

**1. General information****Course:** STATISTICAL TECHNIQUES FOR BUSINESS**Code:** 54336**Type:** ELECTIVE**ECTS credits:** 6**Degree:** 317 - UNDERGRADUATE DEGREE IN BUSINESS MANAGEMENT AND ADMINISTRATION (AB)**Academic year:** 2023-24**Center:** 5 - FACULTY OF ECONOMICS AND BUSINESS**Group(s):** 12**Year:** 4**Duration:** First semester**Main language:** Spanish**Second language:** English**Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** MATIAS GAMEZ MARTINEZ - Group(s): 12

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**2. Pre-Requisites**

It is recommended to have coursed the subjects on Statistics for Business 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
E07	Understand the economic environment as a result and application of theoretical or formal representations on how the economy works. To do so, it will be necessary to be able to understand and use common handbooks, as well as articles and, in general, leading edge bibliography in the core subjects of the curriculum.
E08	Ability to produce financial information, relevant to the decision-making process.
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 to use and develop information and communication technologies and to apply them to the corresponding business department by using specific programmes for these business areas.

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

Search for information in order to analyze it, interpret its meaning, synthesize it and communicate it to others.

Know the tools and methods for the quantitative analysis of the company and its environment, including models for business decision making as well as economic forecast models.

Know the analytical models and techniques of the economic and legal environment currently faced by enterprises, with special attention given to the search for opportunities and the anticipation of potential changes.

Work out problems in creative and innovative ways.

**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 2: Analysis of variance****Unit 3: Data Reduction Methods**

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	E07 E08 G01 G03 G04	0.9	22.5	N	-	
Class Attendance (practical) [ON-SITE]	Other Methodologies	E07 E08 G01 G03 G04	0.9	22.5	N	-	
Study and Exam Preparation [OFF-SITE]	Self-study	E07 E08 G01 G04	1.6	40	N	-	
Other on-site activities [ON-SITE]	Workshops and Seminars	E07 G01 G03 G04	0.52	13	Y	N	
Writing of reports or projects [OFF-SITE]	Group Work	E07 E08 G01 G03 G04	2	50	Y	N	
Final test [ON-SITE]	Assessment tests	E07 G01 G04	0.08	2	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>				<b>Total class time hours: 60</b>			
<b>Total credits of out of class work: 3.6</b>				<b>Total hours of out of class work: 90</b>			

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 problem solving and/or case studies	20.00%	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	40.00%	100.00%	Written test with some practicals questions to be solved.
Assessment of active participation	10.00%	0.00%	The active attitude of the student will be classroom.
Fieldwork assessment	30.00%	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.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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.

Regarding the evaluation in case of illness or other special circumstances (extenuating regulations), see article 6 of the Student Evaluation Regulations 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 (extenuating regulations), see article 6 of the Student Evaluation Regulations of the University of Castilla-La Mancha.

#### Specifications for the resit/retake exam:

You can only recover the qualifications of group work and problem solving (handing it over again according to teacher recommendations) and final test (exam). Qualifications of the other sections will be retained but without possibility of recovery.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Writing of reports or projects [AUTÓNOMA][Group Work]	20
Final test [PRESENCIAL][Assessment tests]	2
Unit 1 (de 6): Introduction to Multivariate Analysis	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3

Class Attendance (practical) [PRESENCIAL][Other Methodologies]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Other on-site activities [PRESENCIAL][Workshops and Seminars]	1
Writing of reports or projects [AUTÓNOMA][Group Work]	4
<b>Unit 2 (de 6): Analysis of variance</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Other on-site activities [PRESENCIAL][Workshops and Seminars]	2
Writing of reports or projects [AUTÓNOMA][Group Work]	4
<b>Unit 3 (de 6): Data Reduction Methods</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Other on-site activities [PRESENCIAL][Workshops and Seminars]	3
Writing of reports or projects [AUTÓNOMA][Group Work]	6
<b>Unit 4 (de 6): Clasification and Comparison of Groups</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Other on-site activities [PRESENCIAL][Workshops and Seminars]	2
Writing of reports or projects [AUTÓNOMA][Group Work]	4
<b>Unit 5 (de 6): Models for Qualitative Data Analysis</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Other on-site activities [PRESENCIAL][Workshops and Seminars]	2
Writing of reports or projects [AUTÓNOMA][Group Work]	6
<b>Unit 6 (de 6): Other Techniques for Business Data Analysis</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Other on-site activities [PRESENCIAL][Workshops and Seminars]	3
Writing of reports or projects [AUTÓNOMA][Group Work]	6
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Class Attendance (practical) [PRESENCIAL][Other Methodologies]	22.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	40
Other on-site activities [PRESENCIAL][Workshops and Seminars]	13
Writing of reports or projects [AUTÓNOMA][Group Work]	50
Final test [PRESENCIAL][Assessment tests]	2
Class Attendance (theory) [PRESENCIAL][Lectures]	22.5
<b>Total horas: 150</b>	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Baillo Moreno, Amparo	100 problemas resueltos de estadística multivariante : (impl	Delta	Madrid	84-96477-73-8	2007	
Grant, E.L.	Control estadístico de calidad	Compañía Editorial Continental		968-26-1256-X	2004	
Hair, J.F., Anderson, R.E., Tatham, R.L. y Black, W.C.	Análisis multivariante	Prentice Hall	Madrid	978-84-8322-035-1	2005	
Johnson, Richard Arnold	Applied multivariable statistical analysis	Prentice Hall		0-13-834194-X	1998	
Kline, Rex B.	Principles and practice of structural equation modeling	Guilford Press,		978-1-4625-2334-4	2016	
Lévy, J.P. y Varela, J. (dirs)	Análisis multivariable para las ciencias sociales	Pearson Education	Madrid	978-84-205-3727-6	2008	
Mitra, Amitava	Fundamentals of Quality Control and Improvement	Prentice-Hall	Upper Saddle River, NJ	0-13-645086-5	1998	
Monecke, A. & Leisch, L.	semPLS: Structural Equation Modeling Using Partial Least Squares				2012	

Montgomery, D.C.	<a href="https://www.jstatsoft.org/article/view/v048i03">https://www.jstatsoft.org/article/view/v048i03</a> Introduction to statistical quality control	Wiley	0-471-66122-8	2005
Mulaik, Stanley A.1935-	Linear causal modeling with structural equations	CRC Press	978-1-4398-0038-6	2009
Peña, D.	Análisis de datos multivariantes	McGraw-Hill	8448136101	2002
Pérez López, César	Control estadístico de la calidad : teoría, práctica y apli	RA-MA	84-7897-331-1	1998
Pérez López, César	Técnicas de análisis multivariante de datos	Pearson Educación	978-84-205-4104-4	2008
Rosseel, Y.	lavaan: An R Package for Structural Equation Modeling <a href="https://www.jstatsoft.org/article/view/v048i02">https://www.jstatsoft.org/article/view/v048i02</a>			2012
Vicente y Oliva, María A. de	Análisis multivariante para las ciencias sociales	Dykinson Universidad Rey Juan Carlos	84-8155-541-X	2000
Arriaza, Fernández, López, Muñoz, ...	Estadística Básica con R y R-Commander	Universidad de Cádiz		
Aldás, Joaquín.	Análisis multivariante aplicado con R /	Alfa Centauro Paraninfo,	978-84-283-2969-9	2017
Daniel Paredes Inilupu	Data Science con R. Análisis de Datos y algoritmos de predicción con R <a href="https://bookdown.org/dparedesi/data-science-con-r/">https://bookdown.org/dparedesi/data-science-con-r/</a>			2020