

# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

# **SYLLABUS DEL CORSO**

## **Modello Lineare Generalizzato**

2122-1-F8203B010-F8203B010M

## Learning objectives

The aim of this course is the analysis of advanced linear models, from the classical linear model to the multivariate models.

#### **Contents**

The aim of the course is to present linear model extending the classical ordinary least squares model. The main topics are

- · generalized linear models
- · multivariate models
- multilevel models

## **Detailed program**

The course aims at introducing at the specification, estimation and verification of the interpretative advanced linear models compared to the classical linear model. It also presents:

• Generalized linear models that do not meet the assumptions of the classical linear model: heteroschedastic models, autoregressive models, non-linear models, models with outliers, GLS

- Multivariate linear models: from least squares models to seemingly unrelated regressions
- Multilevel models: hierarchical data and fixed effects anova, mixed models (random slope, random intercept)

Each area will be the specific object of a course module. The course activity comprises theoretical lecture and lab activity with SAS and R\_\_\_\_\_

## **Prerequisites**

It is requested a good knowledge of:

Univariate descriptive statistics: position indeces; variability indices: symmetry an d kurtosis indices.

Bivariate descriptive statistics: connection, average dependence, linear correlation, linear bivariate,

Multiple, multivariate, polynomial, non-linear regressions.

Probability theory: population and sample; probability in the classic version; combin atorial calculation elements; sampling types; distributions of univariate random variables; random variables Normal, t of Student, F d Snedecor; random sampling dist ributions

Inference:estimation theory, property of the punctual estimators; interval estimation; hypothesis tests: general theory, Neyman Pearson hypothesis tests, hypothesis tests on mean (Normal t of Student) and variance.

Basics of matrix algebra

Therefore student that do not have these previous knowledge in statistics are request ed to attend biostastistics courses and pass exams of of: probability calculation, introduction to statistical inference, introduction to statistical models, statistical models for data categorical. The students also have to know the R or SAS statistical packages.

(in the three-year degree or in the degree course of biostatistics) exams of: univariate and bivariate statistics, probability calculation, introduction to statistical inference, introduction to statistical models, statistical models for data categorical. The students also have to know the R and SAS statistical packages.

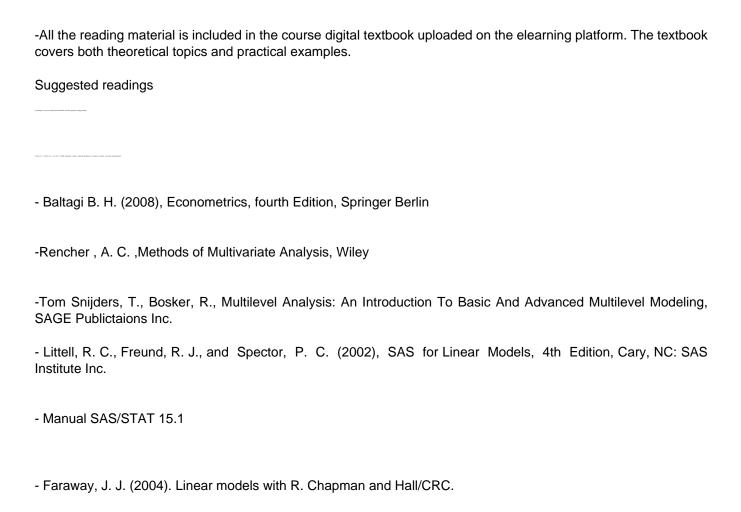
## **Teaching methods**

The course includes theoretical lecture and labs. In theoretical lecture,

#### **Assessment methods**

The examination is carried out by means of a test at the computer lab and comprises two theoretical questions and a practical exercise. The exercise covers one of the topics proposed during the classroom exercises and involves solving a problem using R and SAS software and commenting on the results.

## **Textbooks and Reading Materials**



#### **Semester**

3 cycle which corresponds to the 2nd semester in the period between March and April.

#### **Teaching language**

Italian

