



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Statistica Spaziale M

2526-2-F8204B010

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#### Learning objectives

The course aims at providing students with a set of methodologies to deal with the estimation and prediction of spatial data.

The course provides advanced knowledge of the main probabilistic models and statistical methodologies for the analysis of spatial data, with particular emphasis on applications in the economic and business domains. Students will acquire both theoretical and practical skills in the statistical analysis of geo-referenced data, developing the ability to apply this knowledge to real-world problems, critically interpret results, and propose methodologically sound solutions. The learning path fosters independent judgment in the use of spatial statistical models. The course contributes to strengthening students' ability to learn and stay up to date with advanced methods of statistical inference, in alignment with the "Statistics" learning area of the Master's degree program in Statistical and Economic Sciences.

#### Contents

Exploratory spatial data analysis; analysis of Spatial point pattern; geostatistics; introduction of spatial lattice data.

#### Detailed program

Spatial point processes: homogeneous and non homogeneous Poisson process. CSR tests. Parametric estimation of the intensity function of an inhomogeneous Poisson process.

Geostatistics: exploratory spatial data analysis; variogram, covariogram and correlogram; isotropy and some isotropic variogram models; variogram estimation: empirical variogram, parametric modeling of the variogram function: OLS, WLS, GLS and maximum likelihood estimation; simple, ordinary and universal kriging;

Laboratory sessions in R.

## **Prerequisites**

Inferential statistics, stochastic processes and R programming. The course is not suitable for undergraduate students enrolled in the Erasmus Program. Erasmus postgraduate students are invited to contact the teacher at the beginning of the course.

## **Teaching methods**

Class lessons and lab sessions.

Lectures and lab sessions will be held mainly in person and only occasionally will be conducted remotely.

## **Assessment methods**

\*\*\*\*Lab assesment and oral examination .

The overall mark is obtained by averaging the marks obtained in each part.

## **Textbooks and Reading Materials**

O. Schabenberger, C.A. Gotway, 2005, Statistical methods for spatial data analysis Chapman & Hall/CRC.

Additional readings, R-codes, datasets and case studies will be made available through the eLearning web page of the course.

## **Semester**

First term of the second semester.

## **Teaching language**

Italian.

## **Sustainable Development Goals**

