

## Syllabus

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**Course: Spatial Econometrics**

**Professor:**

### 2018 FIRST SEMESTER

#### PROGRAM

Among the various types of information used by economists in applied empirical modeling, location is of fundamental importance in many fields, such as real-estate price modeling, public finance, effects of political institutions, regional effects of macroeconomic policies, uses and regulation of natural resources, and many others.

In recent years, the rapid increase in the availability of geo-referenced information, along with dedicated software, propelled a similar advance in statistical methods specially designed to analyze geographical patterns and effects. This course presents some of the main results in modern statistical inference for spatial data, emphasizing the practice of data analysis and model estimation using the freely available software **R**, along with some of its dedicated packages.

A number of results is presented along the unifying principle of Bayesian inference in the context of hierarchical modeling. The main necessary principles of Bayesian Inference are developed within the course. Finally, the interaction of the spatial and temporal dimensions of data is investigated, and some of the main modeling strategies for modeling this type of data are reviewed.

#### BIBLIOGRAPHY

- Statistics for Spatio-Temporal Data, Cressie and Wikle, Wiley (2011)
- Applied Spatial Analysis with R, Bivand, Pebesma and Gomez-Rubio, Springer, second edition (2013)
- Hierarchical Modeling and Analysis for Spatial Data, Banerjee, Carlin and Gelfand, CRC Press, Second Edition (2015)
- Handbook of Spatial Statistics, Gelfand, Diggle, Fuentes and Guttorp (eds), CRC Press (2010)
- Introduction for Spatial Econometrics, LeSage and Pace, CRC Press (2009)

#### GRADING

Grading will be based on an applied paper due at the end of the course.

#### PROFESSOR - EMAILS

## DETAILED PROGRAM

- Introduction: the need for spatial econometric methods
- Geo-referenced data: representation and visualization
- Exploratory analysis for spatial data
- Fundamentals of Spatial Random Processes
- Hierarchical Spatial Statistical Models
- Spatio-Temporal Statistical Models