

Academic Year: (2022 / 2023)

Review date: 19-05-2022

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)

Introduction to Data Science
 Probability and Data Analysis
 Introduction to Statistical Modeling
 Statistical Learning
 Predictive Modeling
 Bayesian Data Analysis

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to the functional data analysis.
2. Tools for exploring functional data:
 - a. Functional mean and variance.
 - b. Covariance and correlation functions.
 - c. Cross-covariance and cross-correlation functions.
3. From functional data to smooth functions:
 - a. Basis functions.
 - b. Smoothing functional data by least-squares.
 - c. Smoothing functional data with a roughness penalty.
4. Principal component analysis for functional data:
 - a. Defining functional PCA.
 - b. Visualizing the results.
 - c. Computational methods for functional PCA.
 - d. Regularized PCA.
5. Regression for functional data:
 - a. Functional linear models with scalar responses.
 - b. Functional linear models with functional responses.
6. Supervised classification for functional data:
 - a. k-nearest neighbors.
7. Unsupervised classification for functional data
 1. k-means.

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 test will be held to acquire the necessary skills.

AF2: Updated to allegation

AF3: INDIVIDUAL OR GROUP WORK OF THE STUDENT.

AF9: FINAL EXAMINATION In which the knowledge, skills and abilities acquired throughout the course will be assessed globally.

MD1: CLASS THEORY. 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.

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

- Horváth, L. and Kokoszka, P. Inference for Functional Data with Applications, Springer, 2012
- Kokoszka, P. and Reimherr, M. Introduction to Functional Data Analysis, CRC Press, 2017
- Ramsay, J. and Silverman, B. Functional Data Analysis, Springer, 2005