

Multivariate Analysis (MULTIAN)

1. Objectives

The Multivariate Analysis course is oriented to management science research. This course is mainly concerned with the analysis of multivariate data on individuals or firms. The objectives of the course are:

- (a) To provide the student with some useful tools for his/her future research.
- (b) To help the student to develop a way of thinking in quantitative terms.
- (c) To provide the student with the basic concepts of factor analysis and structural equation modelling.

2. Methodology

2.1. Contents

1. Principal component analysis
2. Exploratory factor analysis
3. Structural models with observed variables
4. Confirmatory Factor Analysis (CFA)
5. Structural models with latent variables
6. Multigroup analysis

2.2. Description of the methodology

The sessions are distributed in 6 blocks of the two sessions. They are conducted in a traditional, professor-to-student way. The topics covered are explained in a set of lecture notes and there is a worked example for each block. Computation is expected to be done in Stata.

The material for this course consists in the lecture notes, the worked examples and data sets. The data sets are in Stata format (extension .dta).

2.3. Number and title of the sessions

The course has 12 sessions, listed in the table of section 5 of this outline.

2.4. Description of the topics

The topics covered are described in the table.

2.5. Required readings

The required readings are listed in the third column of the table.

2.6. Optional readings

AC Acock (2013), *Discovering Structural Equation Modeling with Stata*, Stata Press.

DJ Bartholomew, F Steele, I Moustaki & J Galbraith (2008), Analysis of Multivariate Social Science Data, Chapman & Hall.

RB Kline (2010), Principles and Practice of Structural Equation Modeling, The Guilford Press.

S Rabe-Hesketh & A Skrondal (2008), Multilevel and Longitudinal Modeling Using Stata, Stata Press.

Stata Corp. (2015), Stata Multivariate Statistics Reference Manual, Release 14, Stata Press.

3. Grading

The grades are based on the participation (1/3) and the exercises submitted by the students at the end of each chapter (2/3).

4. Competences

4.1. General competences

- To understand the basic ideas of factor analysis and structural equation modelling.
- To manage the basic methods of multivariate statistical analysis.

4.2. Specific competences

- To understand and apply principal component analysis.
- To understand and apply exploratory and confirmatory factor analysis.
- To estimate, test and evaluate structural equation models.
- To understand and apply multigroup analysis.

5. Outline of the course

SESSION	DESCRIPTION	DOCUMENTS
1-2	Principal component analysis	Outline of the Multivariate Statistics Course The multivariate normal distribution [MVSTAT-01] Principal component analysis [MVSTAT-E1] Social mobility in UK
3-4	Exploratory factor analysis	[MVSTAT-02] Exploratory factor analysis [MVSTAT-E2] Correlation between subject marks

5-6	Structural models with observed variables	[MVSTAT-03] Structural models with observed variables [MVSTAT-E3] Perceptions of income and prestige
7-8	Confirmatory factor analysis	[MVSTAT-04] Confirmatory factor analysis [MVSTAT-E4] Scale of justice norms
9-10	Structural models with latent variables	[MVSTAT-05] Structural models with latent variables [MVSTAT-E5] Antecedents of social capital
11-12	Multigroup analysis	[MVSTAT-06] Multigroup analysis [MVSTAT-E6] Leadership competences

6. Professor's Biography



Prof. Miguel Angel Canela
Associate Professor of Managerial Decision Sciences

Prof. Canela holds a Ph. D. degree in Mathematics from the Universitat de Barcelona (1980). Before joining IESE in 2009, he was a professor at the Department of Applied Mathematics and Analysis of that university and a part-time professor of the Ph. D. Program at IESE. He also worked many years as a consultant at the Institut Català de Tecnologia.

His Ph. D. Dissertation and first research papers were concerned with various problems of Functional Analysis. Later, his interest switched towards interdisciplinary research, entering diverse fields, such as Management Science, Nutrition, Botany, Toxicology and Biochemistry. He has coauthored several research papers with IESE professors and students. Nowadays, his attention is focused on the application of Data Science to various aspects of Management.