

Academic Year: ( 2022 / 2023 )

Review date: 28-04-2022

Department assigned to the subject: Statistics Department

Coordinating teacher: NOGALES MARTIN, FRANCISCO JAVIER

Type: Electives ECTS Credits : 3.0

Year : 4 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Linear algebra  
Probability and Data Analysis  
Introduction to Statistical Modeling

**OBJECTIVES**

Become familiar with different analytical tools, based on data, to make business decisions

Capacity to develop skills to analyze and find relationships between many variables/features

Know how to evaluate supervised-learning models

Develop skills to classify observations based on probabilistic learning and machine learning tools

Handle the R language for statistical-learning tools

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Introduction
  - 1.1 Basics of multivariate data analysis and statistical learning
  - 1.2 Supervised vs. unsupervised learning
  - 1.3 Data visualization techniques
2. Supervised Learning: Regression
  - 2.1 Linear regression
  - 2.2 Linear model selection and regularization
  - 2.3 Cross-validation on regression problems
3. Supervised learning
  - 3.1 Logistic regression
  - 3.2 Bayes classifier
  - 3.3 Linear discriminant analysis and k-Nearest neighbor classifier
  - 3.5 Random Forests
  - 3.6 Support vector machines
4. Unsupervised Learning and Dimensionality Reduction Techniques
  - 4.1 Clustering methods: k-means and hierarchical clustering
  - 4.2 Principal component analysis
  - 4.3 Multidimensional scaling
  - 4.4 ISOMAP and locally-linear embedding

**LEARNING ACTIVITIES AND METHODOLOGY**

Theory (3 ECTS), Practice (3 ECTS).  
50% lectures with teaching materials available on the Web. The other 50% practical sessions (computer labs).

**ASSESSMENT SYSTEM**

The assessment will be made by weighting the continuous evaluation (50%) and the final exam (50%), with a minimum grade of 5 points over 10 in each assessment activity.

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