Multivariate techniques for data analysis

Academic Year: (2017 / 2018) **Review date: 25-09-2017**

Department assigned to the subject: Statistics Department

Coordinating teacher: VELILLA CERDAN, SANTIAGO

Type: Electives ECTS Credits : 6.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Sequences:

Statistics I-II
Mathematics for Economics I-II

In general: Fundamentals of Statistics, Linear Algebra, and Mathematical Analysis.

OBJECTIVES

Knowledge of basic statistical techniques of Data Analysis

Use of Statistical software for Data Analysis

DESCRIPTION OF CONTENTS: PROGRAMME

The purpose of the course is to present an introduction to Data Analytical Techniques at an intermediate level. Emphasis is mainly in applications and examples, not in theoretical derivations. The course requires the intensive use of computer software, specially Microsoft Excel and related programs, such as Statgraphics and SPSS. Prerequisites are some solid knowledge of Matrix Algebra, as well as good foundations of Statistics.

********** DATA ANALYTICAL TECHNIQUES FOR BUSINESS **********

1. REVIEW of elements of Statistics

** 1.1 Basic concepts
** 1.2 Notation
** 1.3 Data examples

2. FUNDAMENTALS of Statistical Software

** 2.1 Editing text and Excel files
** 2.2 Importing text data into Excel
** 2.3 Constructing compressed data files
** 2.4 Defining ranges in Excel
** 2.5 Excel functions and expressions
** 2.6 Matrices with Excel
** 2.7 Excel Add-Ins
** 2.8 Programs of statistical software: STATGRAPHICS and SPSS

3. MULTIDIMENSIONAL data

** 3.1 The data matrix
** 3.2 Different types of data
** 3.3 Mean vector
** 3.4 Covariance and correlation matrices
** 3.5 Graphical methods
** 3.6 Linear combinations
** 3.7 Applications with Excel, STATGRAPHICS and SPSS

4. PRINCIPAL components

** 4.1 Motivation and construction
** 4.2 Standardized case
** 4.3 Data examples
** 4.4 Applications with Excel, STATGRAPHICS and SPSS

5. POPULATION concepts and sampling

** 5.1 Random vectors
** 5.2 Expected values
** 5.3 The univariate and multivariate normal distributions
** 5.4 Sampling distributions

6. SIMULATION techniques

** 6.1 Generation of univariate and multivariate normal data
** 6.2 Applications and examples with Excel

7. CASE analysis

** 7.1 Examples of real data applications in Business, Economics, Finance and Marketing

LEARNING ACTIVITIES AND METHODOLOGY

Competences will be acquired by students from:

[I] Theory classes: one per week (14 sessions)

[II] Practical classes in the computer room: one per week (14 sessions)

Activities [I] and [II] will be devoted to exercises, problems, data examples, and case studies. Teaching will make intensive use of resources available in Aula Global. Some short reading notes will be also distributed, for helping to understand specific parts of the course, and to facilitate the transmission of information during the lectures.

ASSESSMENT SYSTEM

Continuous evaluation: 50%

This will consist in the completion of a Practice Workbook, with a collection of computer and data analysis activities. Attendance to class will be taken into account for the grading process.

Final exam: 50%

Further details can be however discussed at the beginning of the course, in order to reach a common agreement between both instructor and students.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- ALBRIGHT, S. C. and WINSTON, W. L. Business Analytics: Data Analysis & Decision Making, 6th Edition, Cengage Learning, 2017
- JOHNSON, R.A. and WICHERN, D.W. Applied Multivariate Statistical Analysis, 6th Edition, Prentice Hall, 2007

ADDITIONAL BIBLIOGRAPHY

- ANDERSON, D. R., SWEENEY, D. J. and WILLIAMS, T. A. Essentials of Modern Business Statistics with Microsoft Excel, 6th Edition, Cengage Learning, 2016