Introduction to Spatial Data Analysis and Spatial Econometrics
Doctoral School in Economics, University of Rome La Sapienza, 2014/2015

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OBJECTIVES
The course aims at introducing participants to the construction, analysis, modelling and mapping of spatial data in a GIS environment, and to spatial econometrics. Participants will learn both theoretically and practically what the specificities of spatial data are, how to build and to manage geodatasets, how to analyze geographic patterns using the spatial analysis and statistics tools of the software Esri ArcGIS - including density maps, autocorrelation and spatial clusters analysis, raster analysis, geostatistics and spatial regressions. Spatial econometrics models and tests will be introduced, using R and GEODA, including linear models, multi-level models and LDV models.

PROGRAMME

1) Introduction to ArcGIS and to the construction of spatial datasets – May 14th 2015, 3-7 pm (Celata). The specificities of spatial data, spatial analysis and GIS-based techniques. Vector and raster geodata. Introduction to coordinate systems. Georeferencing techniques. Primary and secondary sources for spatial data. Introduction of geocoding services.

2) Vector data editing and mapping – May 20th 2015, 3-7 pm (Celata). Introduction to data processing in ArcGIS. Table and spatial association and selection. Geoprocessing techniques. Introduction to geodata editing. Strumenti di conversione dei geodati. Spatial distribution measures, proximity and accessibility analysis. Mapping.

3) Raster data analysis – May 21st 2015, 3-7 pm (Martellozzo). The specificities of raster data. How to manage and edit raster datasets in ArcGIS. Introduction to remote sensing and photo-interpretation. Raster analysis, map algebra and surface-based indicators. Introduction to spatial networks analysis.


6) **Introduction to spatial econometrics** – *June 3rd, 14:30-16:30; June 4th, 11-13 and 14:30-16:30; June 5th, 9:30-11:30* (Jayet).

   6.1. Spatial linear models: Weight matrices and spatially lagged variables; Spatial moving average and spatial autoregressive processes; Main types of linear models with spatial autocorrelation and autoregression

   6.2. Estimation of spatial linear models: Maximum likelihood estimation of spatial linear models; IV and GMM estimation of linear spatial linear models


   6.4. Panel data, multi-level and LDV models: Specification of spatial models using panel data; Specification of spatial multi-level models; Estimation and tests on spatial panel data and spatial multi-level models

   6.5. Spatial Limited Dependent Variable models: Specification of spatial LDV models; Problems raised by the estimation of LDV models; Methods for estimating spatial binary models

7) **Regression analysis with ArcGIS** – *June 8th 2015, 9-13 am* (Salvati). Introduction to regression analysis of spatial data. Ordinary least square, geographical weighted regression and introduction to spatial autoregression methods. How to manage spatial weights matrixes. Introduction to spatial econometrics.

**When:** May 14th to June 8th 2015, 32 hours (4 CFU) + final exam

**Where:** PC Lab, 5th floor, room 523

**Software:** ArcGIS, R, GEODA.

**Webpage:** [http://geostasto.eco.uniroma1.it/utenti/celata/spatial.html](http://geostasto.eco.uniroma1.it/utenti/celata/spatial.html)