



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Modello Lineare Generalizzato

1819-1-F8203B010-F8203B010M

Learning objectives

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

Knowledge and understanding. This course will provide knowledge and understanding in relation to:

- Extension the hypotheses of the classical linear model to non-linear models, models with non-spherical and non-normal errors. This way is possible to analyze data according to less restrictive and more realistic hypotheses of the classical linear model itself.
- Elimination of strongly correlated outliers and multicollinear variables that invalidate the analyzes
- Study of multivariate models according to more and more realistic hypotheses
- Analysis of hierarchical and nested data

Ability to apply knowledge and understanding. At the end of the course the students will be able to construct linear and non-linear, multiple and multivariate models, with non-hierarchical and hierarchical data, according to realistic hypotheses.

Contents

The aim of the course is the study of more advanced models of the classical linear model. It also presents

- generalized linear models, multivariate linear models

- multilevel models
- path analysis .

The training is carried out through lectures and laboratory practical lessons. The course material and additional information will be posted on the web page in the e-learning platform unimib: <http://elearning.unimib.it/>.

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: models with heteroscedasticity and related errors, non-linear models, the treatment of outliers
- Multivariate linear models of classic and not
- Multilevel models
- Causal models with latent observed variables (path analysis).

Each area will be the specific object of a course module. The training is carried out through lectures and practical classes in statistical and computer lab in which you will face analysis of empirical cases by the use of SAS software. The material of the course (both the theoretical lessons both practical lessons) and additional information will be posted on the web page in the e-learning platform unimib: <http://elearning.unimib.it/>.

Prerequisites

Knowledge of the Linear Classic Model

Teaching methods

The course presents both theoretical and applied classes. During the theoretical part, the methodological frameworks related to the course are presented and then applied during the practical lessons in the laboratory. In the lab, you use SAS software, and you'll learn how to code and read model outputs.

Assessment methods

The final test is in written form with optional oral exam. The written test consists in two theoretical questions about the methods introduced in the course and a practical test in the laboratory, to be taken at the time of the theoretical written exam with the SAS or R software, in analogy to what was done during the exercises. The theoretical questions allow to verify the knowledge of the goals, of the methods of resolution, of the comment of the results of the studied methods of exploratory data analysis. The ability to express oneself with an adequate technical

language is required. The practical test aims to verify the ability to analyze real data sets using the most appropriate data analysis methods, adequately commenting and interpreting the results.

There are no separate tests for attending students and non-attending students.

There are no intermediate tests in progress.

Textbooks and Reading Materials

- Slides and book of the course

- Johnston, J. (1993), *Econometrica*, 3a edizione, Franco Angeli, Milano

- Freund, R. J., Wilson, W. J., and Sa, P. (2006), *Regression Analysis: Statistical Modeling of a Response Variable*, 2nd edition, Academic Press

- Baltagi B. H. (2008), *Econometrics*, fourth Edition, Springer Berlin

- Littell, R. C., Freund, R. J., and Spector, P. C. (2002), *SAS for Linear Models*, 4th Edition, Cary, NC: SAS Institute Inc.: SAS/STAT 9.2, SAS/STAT 9.3 ,

SAS/ETS 9.3

- Snijders TAB, Bosker RJ (2011) *Multilevel analysis: an introduction to basic and advanced multilevel modeling*. Sage Publishers, New York

Semester

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

Teaching language

Italian
