ECO 82900
Spatial Econometrics

City University of New York – Graduate Center
Last offered: Fall 2017
T 9:30-11:30, Graduate Center, 365 5th Ave, Room 5383

Instructor Contact Information
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Office hours: T 2:30-4:00, and by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions
There are no formal prerequisites for this class, apart from enrollment in CUNY Graduate School. However, students are expected to have completed graduate courses in econometrics.

Course Description
This course provides an introduction to spatial econometrics. Spatial econometrics is concerned with the spatial aspects present in cross-sectional and space-time observations. Space is interpreted not merely in a geographic sense but also in an economic or sociological sense.

Learning Objectives
At the end of the course, students are expected to be able to:
1. Quantify spatial dependence in empirical variables
2. Appreciate and interpret spatial aspects of economic relationships from geographic and non-geographic perspectives
3. Understand spatial econometric estimation methods
4. Explain the conditions for identification of spatial models
5. Use statistical/econometrics software to estimate models with spatial elements
6. Test and interpret estimated relationships that contain spatial elements

Assessment: Grading Policy, Assignments, and Exam Dates
Assessment is based on two exams, several homework assignments, and a project proposal. The weights of these components are:
- Midterm exam (24 October) ........................................ 35%
- Final exam (19 December) ........................................ 35%
- Homework assignments............................................ 15%
- Project proposal (due on 12 December) ...................... 15%

The midterm exam covers the more introductory material of the course and thus relates to learning objectives (1), (2) and (3).

The final exam is not cumulative but rather covers material discussed in the second half of the semester. Thus, it covers the more advanced topics of the course and relates to learning objectives (2), (3), (4), and (6).

The homework assignments focus on the practical process of estimation. We will discuss packages available in R that allow spatial analysis of various kinds: graphics, analysis, estimation. Homework assignments may be answered with other software, but there is no guarantee that a particular
assignment can be worked out with the software of your choice if it is not R. Homework assignments are related to learning objectives (1), (5) and (6).

The aim of the project proposal is to draft the outlines of a research project that utilizes spatial econometrics techniques. A successful paper outlines the research question, the relevant background in economic theory, the reason for spatial econometrics or socioeconomic interactions, the nature of the data that are needed for this project (whether in existence or not), and the type of spatial econometric model that can address the research question. This assignment relates to learning objectives (2), (3), (4), and (6).

**Important Dates**
- 14 September: Last day for filing Add/Drop changes without getting a W grade
- 19 September: No class (GC follows a Thursday schedule)
- 24 October: Midterm exam
- 10 November: Last day to file for an unevaluated withdrawal (W) from the course
- 21 November: No class (GC follows a Friday schedule)
- 28 April: no class (Spring Break)
- 12 December: Due date for project proposal
- 19 December: Final exam

**Reading Assignments**
The following reading assignments are still tentative. Readings with an asterisk are the primary focus.

**General sources**

**Tentative Outline (subject to change)**

1. Introduction
   - Various examples from the literature
   - An introduction to R

2. Spatial Statistics: Examining data for spatial continuity


3. Software for spatial statistics and spatial econometrics


4. Estimation of spatial-econometric regression models

a. Basic models and Interpretation of estimates
   "L. Anselin (2006)
   *J. LeSage and R.K. Pace (2009), chapters 1-2
   J. Elhorst (2014), Section 2.7

b. OLS estimation with HAC standard errors

c. Maximum likelihood estimation
   "L. Anselin (2006), Section 5.2.

d. GMM estimation
   "L. Anselin (2006), Section 5.3.


5. Endogenous explanatory variables


6. Testing for spatial interactions in a spatial econometric model

L. Anselin (2006), Section 6.


7. Specifying and identifying spatial relationships
a. Various applications


b. Motivating and analyzing spatial interactions


c. Other thoughts on the validity of spatial econometric models


d. Estimation of spatial econometric models with endogenous spatial weights matrices


e. Other readings


8. Discrete choice


9. Spatial panel econometrics
L. Anselin (2006), Section 7
J.P. Elhorst (2014), Ch.3
J. LeSage and R.K. Pace (2009), Ch.7.

10. Dynamic spatial panel econometrics
J.P. Elhorst (2014), Ch.4