
Academic Year: (2024 / 2025)**Review date: 02-04-2024**

Department assigned to the subject: Statistics Department**Coordinating teacher: NOGALES MARTIN, FRANCISCO JAVIER****Type: Compulsory ECTS Credits : 3.0****Year : 1 Semester : 2**

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Data Programming (19138)
Statistics and Data Science I (19140)
Statistics and Data Science II (19141)

OBJECTIVES

- Ability to use relevant machine learning concepts and methods to formulate, structure and solve practical problems involving massive or complex data.
- Ability to apply basic machine learning models for prediction and decision making.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Machine Learning
 - 1.1. To explain or to predict?
 - 1.2. Bias vs Variance
 - 1.3. Performance evaluation
2. Unsupervised Learning
 - 2.1. Dimensionality reduction: PCA
 - 2.2. Clustering: k-means, hierarchical methods
3. Supervised Learning
 - 3.1. Classification: statistical learning (Bayesian classifiers), machine learning (nearest neighbors, decision trees, random forest, gradient boosting, neural networks)
 - 3.2. Advanced Regression: model selection, regularization tools, feature selection
4. Case Studies for all the topics

LEARNING ACTIVITIES AND METHODOLOGY

Training Activities:

- Theoretical-practical classes

Teaching Methods:

- Presentations in the professor's lecture room with computer and audiovisual support, in which the main concepts of the subject are developed and a bibliography is provided to complement the students' learning.
- Resolution of practical cases, problems, etc. raised by the professor, either individually or in a group.

ASSESSMENT SYSTEM

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

The assessment will be made by continuous evaluation, weighting with a 40% the first assignment and with the other 60% the second one.

With a minimum grade of 5 points over 10 in each assignment.

In the extraordinary call, the evaluation system will be as follows:

1) Exam: 100%

BASIC BIBLIOGRAPHY

- G. James, D. Witten, T. Hastie and R. Tibshirani An Introduction to Statistical Learning with Applications in R, Springer, 2021
- K. Murphy Probabilistic Machine Learning: An Introduction, MIT Press, 2022