John Jay College of Criminal Justice

**Space, Crime and Place:**

**An Introduction to Spatial Statistics**

Tuesday/Thursday 2:50-4:05

(CJBA 363)

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Office Hours

Tue/Thur 4:30-5:30

& By Appointment

Space is the Place. --Sun Ra

Course Description

This is an introduction to spatial statistics. Spatial regression analysis is a collection of statistical methods specifically designed to address problems of spatial dependence in cross-sectional and panel data. The foundations of these techniques will be covered here. Descriptive spatial statistics, spatial weights, and spatial autocorrelation will be explored, as well as the theoretical underpinnings of these techniques. Spatial statistics are increasingly used in the study of crime and justice, demography, epidemiology, economics and many other fields. All social phenomena occur in time and space, this course will identify the influence of space on social phenomena.

Learning Outcomes

1. Students will be familiar with the foundation of spatial analysis.
2. Students will be able to manipulate, display and analyze spatial data.
3. Social behavior occurs in time and space. Students will learn to identify when social processes are spatially dependent and identify the policy implications of spatially dependent processes.
4. Although this is not a mapping, GIS, or GeoDa course, you will learn: the basics of displaying data on maps; how to use cartographic information in spatial analysis; how to join spatial units; and other techniques for manipulating, displaying and analyzing spatial data.

Course Requirements\*

All readings, exercises, and other homework are due prior to the first class of the week. The course is demanding. The material is built on a scaffold and builds on itself. Therefore, you must keep current with homework, assignments and exercises. Bring your questions about the material to class. Throughout the semester there will homework assignments and longer take-home assignments. There are two papers for this course. The first paper is a qualitative paper, which explores the relationship of space and human action. The second is a semester long research project using spatial analysis to explore a problem in crime and justice. Your grade will be based on the homework/take-home assignments, qualitative paper, and the final research project. The homework and take home assignments are designed to build your analytic skills and your understanding of the material. The papers demonstrate your ability to apply the skills learned. There will be no makeup quizzes, nor will there be incomplete grades given in this course.

***Prerequisites***

STA 250, or CJBA 230. Knowledge of basic regression analysis is assumed. A prior course on research methods is encouraged.

**Assignments and Grading**

*Class Participation:*

Students are encouraged to participate in class. During the course students will be asked to present their work to the class and demonstrate a technique. You are expected to ask questions during class and to respond to material being presented by the instructor and other students.

*Homework & Take Home Assignments:*

There will be regular homework assignments. Homework will be assigned for the week. Unless otherwise instructed, homework is posted on blackboard prior to the first class of the week and brought to the first day of class for each week. Homework will take on many forms and will often require access to a pc. Take home Assignments are assignments that will require more than one week to complete. Often these assignments will have multiple steps and are designed to increase your skills with gathering, presenting, and analyzing spatial data. Assignments are posted on Blackboard

*Paper 1:*

This paper is a qualitative paper exploring the relationship of space and human action. 3-4 pages.

*Final Project:*

For the final project the student will pick a topic in the study of crime and justice develop a research question, collect data and analysis the collected data using spatial statistics. The paper should be between 8-10 pages. See the course blackboard site for a list of topics.

Final grades will be based on the following:

Class Participation 5%

Homework/Take Home Assignments 25%

Paper 1 20%

Final Project 50%

**The John Jay College Policy on Plagiarism**

Plagiarism is the presentation of someone else‘s ideas, words, or artistic, scientific, or technical work as one‘s own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source.

Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

It is the student‘s responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of documentation. (From the John Jay College of Criminal Justice Undergraduate Bulletin, pp 38-39)

Required Text and Other Material

Parker, Robert Nash & Emily K. Asencio (2008) GIS and Spatial Analysis for the Social Sciences: Coding Mapping and Modeling, Routledge: New York, NY (PA)

Anselin, Luc (2005) Exploring Spatial Data with GeoDa: A Workbook, Center on Spatially Integrated Social Sciences, free available at <http://geodacenter.asu.edu/>

--- GeoDaTM 0.9 User’s Guide free available at <http://geodacenter.asu.edu/>

GeoDaTM free shareware available at <http://geodacenter.asu.edu/>

Boyer, Paul & Stephen Nissenbaum, Salem Possessed: The social origins of witchcraft- On library reserve.

Links to additional readings on Blackboard (BB)

Recommended Text

Clemmer, Gina (2013) The GIS 20: Essential Skills, ESRI Press.

Course Outline\*

**Fundamental Concepts**

Week 1 Introduction to the course: What is spatial data?

8/28 Course requirements, syllabus, and introduction to maps (PA, pp. 1-50)

Week 2

9/2-4 Boyer, Paul & Stephen Nissenbaum, Salem Possessed: The social origins of witchcraft chapter 1-4

Introduction to Thematic Maps (PA) pp 51-83

**Simple Displays**

Week 3 Homans, George, The human group-Selections (BB)

9/9-11 Mapping for Analysis, (PA, pp 84-111)

In class assignment 1 http://www.infoshare.org

**Spatial Units: Are the Data Spatial?**

Week 4 The Big Cats Census Maps [www.census.gov](http://www.census.gov)

9/16-18 What is the proper unit of analysis in GIS (PA, pp. 112-27)

**First Paper Due**

Spatial Effects & Diffusion

Week 5

9/30-10/2 Tolnay, Stewart, E. & E. M. Beck (1996) Vicarious violence: spatial effects on southern lynching, 1890-1919, *American Journal of Sociology* 102:3, 788-815. (BB)

Festinger, Leon (1963), [Social pressures in informal groups; a study of human factors in housing](http://p83-apps.appl.cuny.edu.ez.lib.jjay.cuny.edu/F/FXX5V6XFMRNKISY3JCID19SDB79P7APG7B26HGR7UNMXUBP1YS-17118?func=full-set-set&set_number=034749&set_entry=000001&format=999)-Selections (BB)

Multiple Variable Maps (PA, pp. 128-59)

-**Paper Topics & Research Questions Due**

Week 6

10/7-9 Baller, Robert D., Luc Anselin, Steven F. Messner, Glenn Deane, and Darnell F. Hawkins (2001) Structural covariates of U.S county homicide rates: Incorporating spatial effects.” *Criminology* 39:561-90 (BB)

Maps for Better Decisions (PA, pp. 160-200)

**Geospatial Modeling and GIS**

Tienda, Marta (1991) “Poor people in poor places: Deciphering neighborhood effects on poverty outcomes.” in Joan Huber (ed) *Macro-Micro Linkages in sociology*, Newberry Park, CA Sage Publications. (BB)

Geospatial Modeling and GIS –Statistical Modeling of Spatial Data (PA, pp 201-15

-**Data Sources Due**

**Spatial Data**

Week 7 Types of Data used in Spatial Modeling (PA, pp. 216-34)

10/14-16

**Moran’s I & Spatial Weights**

Week 8 Class handout computing Moran’s I in Excel

10/21-23 Anslin, Luc Spatial analysis of crime, Measurement and Analysis of Crime and Justice, (BB)

Introduction to GeoDa (WB Ch 1-5, pp. 1-34)

Analyzing Spatial Data with GeoDa

Week 9

10/28-30 Anselin, Luc, Exploring Spatial Data with GeoDa: A Workbook (Ch, 6-10, pp 36-77)

Spatial Data Manipulation

EDA Basics and Linking

Brushing

Multivariate EDA

Advanced Multivariate EDA

Week 10

11/4-6 Anselin, Luc, Exploring Spatial Data with GeoDa: A Workbook (Ch, 11-14 pp. 78-104)

Exploratory Spatial Data Analysis (ESDA) Basics and Geo Visualization

Advanced ESDA

Basic Rate Mapping

**Spatial Weights II**

Week 11

11/11-13 Anselin, Luc, Exploring Spatial Data with GeoDa: A Workbook (Ch, 15-19 pp. 105-47)

Contiguity Based Spatial Weights

Distance-Based Spatial Weights

Spatially Lagged Variables

Global Spatial Auto Correlation

Week 12

11/18-20 Anselin, Luc, Exploring Spatial Data with GeoDa: A Workbook (Ch, 20-22 pp. 148-200)

Spatial Autocorrelation For Rates

Bivariate Spatial Autocorrelation

Regression Basics

Week 13

11/25-12/2 Anselin, Luc, Exploring Spatial Data with GeoDa: A Workbook (Ch, 23-25 pp. 201-23)

Tolnay, Stewart, E. & E. M. Beck (1996) Vicarious violence: spatial effects on southern lynching, 1890-1919, *American Journal of Sociology* 102:3, 788-815. (BB)

Regression Diagnostics

Spatial Lag Model

Spatial Error Model

Week 14 Presentation of Final Projects

12/4-11

\*Subject to change

Bibliography

Anslin, Luc(1988). Spatial Econometrics: Methods and Models Boston, Boston, MA: Kluwer Academic Publishers

Anslin, Luc, Jacqueline Cohen, David Cook, Wilpen Goor, and George Tita (2001).Spatial Analysis of Crime . In David Duffee (ed.), Criminal Justice 2000. Vol4. Measurement and Analysis of Crime and Justice. Washington D.C.: National Institute of Justice

Cliff, Andrew and J. Keith Ord, (1981). Spatial Processes: Models and Applications. London: Pion

Felson, Marcus (1994) Crime in Everyday Life: Insights and Implications for Society, Thousand Oaks, CA: Pine Forge Press.

Haining, (2003) Spatial Data Analysis: Theory and Practice, Cambridge

Lersch, Kim Michelle (2004), Space, Time, and Crime, Carolina Academic Press. NC.

Maltz, Micheal D. and Joseph Targonski (2002). “A Note on the Use of County Level UCR Data,” Journal of Quantitative Criminology

Massey, Douglas S. (1979). “Effects of Socioeconomic Factors on Residential Segregation of Blacks Spanish American in U.S. Urban Areas.” American Sociological Review 44:1015-22.

Massey, Douglas S., and Nancy Denton. (1988). “Suburbanization and Segregation in U.S. Metropolitan Areas.” American Journal of Sociology 94:592-626.

Massey, Douglas S., and Nancy Denton. (1993). American Apartheid: Segregation and the Making of the Underclass. Cambridge, Mass.: Harvard University Press.

Messner, Steven F., Luc Anslin, Robert D. Baller, Darnell F. Hawkins, Glenn Deane, and Stewart F. Tolney (1999) “ The Spatial Patterning of County Homicide Rates: An Application of Exploratory Spatial Data Analysis.” Journal Quantitative Criminology 15:423-450.

Odland, John (1988) Spatial Autocorrelation. London: Sage Publication

Paternoster, Raymond,& Robert Brame et. al.(2003) An Empirical Analysis of Maryland’s Death Sentencing System with Respect to the Influence of Race and Legal Jurisdiction: Final Report, unpublished manuscript .

Poveda, Tony G.(2000) “American Exceptionalism and the Death Penalty, Social Justice 27:252-67

Quillian, Lincoln (2002) “Why is black-White Residential Segregation so Persistent?: Evidence on Three Theories From Migration Data.” Social Science Research 31:197-229

Quillian, Lincoln and Devah Pager (2001), “Black Neighbours, Higher Crime? The Role of Racial Stereotypes in Evaluations of Neighbourhood Crime.” American Journal of Sociology 107:717-67

Stucky, Thomas, D. & John R. Ottensmann (2009), “Land Use and Violent Crime” Criminology 47:1223-61

Waller & Gotway (2003), Applied Spatial Statistics for Public Health, Wily