

Academic Year: ( 2023 / 2024 )

Review date: 20-04-2023

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)**

Basics of Statistics

**OBJECTIVES**

1. Ability to identify problems associated with the prediction of statistical data using several variables.
  2. Acquire skill in solving regression problems.
  3. Acquire skills in solving supervised classification problems.
  4. Acquire skill in solving unsupervised classification problems.
  5. Ability to select variables of interest in regression problems, supervised classification and unsupervised classification.
  6. Know and handle computer tools for Statistical Learning.
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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. High dimensional regression:
  - The regression problem.
  - Multiple linear regression.
  - Problems of multiple linear regression in high dimension.
  - Methods for multiple linear regression in high dimension.
  - Non-linear regression in high dimension.
  - Tree-based methods in high dimension.
3. Supervised classification in high dimension:
  - The supervised classification problem.
  - Problems of supervised classification in high dimension.
  - Classical supervised classification methods in high dimension.
  - Tree-based methods in high dimension.
4. Unsupervised classification in high dimension:
  - The supervised classification problem.
  - Problems of unsupervised classification in high dimension.
  - Partitional methods in high dimension.
  - Hierarchical methods in high dimension.
  - Mixture-based methods in high dimension.
  - Density-based methods in high dimension.

## LEARNING ACTIVITIES AND METHODOLOGY

AF1. THEORETICAL-PRACTICAL CLASSES. They will present the knowledge that students should acquire. They will receive the class notes and will have basic texts of reference to facilitate the follow-up of the classes and the development of the subsequent work. Exercises, practical problems on the part of the student will be solved and workshops and evaluation tests will be carried out to acquire the necessary skills.

AF2. TUTORIES. Individualized assistance (individual tutorials) or group (collective tutorials) to students by the teacher.

AF3. INDIVIDUAL OR GROUP STUDENT WORK.

MD1 THEORY CLASS. Exhibitions in the teacher's class with support of computer and audiovisual media, in which the main concepts of the subject are developed and the materials and bibliography are provided to complement the students' learning.

MD2. PRACTICES. Resolution of practical cases, problems, etc. raised by the teacher individually or in groups.

MD3. TUTORIES. Individualized assistance (individual tutorials) or group (collective tutorials) to students by the teacher. For subjects of 6 credits, 4 hours will be dedicated with 100% of attendance.

## 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 labs (20%)

<b>% end-of-term-examination:</b>	50
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<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	50
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## BASIC BIBLIOGRAPHY

- Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani An introduction to statistical learning, Springer, 2013

- Trevor Hastie, Robert Tibshirani and Jerome Friedman The Elements of Statistical Learning, Springer, 2009

## ADDITIONAL BIBLIOGRAPHY

- Bradley Efron and Trevor Hastie Computer Age Statistical Inference, Cambridge, 2016