

## 27621 - Data Analysis and Multivariate Techniques

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 27621 - Data Analysis and Multivariate Techniques

**Faculty / School:** 109 - Facultad de Economía y Empresa

**Degree:** 450 - Degree in Marketing and Market Research

**ECTS:** 6.0

**Year:** 3

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The main goal of this highly instrumental course is that the student learns a set of statistical tools widely used in the realization of a multidimensional exploratory analysis. All the topics will be approached from a practical point of view, using different data sets to illustrate the techniques explained. For we will use the R programming language and environment, which integrates a multitude of packages that increase its capacity and versatility.

These approaches and goals are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>) as the examples worked on in class analyze databases that address some of these issues. All the training provided by this subject (theoretical and practical) contributes transversally to the AGENDA 2030 and SDGs since its training enables the student to contribute to the analysis and management of the 245 indicators of the SDGs.

### 2. Learning results

- Perform an initial analysis of a multivariate data set
- Perform principal component analysis and interpret the results obtained
- Perform a factor analysis and interpret the results obtained
- Carry out a data classification process using agglomerative hierarchical procedures
- Carry out a data classification process using partitioning procedures
- Design classification procedures to discriminate between groups of observations
- Validate and interpret the results obtained in a classification procedure

### 3. Syllabus

BLOCK 1: Introduction to R

Unit 1: Introduction to R

BLOCK 2: Initial analysis of a multivariate data set

Unit 2: One-dimensional exploratory analysis

Unit 3: Two-dimensional exploratory analysis

BLOCK 3: Data reduction techniques

Unit 4: Principal Component Analysis

Unit 5: Factor Analysis

## BLOCK 4: Classification techniques

Unit 6: Cluster Analysis

Unit 7: Discriminant Analysis

### 4. Academic activities

Master classes: 30 hours

Practical classes: 30 hours

Personal Study: 86 hours

Assessment tests: 4h

6 ECTS = 150 hours

Lectures will be used to develop the concepts and techniques of each topic, using expository methods or combined with some flipped classroom sessions, aiming to enhance student participation and discussion in class. The practical classes will be used to show the student how to approach and solve problems using the computer tools.

In principle, the teaching methodology and its evaluation is planned to be based on face-to-face classes. However, if circumstances so require, they may be carried out online.

### 5. Assessment system

In the FIRST CALL the subject will be evaluated by means of continuous and global evaluation; global evaluation system will be applied in the SECOND CALL.

**Continuous assessment** It consists of the following:

- 6 deliveries or activities (A) more or less corresponding to each of the topics that the student will perform individually outside the classroom. It accounts for 20% of the final grade.

- 1 individual test (E1), that it will be conducted in the classroom in which the acquisition of knowledge of R will be assessed and the necessary techniques for conducting a one and two-dimensional exploratory analysis of a database. This test will take place around the middle of the semester. It accounts for 30% of the final grade

- 1 individual test (E2) that it will be conducted in the classroom, in which the acquisition of knowledge about the application of multivariate statistical techniques explained in class and the subsequent drawing of conclusions will be assessed. This test will take place at the end of the semester on the dates provided by the Center. It accounts for 50% of the final grade

#### **Global Assessment:**

It consists of an individual exam (E) of 10 points that will assess the theoretical and practical knowledge of the subject through exercises in which they will have to answer different questions about different databases. The answers to the questions will be scripted using the R program, and a report will be written with the conclusions obtained.

This test will take place on the date set for each of the two calls.

#### **Assessment Criteria:**

In the continuous evaluation system, the 6 activities (A) and the evaluable tests (E1, E2) will be scored on a scale of 0 to 10 points. The student must obtain at least a grade of 3 points in each of the three parts (the average of the 6 activities, the evaluable test E1 and the evaluable test E2) in order to calculate the weighted average score of them. In the case of not passing this minimum grade of 3 points in any of the parts, the student will not be able to continue with the continuous evaluation system. If the grades for each part have been obtained at minus 3, the final grade in the continuous evaluation will be calculated as the weighted average of 20% of the average evaluation of the activities, 30% of the grade for test E1 and 50% of the grade for test E2. The final grade must be equal to or higher than 5.

Students who do not take the continuous evaluation or whose grade has not exceeded 5 or who wish to improve their grade may opt for the global evaluation.

This global evaluation consists of an exam (E), scored on a scale of 0 to 10 points, whose final grade must be equal to or greater than 5 points.

In other words, the final grade for the subject will be calculated as follows:

Final grade =  $0.2 \cdot \text{Average}(\text{Grade}(A)) + 0.3 \cdot \text{Grade}(E1) + 0.5 \cdot \text{Grade}(E2)$  if the student uses the continuous evaluation modality to pass the subject having obtained a minimum grade of 3 points in each evaluable part

Final grade = Grade (E) if the student uses the global evaluation modality

### 6. Sustainable Development Goals

7 - Affordable and Clean Energy

12 - Responsible Production and Consumption

13 - Climate Action