

**1. General information****Course:** STATISTICAL DATA ANALYSIS**Type:** ELECTIVE**Degree:** 316 - UNDERGRADUATE DEGREE IN ECONOMICS**Center:** 5 - FACULTY OF ECONOMICS AND BUSINESS**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 53341**ECTS credits:** 4.5**Academic year:** 2023-24**Group(s):** 10**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** NOELIA GARCIA RUBIO - Group(s): 10

Building/Office	Department	Phone number	Email	Office hours
Facultad de Ciencias Económicas y Empresariales. Despacho 3.13	ECONOMÍA APLICADA I	926053545	noelia.garcia@uclm.es	Tuesday: 11:00-13:00 Wednesday and Thursday: 12:00-14:00 You can request face-to-face tutorials at other times or tutorials through Teams by email.

2. Pre-Requisites

It is recommended to have coursed the subjects on Statistics for Economics and Statistical Inference

3. Justification in the curriculum, relation to other subjects and to the profession

Today it is very common, in the world of Economics and Business, to have a great amount of data and manage computer tools for proper extraction of the statistical information they contain.

In this process, the knowledge and use of appropriate statistical techniques is fundamental to the discovery of new and meaningful relationships and behavior patterns within the data. The aim of the course is to provide students with the tools necessary for the representation, description and extraction of patterns and relationships between variables in multidimensional data, which is known in the statistical literature as "data mining".

4. Degree competences achieved in this course**Course competences**

Code	Description
E03	Ability to find economic data and select relevant facts.
E06	Application of professional criteria to the analysis of problems, based on the use of technical tools.
E11	Diagnosis and assessment skills to conduct structural and cyclical reports, as well as economic forecast summaries on the reality of the economy in Spain, the European Union and in any of the product sectors and factor markets. To do so, it will be necessary to understand and use common handbooks, as well as articles and, in general, leading edge bibliography in the core subjects of the curriculum.
G01	Possession of the skills needed for continuous, self-led, independent learning, which will allow students to develop the learning abilities needed to undertake further study with a high degree of independence.
G03	Develop oral and written communication skills in order to prepare reports, research projects and business projects and defend them before any commission or group of professionals (specialised or non-specialised) in more than one language, by collecting relevant evidence and interpreting it appropriately so as to reach conclusions.
G04	Ability for the use and development of information and communication technology in the development of professional activity.
G05	Capacity for teamwork, to lead, direct, plan and supervise multidisciplinary and multicultural teams in both national and international environments.

5. Objectives or Learning Outcomes**Course learning outcomes**

Description

Train the student to work out problems in creative and innovative ways.

To know the tools and methods for quantitative analysis of markets, sectors and companies, including models for decision-making and economic forecasting models.

Train the student to listen to and defend arguments orally or in writing

Additional outcomes

The student will obtain the ability to conduct a preliminary analysis of the data, identifying relevant information and preparing it for further analysis. The student will know identify the appropriate statistical technique, based on the data available and taking into account their nature, to achieve the objectives. The student will get the ability to properly apply each statistical technique through appropriate tools, mainly using the statistical programming environment R. The student will be able to draw the relevant conclusions and know how to analyze and transmit them appropriately for decision making in a business economic scope.

6. Units / Contents**Unit 1: Introduction to Multivariate Analysis****Unit 1.1** Data and measurement scale

Unit 1.2 Introduction to Data Mining and software R for statistical computing

Unit 1.3 Descriptive and exploratory data analysis

Unit 1.4 Detection of outliers

Unit 1.5 Treatment of non-response

Unit 2: Classification and comparison of groups

Unit 2.1 Linear discriminant analysis

Unit 2.2 Cluster Analysis

Unit 2.3 Analysis of variance

Unit 3: Data reduction methods

Unit 3.1 Principal component analysis

Unit 3.2 Factor analysis

Unit 4: Models for qualitative data analysis

Unit 4.1 Contingency tables and measures of association

Unit 4.2 Correspondence factor analysis

Unit 4.3 Multidimensional scaling

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E03 E06 E11 G04	1	25	N	-	
Class Attendance (practical) [ON-SITE]	Combination of methods	E03 E06 E11 G01 G03 G04 G05	0.5	12.5	N	-	
Study and Exam Preparation [OFF-SITE]	Self-study	E03 E06 E11 G01 G04	1.2	30	N	-	
Writing of reports or projects [OFF-SITE]	Group Work	E03 E06 E11 G01 G04 G05	0.86	21.5	Y	N	
Other off-site activity [OFF-SITE]	Self-study	E11 G01 G03 G04	0.76	19	Y	N	
Other on-site activities [ON-SITE]	Combination of methods	E06 E11 G01 G03 G04 G05	0.1	2.5	N	-	
Final test [ON-SITE]	Assessment tests	E06 E11 G01 G03 G04	0.08	2	Y	Y	
Total:			4.5	112.5			
Total credits of in-class work: 1.68			Total class time hours: 42				
Total credits of out of class work: 2.82			Total hours of out of class work: 70.5				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of active participation	5.00%	0.00%	The active attitude of the student will be assessed in the classroom.
Fieldwork assessment	20.00%	0.00%	At the beginning of the course working groups will be created and they will develop a project along the course. These projects will be supervised by the teacher and may need to be exposed at the end of the course.
Assessment of problem solving and/or case studies	15.00%	0.00%	The teacher will provide the student some tasks which will have to be solved and delivered at the end of each theme.
Final test	60.00%	100.00%	The teacher will provide the student some tasks which will have to be solved and delivered at the end of each theme.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The subject follows an evaluation system based on the assessment of various training activities and an exam. The student is required to obtain a 4 (out of 10) in the final evaluation test to make an average with the grade obtained in the rest of the proposed training activities. Depending on the circumstances of the group, and prior agreement with the students, the final test may be replaced by increasing the weight of the part corresponding to field work and the resolution of problems or cases.

Those students who, although they have carried out evaluable activities, wish to be evaluated with the criteria of non-continuous evaluation must inform before the end of the class period.

Regarding the evaluation in case of illness or other special circumstances (mitigating rules) see article 6 of the Regulation of Evaluation of the Student of the University of Castilla-La Mancha.

Non-continuous evaluation:

The evaluation will consist of a single theoretical-practical test in which the skills of the subject will be evaluated. It will consist of questions of theoretical content and practices in R language.

In accordance with section b of point 4.2. of the 2022 Student Regulations, any student may switch to the non-continuous assessment modality, by the procedure established by the teacher, provided that they have not participated during the class teaching period in evaluable activities that together involve at least the 50% of the total evaluation of the subject. If a student has reached that 50% of assessable activities or if, in any case, the class period has ended, they will be considered in continuous assessment without the possibility of changing the assessment modality.

Regarding the evaluation in case of illness or other special circumstances (mitigating rules) see article 6 of the Regulation of Evaluation of the Student of the University of Castilla-La Mancha.

Specifications for the resit/retake exam:

There are no particularities.

Specifications for the second resit / retake exam:

The evaluation will be carried out on a single test being necessary a minimum score of 5 out of 10 to pass the subject

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Other on-site activities [PRESENCIAL][Combination of methods]	2.5
Final test [PRESENCIAL][Assessment tests]	2
Unit 1 (de 4): Introduction to Multivariate Analysis	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	6.67
Class Attendance (practical) [PRESENCIAL][Combination of methods]	3.33
Study and Exam Preparation [AUTÓNOMA][Self-study]	7.5
Writing of reports or projects [AUTÓNOMA][Group Work]	5.75
Other off-site activity [AUTÓNOMA][Self-study]	4
Group 10:	
Initial date: 16-09-2019	End date: 07-10-2019
Unit 2 (de 4): Clasification and comparison of groups	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	5.83
Class Attendance (practical) [PRESENCIAL][Combination of methods]	2.91
Study and Exam Preparation [AUTÓNOMA][Self-study]	7.5
Writing of reports or projects [AUTÓNOMA][Group Work]	5
Other off-site activity [AUTÓNOMA][Self-study]	5
Group 10:	
Initial date: 07-10-2019	End date: 29-10-2019
Unit 3 (de 4): Data reduction methods	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	5.83
Class Attendance (practical) [PRESENCIAL][Combination of methods]	2.91
Study and Exam Preparation [AUTÓNOMA][Self-study]	7.5
Writing of reports or projects [AUTÓNOMA][Group Work]	5
Other off-site activity [AUTÓNOMA][Self-study]	5
Group 10:	
Initial date: 04-11-2019	End date: 25-11-2019
Unit 4 (de 4): Models for qualitative data analysis	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	6.67
Class Attendance (practical) [PRESENCIAL][Combination of methods]	3.35
Study and Exam Preparation [AUTÓNOMA][Self-study]	7.5
Writing of reports or projects [AUTÓNOMA][Group Work]	5.75
Other off-site activity [AUTÓNOMA][Self-study]	5
Group 10:	
Initial date: 26-11-2019	End date: 17-12-2019
Global activity	
Activities	hours
Writing of reports or projects [AUTÓNOMA][Group Work]	21.5
Other off-site activity [AUTÓNOMA][Self-study]	19
Other on-site activities [PRESENCIAL][Combination of methods]	2.5
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Class Attendance (practical) [PRESENCIAL][Combination of methods]	12.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	30
Final test [PRESENCIAL][Assessment tests]	2
Total horas: 112.5	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
López Cano, Emilio	Análisis de datos con R aplicado a la economía, la empresa y la industria https://www.lcano.com/b/adr/_book/				2019	
Aldás, J. y Uriel, E.	Análisis multivariante aplicado con R /	Alfa Centauro Paraninfo,		978-84-283-2969-9	2017	
Giudici, P.; Figini, S.	Applied data mining for business and industry	Wiley	Chichester (UK)	978-0-470-05887-9	2009	
Escobar Espinar, Modesto	Análisis gráfico/exploratorio	La Muralla		84-7635-387-1	1999	

Everitt, B.; Hothorn, T..	A handbook of statistical analyses using R	Hespérides Chapman and Hall/CRC	Boca Raton ; London ; New York	978-1-4200-7933-3	2010
Gil Flores, Javier	análisis factorial	La Muralla-Hespérides.			
Everitt, B.; Hothorn, T..	An introduction to applied multivariate analysis with R	Springer	New York	978-1-4419-9649-7	2011
Gil Flores, Javier	Análisis discriminante	La Muralla ; Salamanca Hespérides		84-7133-704-5	2001
Johnson, Dallas E.	Métodos multivariados aplicados al análisis de datos	International Thomson Editores		968-7529-90-3	2000
Lévy, J.P. y Varela, J.	Análisis Multivariable para las Ciencias Sociales	Pearson/Prentice			2003
Martínez Arias, María Rosario	El análisis multivariante en la investigación científica	La Muralla Hespérides		84-7635-386-3	1999
Peña, Daniel	Análisis de datos multivariantes	McGraw-Hill, Interamericana de España		84-481-3610-1	2002
Tattar, P. N.; Rumaiah, S. y Manjunath, B. G.	A Course in Statistics in R	Wiley		978-1-119-15272-9	2016
Uriel Jiménez, Ezequiel	Análisis multivariante aplicado : aplicaciones al marketing,	Thomson		84-9732-372-6	2005