



Universitat de Lleida

DEGREE CURRICULUM
ANALYSIS OF DATA

Coordination: PAGES BERNAUS, ADELA

Academic year 2023-24

Subject's general information

Subject name	ANALYSIS OF DATA			
Code	102358			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's degree in Industrial Organization and Logistics Engineering	4	OPTIONAL	Attendance-based
	Not informed	4	OPTIONAL	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRAULA		TEORIA
	Number of credits	3		3
	Number of groups	1		1
Coordination	PAGES BERNAUS, ADELA			
Department	ECONOMICS AND BUSINESS			
Teaching load distribution between lectures and independent student work	On-campus teaching: 60 hours Autonomous independent work: 90 hours			
Important information on data processing	Consult this link for more information.			
Language	English			
Distribution of credits	Theoretical: 3 ECTS Practice: 3 ECTS			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
PAGES BERNAUS, ADELA	adela.pages@udl.cat	7,2	

Subject's extra information

Data Analysis is offered in the 2nd semester of the 4th year of the degree in Engineering in Industrial Organization and Logistics or the degree in Chemical Engineering. It corresponds to the Subject "Circular Economy" within the Module "Optative Formation".

This subject requires continuous work throughout the semester in order to achieve the stated goals. Critical thinking and abstract reasoning abilities are required.

It is recommended to frequently visit the Virtual Campus space (<http://cv.udl.cat>) associated with the subject as all the corresponding information is announced.

Learning objectives

This is a practical course where data analysis is approached from an intuitive point of view. Statistical concepts and techniques will be presented with the use of the computer and practical cases. The course is taught mainly with the support of the statistical software R together with the support of spreadsheets, such as Excel.

By the end of this course, students will be able to:

- Organize and describe analytically statistical data.
- Communicate data insights, both numerically and graphically.
- Think critically about data, apply appropriate techniques and draw conclusions from such analysis.
- Support decision making with the use of data analytics
- Perform reproducible statistical analysis

Competences

Basic

B03 That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.

B04 That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public.

B05 That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

Transversal

CT3. To implement new technologies and technologies of information and communication.

CT4. To apply basic knowledge of entrepreneurship and professional environments.

CT5. To apply essential notions of scientific thinking.

General competences

CG6. To implement specifications, regulations and mandatory rules.

CG7. To analyze and assess the social and environmental impact of technical solutions.

CG10. To work in a multilingual and multidisciplinary environment.

Specific competences

CE16. To define the basic knowledge and applications of environmental technologies and sustainability.

CE18. To acquire capacity for planning and developing new projects, products and processes.

Subject contents

Lesson 1. Introduction to the statistical software for data analysis R

- Working in Rstudio
- Reproducible workflow – Introduction to Rmarkdown
- Statistical Concepts
- Graphics in R
- Tidyverse universe

Lesson 2. Exploratory Data Analysis

- One-variable analysis
- Two-variable analysis
- Principal Components Analysis

Lesson 3. Linear Regression

- Simple Linear Regression
- Multiple Linear Regression
- Interaction effects in Regression

Lesson 4. Classification Problem

- Logistic Regression
- Nearest Neighbour Analysis

Lesson 5. Time Series

- Stochastic Processes
- ARIMA models

Methodology

The course develops theoretical concepts by means of case examples.

The usual format of the sessions will consist of a first part of explanation of the main concepts, and then a practical guided activity that will allow students to consolidate the concepts discussed in the session.

The time distribution of dedications will be:

Activity	Classroom activity		Homework activity		Total time
	Goals	Hours	Student work	Hours	Hours/ECTS

Master class	Explanation of concepts	30	Comprehension	45	75
Problems and case studies	Case study, problems	30	Problem solving	45	75
Total		60		90	150

Development plan

Week	Description	Classroom activity	HTP	Homework activity	HTNP
W1	Presentation. Lesson 1	Presentation of the course Master class	4	Comprehension	6
W2	Lesson 1	Master class. Problems setup	4	Comprehension and problem solving	6
W3	Lesson 1	Master class. Problems setup	4	Comprehension and problem solving	6
W4	Lesson 2	Master class. Problems setup	4	Comprehension and problem solving	6
W5	Lesson 2	Master class. Problems setup	4	Comprehension and problem solving	6
W6	Lesson 2	Master class. Problems setup	4	Comprehension and problem solving	6
W7	Lesson 3	Master class. Problems setup	4	Comprehension and problem solving	6
W8	Lesson 3	Master class. Problems setup	4	Comprehension and problem solving	6
W9	First term test	Individual test	2	Test preparation	3
W10	Lesson 3	Master class. Problems setup	4	Comprehension and problem solving	6
W11	Lesson 4	Master class. Problems setup	4	Comprehension and problem solving	6
W12	Lesson 4	Master class. Problems setup	4	Comprehension and problem solving	6
W13	Lesson 4	Master class. Problems setup	4	Comprehension and problem solving	6
W14	Lesson 5	Master class. Problems setup	4	Comprehension and problem solving	6
W15	Lesson 5	Master class. Problems setup	4	Comprehension and problem solving	6
W16	Second term test	Individual test	2	Test preparation	3

Evaluation

Continuous evaluation

The final mark of the subject is composed of the following blocks and weights:

- Practical activities and exercises: 25%
- Mid-term exam: 40%
- Project: 25% Within this block, the weight distributed as follows:
 - First delivery: 15%
 - Final delivery: 70%
 - Presentation: 15%
- Test: 10%

Score ranges from 0 to 10 points.

The activities must be submitted through the Campus Virtual site within the period given.

Alternative evaluation/Avaluació alternativa

Students who have the approval to be assessed through "Avaluació alternativa" (see requirements and procedure in the "Normativa d'avaluació" regulation) must carry out the following activities on the stipulated delivery dates.

- Practical activities and exercises (individual format): 25%
- Mid-term exam: 40%
- Project: 25% Within this block, the weight distributed as follows:
 - First delivery: 15%
 - Final delivery: 70%
 - Presentation (video): 15%
- Test: 10%

Bibliography

- Daniel Peña (2010) *Análisis de series temporales*. Alianza Editorial.
- David Dalpiaz *Applied Statistics with R* (<https://book.stat420.org/>)
- Douglas Montgomery, George C. Runger (2018) *Applied Statistics and Probability for Engineers*. Wiley
- Hadley Wickham, Garrett Grolemund (2017) *R for Data Science*. O'Reilly Media (<https://r4ds.had.co.nz/>)
- Rob J. Hyndman, George Athanasopoulos (2018) *Forecasting: Principles and Practice*. OTexts: Melbourne, Australia (<https://otexts.com/fpp2/>)
- <http://cran.r-project.org/manuals.html>