



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Analisi dei Dati

2223-3-E4102B088

---

#### Learning objectives

The course aims to introduce the concept of latent variable and the most important models with latent variables. Lectures will be alternated with lectures in the laboratory with SAS so as to enable students to learn the use of statistical packages and thus be able to apply the techniques learned.

#### Contents

- Meaning of causality in statistics Spurious correlation
- Structural models with observed variables
- Path analysis Different meanings of latent variable
- Factorial model
- Principal component analysis and factorial model
- Structural models with latent variables

#### Detailed program

Introduction to the meaning of causality in statistics

Spurious correlation

Structural models with observed variables. path analysis. Examples and exercises with SAS

Different meanings of latent variable

Factorial model: Assumptions. Community: meaning and computation. Methods for deriving solutions: meaning and methods.

Methods of estimating factors Interpretation of results.

Methods of deriving factorial scores. Non-uniqueness of factorial solutions: non-identifiability of parameters and

indeterminacy of factorial scores. Estimation methods and Hypothesis Testing. Examples and exercises with SAS  
Differences in factor analysis with principal component method.  
Structural models with latent variables. Relationships with path analysis and factor analysis. Solution and their interpretation. Non-uniqueness of solutions. Estimation methods and hypothesis testing. Examples and exercises with SAS

## Prerequisites

No formal prerequisites. However, knowledge of the contents of the teachings of Probability Calculus, Statistics 1, Computer Laboratory, Multivariate Statistical Analysis., Database is required

## Teaching methods

Lectures will alternate between lectures in which the theoretical concepts will be imparted with many practical exemplifications and laboratory exercises in which with the help of SAS the techniques learned will be used on real data

## Assessment methods

Written exam, 2 theory questions and 1 data analysis exercise carried out using SAS

## Textbooks and Reading Materials

Slides and course notes

Alwin, Duane F. and Robert M. Hauser (1975) "The decomposition of effects in path analysis." *American Sociological Review*, vol. 40 ( February ): 37-40.

factor model. Rotation of the

Blalock, Hubert M., Jr. (1965) "Path analysis: sociological examples." *American Journal of Sociology* 72 ( July ): 1-16.

Blalock, Hubert M., Jr. (1971) "Path analysis: sociological examples (addenda)." Pp. 136-8 in Hubert M. Blalock, Jr. (ed.), *Causal Models in the Social Sciences*. Chicago: Aldine-Atherton.

Duncan, Otis Dudley, David L. Featherman and Beverly Duncan (1971) *Socioeconomic Background and Achievement*. New York: Academic Press.

Land, Kenneth C., (1969) "Principles of path analysis." Pp. 3-37 in Edgar F. Borgatta (ed.), *Sociological Methodology*, San Francisco: Jossey-Bass.

Saris, W.E., & Stronkhorst, L.H. (1984). *Causal modeling in nonexperimental research*. Sociometrical Research Foundation. Amsterdam, The Netherlands.

Werts, C. E., & Linn. R. L. (1970) Path analysis: psychological examples. *Psychological Bulletin*, 67, 193-212.

Lawley, D. N. and Maxwell, A. E. (1971) *Factor Analysis as a Statistical Method*, American Elsevier, New York.

Hauser, R. M., Goldberger, A. S. The treatment of unobservable variables in path analysis. In H. L. Costner (ed.), *Sociological methodology*. London: Jossey-Bass, 1971. In K. G. Jöreskog, & H. Wold (Eds.). *Systems under indirect observation Causality structure prediction* New York: North Holland.

Lawley, D. N. and Maxwell, A. E. (1971) *Factor Analysis as a Statistical Method*, American Elsevier, New York.

Hauser, R. M., Goldberger, A. S. The treatment of unobservable variables in path analysis. In H. L. Costner (ed.), Sociological methodology. London: Jossey-Bass, 1971.

In K. G. Jöreskog, & H. Wold (Eds.). Systems under indirect observation Causality structure prediction New York: North Holland.

## **Semester**

2 semester 2023 - second cycle

## **Teaching language**

Italian

## **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING

---