

Academic Year: (2021 / 2022)

Review date: 20-07-2021

Department assigned to the subject: Statistics Department

Coordinating teacher: GALEANO SAN MIGUEL, PEDRO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Probability I
 Probability II
 Linear Algebra
 Statistical inference methods I
 Stochastic processes
 Statistical inference methods II
 Multivariate Analysis

OBJECTIVES**COMPETENCES**

1. Capacity for identifying problems associated with statistical data in several variables.
2. Basic knowledge for handling vectors and matrices.
3. Acquire skills in multivariate data description.
4. Capacity for making and interpreting plots of multivariate datasets.
5. Know the properties of multivariate distributions.
6. Capacity for making hypothesis testing on a multivariate population.
7. Acquire skills in principal component analysis.
8. Acquire skills in heterogeneity problems such as outlier detection, hypothesis testing for different means and classification.
9. Handle statistical software for multivariate analysis.

SKILLS

1. Aptitude to understand a real problem and to analyze it as an statistical problem.
2. Modeling and solving problems.
3. Capacity of analysis and synthesis.
4. Oral and written skills.
5. Aptitude to work in a group.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to statistical learning.
2. Linear regression.
3. Linear classification.
4. Resampling methods.
5. Selection and regularization of linear models.
6. Nonlinear methods.
7. Tree-based methods.
8. Support vector machines.
9. Unsupervised learning.

LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS): Theoretical classes with support material taken from the web.

Practical classes (2 ECTS): Problem solving classes. Computing classes in computer halls. Work assignments in groups. Oral presentations and debates.

Tutorial classes before the midterm exam.
 Tutorial classes during the week 15.

ASSESSMENT SYSTEM

Final exam (50%). More than 4 out of 10 is required in the final exam to pass the course.

Midterm exam (30%)

Resolution of exercises and participation in class (20%)

% end-of-term-examination:	50
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% of continuous assessment (assignments, laboratory, practicals...):	50
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BASIC BIBLIOGRAPHY

- Gareth James, Daniel Witten, Trevor Hastie, Robert Tibshirani An Introduction to Statistical Learning, Springer, 2013

ADDITIONAL BIBLIOGRAPHY

- Bradley Efron, Trevor Hastie Computer Age Statistical Inference, Cambridge University Press, 2016
- Trevor Hastie, Robert Tibshirani, Jerome Friedman The Elements of Statistical Learning, Springer, 2009
- Trevor Hastie, Robert Tibshirani, Martin Wainwright Statistical Learning With Sparsity, CRC Press, 2015