

Bachelor Degree in Business Administration and Management and Business Transformation

Course: Data analysis methods and techniques

Subject: Statistics

Credits: 6 ECTS

Program: Bachelor

Modality: On-Site

Year: Second

Semester: First

Academic Year: 2026–2027

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2. Presentation

2.1 Description

Once the conceptual bases of statistics have been established in the subject of Fundamentals of Statistics, we enter into the development of different statistical techniques, models, methods and procedures with an eminently applied approach. Here linear models are placed as a basic and yet powerful tool within statistical methodology, with the procedures of Simple Linear Regression and Multiple Linear Regression playing a fundamental role.

2.2 Relevant professional applications

In this course we study the foundations of the theory and application of linear models, which are undoubtedly a basic and yet powerful tool within statistical methodology. The purpose is to analyze whether or not there is any relationship between certain variables, and if so, express it as accurately as possible.

The greatest utility of a model is that, once constructed and reflected (through the built-in calculations that will be performed with Excel) a behavior representative of the key business variables, we can analyze the estimated effect that certain changes in these variables can have on the ratios that have been defined as priorities. For example, if we model the business of a candy factory and define as main ratios the result, the box generated, the shareholder's profitability or any other ratio we have defined, we can study the effect on them when certain variables are modified such as: sales prices, raw material purchase prices, electricity cost, personnel, etc. This is one of the most comprehensive and powerful business risk management tools together with business decision making.

3. Learning outcome of the degree

- RAT6 - The graduate will be able to understand the different data analysis techniques used to assess the feasibility of a business project.
- RAT9 - The student will be able to provide clear and precise explanations of any knowledge/information, both orally and in writing, in Catalan, Spanish and a third language, particularly English.
- RAT10 - The student will be able to apply digital technologies (at the right time) in his/her field of expertise.
- RAT12 - The graduate will be able to develop both traditional and digital marketing and promotional projects in a business environment.
- RAT13 - The graduate will be able to analyze the economic operations of companies, which have been carried out in the financial markets.
- RAT14 - The graduate will be able to apply in an effective way the principles of quality management and continuous improvement of organizations by means of a simulation of the implementation of a quality system in a company.
- RAT16 - The graduate will be able to understand the economic-financial information of business entities and institutions in relation to their environment.
- RAT18 - The student will be able to provide innovative, creative and entrepreneurial solutions in professional situations.
- RAT19 - The student will be able to evaluate the sustainability and social impact of the proposals presented, with ethical, environmental and professional responsibility.
- RAT20 - The student will be able to apply the gender perspective in the professional tasks.
- RAT21 - The graduate will be able to verify the economic-financial information of business organizations and institutions with regard to their environment, by analyzing the companies' profit and loss accounts.
- RAT24 - After completing the degree, the student will be able to design projects for IT services and systems in all business fields.

4. Learning outcomes of the subjects

- RAM2 - The student will be able to correctly solve exercises and problems in which statistical methods, techniques and procedures are applied.
- RAM3 - The student will be able to properly use computer programs for solving exercises and statistical problems.
- RAM4 - The student will be able to statistically analyze business data to obtain results and conclusions.
- RAM5 - The student will be able to correctly identify a problem, its relevant data and possible causes.
- RAM6 - The student will be able to properly analyze a problem and its possible causes, by visualizing data related to relevant information.
- RAM7 - The student will be able to clearly restructure the available information according to the objectives.
- RAM8 - The student will be able to correctly solve numerical, commercial and financial, statistical and similar data.

5. Contents

The subject will address issues in the development of different statistical techniques, models, methods and procedures with an eminently applied approach. Here linear models are placed as a basic and yet powerful tool within statistical methodology, with the procedures of Simple Linear Regression and Multiple Linear Regression playing a fundamental role. In particular:

1. Probability: Sample Distributions and Central Limit Theorem

- 1.1. Introduction: Statistics in the field of the State and the company.
- 1.2. Sampling Methods
- 1.3. Sample distribution of the mean
- 1.4. Sample Distribution of the Proportion
- 1.5. Central Limit Theorem
- 1.6. Application of the sample distribution of the mean.

2. Statistical Inference: Point Estimation and Confidence Intervals

- 2.1. Point estimators and confidence intervals of a mean
- 2.2. Concept of interval and confidence level
- 2.3. Confidence intervals of the population mean μ
- 2.4. Confidence intervals of the population mean μ with known σ
- 2.5. Confidence intervals of the population mean μ with unknown σ
- 2.6. Confidence intervals for a proportion π
- 2.7. Sample size and calculation of sampling error

3. Statistical Inference: Hypothesis Testing of a Sample

- 3.1. What is a hypothesis test?
- 3.2. Unilateral (single-tailed) and bilateral (two-tailed) hypothesis tests
- 3.3. Definition and calculation of test and p-value *statistics*
- 3.4. Population inference of the mean (t-test/z-test) with a value
- 3.5. Population inference of the ratio (z-test) to a value
- 3.6. Sample Variance Equality Test (*Chi-Square Test*)

4. Statistical Inference: Two-Sample Hypothesis Testing

- 4.1. Hypothesis testing of two sample means: independent samples
- 4.2. Hypothesis testing of two sample means: paired samples
- 4.3. Hypothesis testing of two sample proportions
- 4.4. Sample Variance Test (*Fisher F Test*)
- 4.5. Hypothesis Testing of More Than Two Sample Means: *ANOVA*

5. Univariate Modeling: Simple Linear Regression (RLS)

- 5.1. Introduction to *Data Modelling*
- 5.2. Pearson's *correlation coefficient*
- 5.3. Simple Regression Analysis (RLS): Ordinary Least Squares
- 5.4. Model Adjustment
- 5.5. Model validation analysis: residuals and errors
- 5.6. Quality of the model: R^2
- 5.7. Interpretation of the explanatory and predictive model

6. Multivariate Modeling: Multiple Linear Regression (RLM)

- 6.1. Correlations Table
- 6.2. Tuning the RLM model
- 6.3. Model validation analysis: residuals and errors
- 6.4. Quality of the model: Adjusted R^2
- 6.5. Study of multicollinearity: Variance Inflation Factor (*VIF*)
- 6.6. Interpretation of the explanatory and predictive model
- 6.7. Introduction of explanatory qualitative variables (Var. Indicator – *Dummy*)
- 6.8. Introduction to Time Series (*ARIMA*) and Econometric Models

Application through examples and exercises of Corporate Social Responsibility to ensure a better sustainable community and continuity in the awareness of its importance.

6. Methodology

Learning outcomes developed	Teaching methodology	Training activities
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Knowledge	Master class	Teacher's presentations
	Instructional sessions	Student's presentations
	Tutoring	Meetings for the resolution of doubts
	Learning based on readings	Reading and analysis of documents
Skill	Learning based on projects	Problem solving
	Learning based on audio-visual	Audiovisual analysis
	Case-based learning	Search and processing of information. Problem solving
Competence	Project-based work	Reporting Submissions of reports or papers

7. Evaluation

Evaluation system	Weight
Continuous evaluation: exercises, problems, reporting, papers, case studies	40 %
Mid-term exam	20 %
Final exam	40 %

The regulations include the obligation of 75% attendance.

- Absences are divided into two categories: justified and unexcused. Excused absences are those that can be demonstrated with a proof. All other absences are considered unjustified absences.
- The supporting documents must be delivered within a maximum period of 7 days to the teaching staff and clearly include the student's personal data as well as the date and time in which the student did not attend to a class.

Continuous assessment

The final grade for the subject is calculated based on the weighting of three evaluation blocks, divided into evaluable activities:

A. Midterm exam: 20%

B. Exercises, problems, preparation of reports, assignments, presentations: 40%

1. Four evaluable activities: 5% each
2. A group assignment or report: 10%
3. A group presentation: 10%

C. Final exam: 40%

These three blocks will only be weighted if the final exam grade is equal to or greater than 4.0. If the final exam grade is less than 4.0, the subject cannot be passed.

In the event that the subject is failed and, in turn, the final exam grade is less than 5.0, the student can recover the final exam with an additional test. If the weighted grade for the activities in section B is less than 5, this is also recoverable. With the result obtained, the final grade for the subject will be calculated according to the previous criteria.

Students who do not attend evaluative activities with a weight greater than 50% will receive an overall course grade of "Not presented."

Single Evaluation

The single evaluation consists of a single exam that is equivalent to 100% of the course grade. The exam, and therefore the subject, is passed with a grade of 5 out of 10 in this final test. In case of obtaining a grade lower than 5.0, the student has the right to a make-up exam.

To benefit from the single evaluation, it is necessary to send a written request to the coordination during the first 15 business days of the course.

The regulations establish a mandatory attendance requirement of 75%.

Regular attendance at in-person teaching activities is a fundamental academic requirement for the proper acquisition of the course competencies and learning outcomes. Accordingly, students must attend at least **75% of all scheduled sessions**.

Failure to meet this minimum attendance requirement will result in the loss of the right to sit the final examination for the course. Consequently, the student will receive a failing grade, with no possibility of accessing reassessment procedures or second-chance examinations, in accordance with the University's current academic regulations.

1. Absences are divided into two categories: **excused** and **unexcused**. Excused absences are those that can be supported by appropriate documentation. All other absences will be considered unexcused.
2. Supporting documentation for excused absences must be submitted to the teaching staff within a maximum of **7 days** and must clearly include the student's personal details, as well as the date and time period during which attendance in class was prevented.

8. Bibliography

8.1 Basic Bibliography

- Introduction to Mathematical Statistics, Global Edition, 8th Edition, Robert V. Hogg, Joseph McKean, Allen T. Craig, Late, 2021 | Pearson

8.2 Complementary Bibliography

- Estadística para administración y economía, Stevenson, William, 17 valoraciones por Goodreads, ISBN 10: 9686034102 / ISBN 13: 9789686034103, Editorial: Editorial Reverté, 2020
- Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (Wiley - Business Series) Wiley Business Series, Bart Basens, 2014
- Handbook of Marketing Decision Models (Second Edition), Springer, Berend Weirenga and Ralf van der Lans, 2018
- Business Statistics for Competitive Advantage with Excel - Basics, Model Building, Simulation and Cases, Springer, Cynthia Fraser, 2019