

TEACHING GUIDE SUPERIOR STATISTIC

GRADO EN ECONOMÍA (INGLÉS)

ACADEMIC YEAR 2026-27

Publication date: 05-07-2026



I.-Subject Identification

Type	OPTATIVA
Teaching period	4 course, 1Q semester
Nº of credits	6
Language in wich the subject is taught	English

II.-Presentation

This course is designed to provide students with a solid understanding of applied statistical methods for analyzing business and economic data. It combines the theoretical foundations of statistical learning techniques with practical applications in R, emphasizing both the assumptions underlying the methods and their interpretation in real-world settings. Through examples and case studies, students will develop the ability to conduct rigorous statistical analyses and draw meaningful insights from business and economic problems.

III.-Learning outcomes

CT01. Ability to analyse and synthesise
 CT03. Oral and written communication in native language
 CT05. Knowledge of information systems relating to the field of study
 CT06. Ability to analyse and search for information from different sources
 CT07. Ability to solve problems
 CT08. Ability to make decisions
 CT09. Ability to work in a team
 CT15. Ability to learn independently
 CT17. Creativity
 CB02 . That students are able to apply their knowledge to their work or vocation in a professional manner and have the skills that are typically demonstrated through the preparation and defense of arguments and problem solving within their field of study.
 CB03 . That students have the ability to gather and interpret relevant data (usually within their field of study) to express judgments that include a reflection on relevant topics related to social, scientific or ethical areas.
 CB04 . That students are able to transmit information, ideas, problems and solutions to both specialized and non-specialized audience.
 CB05 . That students have developed the learning skills needed to undertake further studies with a considerable degree of autonomy.
 CE01. Ability to put knowledge of economics into practice
 CE02. Information search and research skills
 CE06. Ability to learn and apply the different qualitative techniques used in economics
 CE14. Ability to convert an empirical problem into an area of research and reach conclusions
 CE19. Forecasting with different economic variables

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.
- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.



IV.-Contents

IV.A.-Syllabus

Topic 1: Introduction: Statistical Learning
 Topic 2: Multivariate Data: Exploratory Data Analysis
 Topic 3: Dimensionality Reduction: Factor Analysis, Model Selection and Regularization
 Topic 4: Dimensionality Reduction: Joint Analysis
 Topic 5: Supervised Classification Techniques: Discriminant Analysis
 Topic 6: Supervised Classification Techniques: Logistic Regression
 Topic 7: Variance Analysis
 Topic 8: Unsupervised Classification Techniques: Clustering Methods and Decision Trees
 Topic 9: Unsupervised Classification Techniques: SEM

IV.B.-Training activities

Type	Title
Practical sessions	Computer Lab
Theoretical sessions	Theoretical classes
Practical sessions	Theoretical and theoretical-practical topics will be explained in class.
Practical sessions	Students will solve different use cases in the computer lab.

V.-Student workload	
Theoretical sessions	32
Resolution of exercises, problems, case studies, etc.	25
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	0
Tests and/or exams	3
Academic tutorials	30
Related activities: conferences, seminars, etc.	18
Preparation of theoretical sessions and self-study	35
Preparation of practical tasks, exercises, case studies, projects, etc.	25
Preparation for tests and/or exams	12
Total student workload	180

VI.-Methodology and academic programme		
Type	Period	Content
Theoretical sessions	Week 1 to Week 2	Topic 1. Introduction: Statistical Learning.
Theoretical sessions	Week 2 to Week 3	Topic 2: Multivariate Data: Exploratory Data Analysis.
Theoretical sessions	Week 4 to Week 5	Topic 3: Dimensionality Reduction: Factor Analysis, Model selection and Regularization.
Theoretical sessions	Week 5 to Week 6	Topic 4. Dimensionality Reduction: Joint Analysis.
Theoretical sessions	Week 6 to Week 7	Topic 5: Supervised Classification Techniques: Discriminant Analysis.
Theoretical sessions	Week 7 to Week 9	Topic 6: Supervised Classification Techniques: Logistic Regression.
Theoretical sessions	Week 9 to Week 10	Topic 7: Variance Analysis.
Practical sessions	Week 13 to Week 15	Exercises
Theoretical sessions	Week 11 to Week 12	Topic 8: Unsupervised Classification Techniques: Clustering Methods and Decision Trees.



Theoretical sessions	Week 12 to Week 13	Topic 9: Unsupervised Classification Techniques: SEM.
Practical sessions	Week 13 to Week 15	Exercises and presentations

VII.-Assessment methods

The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University.

All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject.

The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call).

Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities.

The distribution and characteristics of the assessment activities are described below.

VII.A.-Description and weight of the assessment activities

The course will be passed according to the following rules.

The assessment will consist of two parts:

1. The final examination will be held on the official date established by the University. It will consist of two parts: (i) a set of brief theoretical and practical questions (6 points), and (ii) practical questions/problems (4 points). The final examination grade will be the sum of the scores obtained in both parts and will account for 60% of the final course grade.
2. Course project: Students must complete a course project, which must be submitted in PDF format together with the corresponding dataset and R script. The project must also be presented and defended in a public 5-minute oral presentation. The project will account for 40% of the final course grade. The instructor may assign a grade of 0/10 if the student is unable to adequately defend the submitted work. The written report must be organized into the following sections: Introduction, Methods, Results, Conclusions, and References. The project topic must be approved in advance by the course instructor. Due to the nature of this assessment, the course project is not eligible for reassessment during the extraordinary June/July examination period.

The final grade will be the weighted average of the exam (60%) and project (40%) grades. This average will be calculated only if both parts have been passed (with a score equal to or greater than 5/10). Therefore, in no case will compensation be made between failed and approved parts.

REASSESSMENT IN THE EXTRAORDINARY June/July SESSION: If the student does not achieve a score of 5/10 in the final course grade, they must retake the exam in the extraordinary session, which will have the same structure as the regular session. In the extraordinary session, the project evaluation is not reassessable.

EARLY CALL EVALUATION: Given the characteristics of the course and the advanced session, the evaluation for students who request it will be conducted through an in-person theoretical-practical test that covers all the course content, similar to the regular session.

Work (projects) done in previous courses, or calls, will not be accepted.

VII.B. Assessment of students with academic exemption from class attendance



Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.

Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.



VIII.-Teaching resources and materials

Basic bibliography

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). *An introduction to statistical learning with applications in R* (2nd Edition). Springer.

Joseph F. Hair, William C. Black, Barry J. Babin, & Rolph E. Anderson (2010). *Multivariate Data Analysis. A Global Perspective* (7th edition). Paraninfo

Consultation bibliography

Brownlee, J. (2020). *Machine learning mastery with R: Get started, build accurate models and work through projects step-by-step* (Edition: v1.11). Machine Learning Mastery.

Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The elements of statistical learning* (2nd Edition). Springer

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning with applications in R*. Springer.

IX.-Professors

Name and surname	MIGUEL ÁLVAREZ GARCÍA
E-mail address	miguel.alvarez@urjc.es
Department	Economía Aplicada I e Historia e Instituciones Económicas
Campus	Madrid - Quintana
Category	Profesor/a Asociado/a
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0
Number of sexennia	0
No. of positive evaluations by Docentia	0

