Statistics, probability and multivariate analysis

Academic Year: (2020 / 2021) **Review date: 01-07-2020**

Department assigned to the subject: Economics Department, Statistics Department

Coordinating teacher: NOGALES MARTIN, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

OBJECTIVES

1. Capacity for modeling problems derived from data with many variables.
2. Acquire analytical skills to describe multivariate data.
3. Capacity for making and interpreting plots for data in high dimension.
4. Capacity for making statistical inference on a multivariate population.
5. Acquire skills in advanced statistical tools like principal component analysis, factorial analysis, classification and clustering.
6. Handle statistical software for multivariate analysis.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Descriptive analysis for univariate data
1.1 Introduction
1.2 Examples

2. Multivariate calculus
2.1 Vectors
2.2 Matrices

3. Descriptive analysis for multivariate data
3.1 Numerical analysis
3.2 Graphical analysis

4. Multivariate distributions and inference
4.1 Properties
4.2 Hypothesis tests

5. Principal component analysis
5.1 Introduction
5.2 Computation and interpretation

6. Factor analysis
6.1 Properties
6.2 Estimation and interpretation

7. Cluster analysis
7.1 Non-hierarchical models
7.2 Hierarchical models

8. Discriminant analysis and classification
8.1 Logistic regression
8.2 Bayes classifiers

ASSESSMENT SYSTEM

Midterm (homework) 50%, Final project 50%

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- Michael Barrow Statistics for Economics Accounting and Business Studies, Prentice Hall, 2010
- Paul Newbold Statistics for Business and Economics, Pearson, 2012
- Richard A. Johnson and Dean W. Wichern Applied multivariate statistical analysis, Prentice Hall, 2007
- Theodor W. Anderson An Introduction to Multivariate Statistical Analysis, Wiley, 2009

ADDITIONAL BIBLIOGRAPHY

- Garrett Grolemund and Hadley Wickham R for Data Science, O'Reilly, third edition, 2019