
Instructor: Robert (Rob) J. Franzese, Jr. (franzese@umich.edu; www.umich.edu/~franzese)
Lab Assistant: Srinivas (Chinnu) Parinandi (eparinan@umich.edu)

Description & Objectives: Spatial interdependence is ubiquitous across the social sciences. The likelihood and outcomes of demonstrations, riots, coups, and revolutions in one country almost certainly depend in substantively crucial ways on such occurrences in other countries (e.g., through demonstration effects or snowballing). Election outcomes and candidate qualities or strategies in some contests surely depend on those in others, and representatives’ votes in legislatures certainly depend on others’ votes or expected votes. In micro-behavioral research, long-standing and recently surging interest in contextual or network effects often refers to effects on each individual’s behavior or opinion from sets of other individuals’ opinions or behaviors; e.g., a respondent’s opinion on some policy likely depends on the opinions of her state, district, community, or social group. In international relations, states’ entry decisions in wars, alliances, and organizations, e.g., heavily depend on how many and who else enters and how. In comparative and international political economy, globalization, i.e., international economic integration, implies strategic (and non-strategic) interdependence in national-level macroeconomic policymaking. This course introduces spatial and spatiotemporal econometric models for continuous and limited dependent variables that can address such interdependence, with an emphasis on social-science applications.

The main objective of this course is to teach students how to incorporate the interdependence implied by most social scientific theories into their empirical analysis. Students will learn inter alia how to 1) diagnose spatial patterns in their data, 2) estimate the structural parameters of spatial and spatiotemporal regression models, 3) calculate and present spatial and spatiotemporal effects, 4) use spatial modeling to discriminate between the multiple sources of spatial correlation—common exposure, interdependence, and selection—and, when it exists, to evaluate the nature of the interdependence (e.g., strategic free-riding behavior, learning, coercion) among units of observation.

Daily Schedule: Our morning sessions will start around 9:30am (after continental breakfast courtesy of ICPSR, enrollments permitting). We will break for lunch around 11:30am, resuming with our afternoon session around 1pm. We will take a 15-30 minute break around 3:00pm (also with catered refreshments, enrollments permitting), and resume for lab 3:30-5:00.

Prerequisites: Students should have a basic understanding of matrix algebra, probability theory, first-year calculus, and regression as well as some familiarity with a software package that can be used for spatial analysis (e.g., Stata, R, or MatLab).

Course Materials: We do not use a textbook, but Anselin (2006) and Franzese & Hays (2008) overview most topics covered. Ward & Gleditsch (2008) provides good introductory textbook overview; LeSage & Pace (2009) is a good fuller, and more intermediate to advanced textbook.

Course Outline with Readings and Lab Plans

Session 1 (Monday, August 15th, Morning):
Introductory Stuff, Theoretical and Empirical Models of “Spatial” Interdependence


Session 2 (Monday, August 15th, Afternoon):
Diagnosing Spatial Association in Raw Data and/or in OLS Residuals


********** Lab Exercises: Measures & Diagnostics**********

Session 3 (Tuesday, August 16th, Morning):
Spatial Lag, Error, and Mixed Models I: A Typology of Structural Models


Session 4 (Tuesday, August 16th, Afternoon):
Spatial Lag, Error, and Mixed Models II: Estimation


**********Lab Exercises: SAR & STAR Models**********

Session 5 (Wednesday, August 17th, Morning):
Spatial Lag, Error, and Mixed Models III: Calculating and Presenting Spatial Effects


Session 6 (Wednesday, August 17th, Afternoon):
Spatiotemporal Models: Estimation & Interpretation


**********Lab Exercises: More SAR & STAR Models**********

Session 7 (Thursday, August 18th, Morning):
Limited Dependent Variables I: Spatial-Probit Model


**********Lab Exercises: Spatial Probit**********
Session 8 (Thursday, August 18th, Afternoon):
Limited Dependent Variables II: Spatial-Duration and Spatial-Count Models


**********Lab Exercises: Spatial-Duration & Count **********

Session 9 (Friday, August 19th, Morning):
Multiparametric Spatial-Lag Models and Network-Behavior Coevolution


**********Lab Exercises: m-STAR Model**********

Session 10 (Friday, August 19th, Afternoon):
Network and Spatial-Econometric Models of Network-Behavior Coevolution