledge outside of the course.

Course Format & Requirements.
Class meetings will be organized around three rotating activities: lecture, discussion and lab. All students are expected to actively participate. Students must be present to actively participate.

Students are required to submit a one-paragraph (no more than 250 words) reflecting on the week’s readings. Reflections can include points that were particularly interesting or aspects that were confusing and require further clarification. The reflections must be submitted to me via email (kcurtis@ssc.wisc.edu) at least 24 hours before the class meeting (1:20P on Wednesday).

Students are required to complete four homework assignments during the semester. The assignments correspond to the material covered in the in-class labs. I will provide example data to be used in the labs and in the homework assignments. Students are welcome (encouraged!) to use their own data on their own, but not to complete the labs and homework assignments. Collaboration of ideas among seminar participants is appropriate and encouraged, but the assignments must be executed independently. Evidence to the contrary will result in the full loss of credit on the assignment. All assignments must be submitted to me via email (kcurtis@ssc.wisc.edu) before the class meeting of the date identified on the course schedule below. Late assignments will not be accepted.

Homework assignments will be graded on the quality and clarity of content, which includes clear and accessible communication and format. Please use 11 or 12 point font, 1 inch margins, and single spacing.
There is no page limit on the homework assignments given varying needs to incorporate figures, tables, and/or citations. However, students are expected to approach the homework assignments as brief reports that summarize the main analytical strategy and findings; organization, brevity and conciseness are highly valued.

As a final assignment, students are required to complete a research proposal that follows the National Science Foundation (NSF) dissertation fellowship format. Rather than submitting a full proposal, complete with budget and biosketch, students will prepare the Project Description portion of the larger packet one would submit to NSF. Details on the format and expectations can be found at (see especially page II-8): http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/gpgprint.pdf

The 10-page limit is firm. References must be included but will not count toward the page limit. Proposals must use 11 or 12 point font, 1 inch margins, and a full space between paragraphs. Single-spacing is the norm for grant proposals and will be used in this assignment. Please submit the proposals as a *.doc or *.pdf file. The final assignment must be submitted to me via email (kcurtis@ssc.wisc.edu) by 5P on 14 May. Like a real submission, late proposals will not be accepted.

Proposals will be graded on the same principles as those used by NSF—intellectual merit and broader impacts—in addition to the quality and clarity of content. Avoid jargon. Please carefully review the proposal description (link given above) and follow up with me on any questions. Do not wait until the last minute or even the last two weeks to begin the proposal writing process. Brief (250 words) project summaries are due before class on 19 April. Students should consider exchanging drafts of proposals with peers to improve readability. As with the homework assignments, discussing ideas is acceptable and encouraged, but the work must be executed independently. Evidence to the contrary will result in the full loss of credit on the assignment.

A note on sending documents via email: please copy yourself on the message you submit to me with your attached document to confirm that the email was successfully sent.

Course grades will be based on the following percentage distribution:

- Reading Reflections: 10%
- Homework Assignments: 50%
- Research Proposal: 40%

Course Etiquette.
Come prepared. Be respectful. Turn off your cell phones.

Course Outline & Reading List.
There is one required text. The text is available for purchase through no specific vendor; it can be purchased through a number of on-line vendors.


In addition to the text, there are several required journal articles and book chapters. All required readings are available online at my faculty website (http://www.drs.wisc.edu/faculty/curtis/cesoc-977.php). Please be in touch if you have any problems accessing the articles.
Course Schedule.
All lectures and discussions will meet in 301 Ag Hall. All labs will meet in 3218 Social Sciences.

Week 1 (26 January). Lecture: Orientation to Spatial Data
No readings

Week 2 (2 February). Discussion: Spatial Data & Spatial Thinking

Week 3 (9 February). Lab: Orientation to Example Data, GeoDa & R
2. GeoDa Workbook, Chapters 2, 3 and 7-10

Week 4 (16 February). Lecture: ESDA & Spatial Autocorrelation
Homework #1 due before class
3. Ward and Gleditsch, Chapter 1 [A recent and accessible introduction to spatial data analysis aimed at social scientists]

Week 5 (23 February). Discussion: Spatial Autocorrelation
quantitative geographer who has contributed much to the spatial autocorrelation literature]


Week 6 (1 March). Lab: ESDA & Spatial Autocorrelation in GeoDa & R
1. GeoDa Workbook, Chapters 11, 12, 15-19, and 21

Week 7 (8 March). Lecture: Spatial Processes
Homework #2 due before class
3. Ward and Gleditsch, Chapters 2 and 3 [A gentle orientation to spatial regression models]

Week 8 (15 March). Discussion: Spatial Dependence & Spatial Heterogeneity

Week 9 (8 March). Lab: Traditional & Spatial Linear Regression in GeoDa & R
1. GeoDa Workbook, Chapters 22-25

Week 10 (29 March). Guest Lecture. Jun Zhu
Homework #3 due before class
Readings to be announced

Week 11 (5 April). No Class, Spring Recess

Week 12 (12 April). Lecture: Spatial Heterogeneity, Part 2


**Week 13 (19 April). Discussion: Relationship Heterogeneity**

*Research project summary due before class*


**Week 14 (26 April). Lab: GWR & Spatial Regime Analysis in R**


**Week 15 (3 May). No Class, Writing Day**

*Homework #4 due before regular class meeting time*

**Week 16 (10 May). Course Wrap-up**

14 May. Research Proposals Due (5P)