

Degree programme	Type	Course
Business Administration	FB	2
Economics	FB	2

Contact lecturer

Name : Dolors Márquez Cebrián

Email : mariadolores.marquez@uab.cat

Teaching staff

Maria del Mar Gómez Pujalte

Daniel Ruiz Palomo

David Gomez Guillen

Xavier Vila Carnicero

Mireia Díaz Sanchís

Teaching staff (external to UAB)

Theivan.Pasupathipillai@uab.cat

Robert Wojciechowski

Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

It is recommended that the student has passed the following subjects: Statistics I, Mathematics I and Mathematics II. This way, the student will have acquired the competences necessary to Statistics II with the best warranty of success. It is also essential that you demonstrate basic knowledge of R.

Objectives

This subject will enable the students to understand and apply the statistical method to solve problems characteristic of economics and business. Thus, starting from empirical evidence gathered in a given sample the students will be able to arrive to conclusions scientifically valid which will help them in decision making.

This subject must also provide students with the theoretical foundations that will enable them to follow satisfactorily other subjects (Econometrics, Econometric forecast models, Operations Research) of quantitative

content as well as tools that will help them with a better understanding of subjects such as Macroeconomics, Game Theory, Marketing Research) in which some statistical concepts (theoretical or practical) can play an important role.

Learning outcomes

Business Administration

- CM15 (Estimate statistical models using computer programs for quantitative data analysis.) Estimate statistical models using computer programs for quantitative data analysis.
- CM19 (Make decisions based on the analysis of the statistical information generated for each problem.) Make decisions based on the analysis of the statistical information generated for each problem.
- KM16 (Identify the statistical techniques necessary for the quantitative and qualitative representation of the behaviour of variables with random components.) Identify the statistical techniques necessary for the quantitative and qualitative representation of the behaviour of variables with random components.
- KM17 (Describe in statistical terms the quantitative and qualitative information regarding economic phenomena and variables.) Describe in statistical terms the quantitative and qualitative information regarding economic phenomena and variables.

Economics

- CM05 (Estimate statistical models using computer programmes for quantitative data analysis.) Estimate statistical models using computer programmes for quantitative data analysis.
- CM09 (Make decisions based on the analysis of the statistical information generated for each problem.) Make decisions based on the analysis of the statistical information generated for each problem.
- KM04 (Identify the statistical techniques necessary for the quantitative and qualitative representation of the behaviour of variables with random components.) Identify the statistical techniques necessary for the quantitative and qualitative representation of the behaviour of variables with random components.
- KM05 (Describe in statistical terms the quantitative and qualitative information regarding economic phenomena and variables.) Describe in statistical terms the quantitative and qualitative information regarding economic phenomena and variables.

Contents

Unit 1 Introduction to Inferential Statistics and Estimation

1.1 Inferential Statistics: Definition and Inference Methods

1.2 Definition, characteristics and Distribution of the main sample statistics: mean, variance and proportion

1.3 Methods of point estimation and interval estimation

1.4 Properties of estimators: bias, efficiency and consistency

1.5 Methods of estimation: maximum likelihood and method of moments

Unit 2 Parametric hypothesis tests

2.1 Concept of parametric test: null hypothesis and alternative hypothesis

2.2 Test statistic and error type

2.3 Tests on the population mean, population variance and population proportion

2.4 Sample comparison test

2.5 Analysis of Variance

2.6 The p-value

Unit 3 Goodness-of-fit and analysis of the relationship between variables

3.1 Chi-Square goodness-of-fit test for discrete variables

3.2 K-S goodness-of-fit test for continuous variables

3.3 Test of independence between qualitative variables

3.4 Analysis of the correlation between quantitative variables: correlation coefficient

Unit 4 Introduction to the regression model

4.1 Presentation and objectives of the model

4.2 Hypothesis of the model specification

4.3 Estimation by Ordinary Least Squares (OLS) and their properties

4.4 Model testing

4.5 Coefficient of the goodness-of-fit and relationship between the correlation and the regression analysis

4.6 Forecasting

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Individual study	89.5	3.58	CM05, CM15, KM04, KM16
Lab sessions	17	0.68	CM05, CM15, KM04, KM16
Lectures	32.5	1.3	CM09, CM19, KM05, KM17
Tutoring and monitoring work in progress	7.5	0.3	CM09, CM19, KM04, KM16

The activities that will allow the students to learn the basic concepts included in this course are:

1. Theory lectures where the instructor will explain the main concepts.

The goal of this activity is to introduce the basic notions and guide the student learning.

2. Problem Sets

A problem set which students will have to solve individually will be included in every unit. The goal of this activity is twofold. On one hand students will work with the theoretical concepts explained in the classroom, and on the other hand through this practice they will develop the necessary skills for problem solving.

3. Lab sessions

The aim of this activity is to learn to use computational tools for the treatment and analysis of data.

This activity will be developed, on the programmed days, in the computer rooms of the faculty. Faculty or in the teaching room depending on the circumstances and availability of spaces. If the activity is developed in the regular classroom, students will need to bring their own laptop in order to participate in the activity.

4. Tutoring hours

Students will have some tutor hours in which the subject instructors will help them solve any doubts they may have.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Final exam	50%	2	0.08	CM09, CM19, KM04, KM05, KM16, KM17

Midterm exam	20%	1	0.04	CM09, CM19, KM05, KM17
Exercises, essays and/or lab practices	30%	0.5	0.02	CM05, CM15, KM04, KM05, KM16, KM17

This subject does not offer the option for comprehensive evaluation.

The evaluation of the students will be carried out according to the following activities:

1. A midterm exam

Written evidence in which the student will not be allowed to consult any kind of teaching material. The maximum resolution time will be 60 minutes. This test does not release matter.

2. A final exam

Written evidence in which the student will not be allowed to consult any kind of teaching material. The maximum resolution time will be 2 hours, and will include all the subject matter of the course.

The exam is designed so that the student performs a last learning effort that is considered necessary to consolidate the previously acquired knowledge, thus guaranteeing the success in the continuous learning process of the greatest possible number of students.

3. Submission of problem sets and essays, and/or lab practices

Students will submit, at the request of the teaching staff and following their instructions, exercises, essays and/or lab practices to be solved individually and/or in groups of between 2 and 4 students.

Evaluation criteria

The grade of the midterm exam will weight a 20% of the average grade of the subject.

The grade of the final exam will weight a 50% of the average grade of the subject.

The grade of the submission of exercises, essays and/or lab practices will weight a 30% of the average grade of the subject.

Therefore, the average grade of the subject is computed as:

average grade of the subject = 20% (grade of the midterm exam) +

+ 50% (grade of the final exam)+

+ 30% (grade exercises/essays/lab practices)

The subject will be considered \"passed\" if the following two requirements are met:

1. the average grade of the subject is equal to or greater than 5 and

2. the grade of the final exam is equal to or greater than 3.

- A student that meets the first requirement above but does not meet the second will receive an average grade of the subject equal to 4.5, and will qualify for the re-evaluation test according to what is established in the section \"Retake Process\" below.
- A student that meets the second requirement above but does not meet the first, or any of them, will qualify for the re-evaluation test according to what is established in the section \"Retake Process\" below.

A student who has not participated in any of the assessment activities will be considered \"Not evaluable\".

Calendar of evaluation activities

The dates of the evaluation activities (midterm exams, exercises in the classroom, assignments, ...) will be announced well in advance during the semester.

The date of the final exam is scheduled in the assessment calendar of the Faculty.

"The dates of evaluation activities cannot be modified, unless there is an exceptional and duly justified reason why an evaluation activity cannot be carried out. In this case, the degree coordinator will contact both the teaching staff and the affected student, and a new date will be scheduled within the same academic period to make up for the missed evaluation activity." Section 1 of Article 264. Calendar of evaluation activities (Academic Regulations UAB).

Students of the Faculty of Economics and Business, who in accordance with the previous paragraph need to change an evaluation activity date must process the request by filling out an Application for exams' reschedule: e-Formulari per a la reprogramació de proves.

Grade revision process

After all grading activities have ended, students will be informed of the date and way in which the course grades will be published. Students will be also be informed of the procedure, place, date and time of grade revision following University regulations.

Retake Process

"To be eligible to participate in the retake process, it is required for students to have been previously been evaluated for at least two thirds of the total evaluation activities of the subject." Section 2 of Article 261. The recovery (UAB Academic Regulations). Additionally, it is required that the student to have achieved an average grade of the subject greater than or equal to 3.5 and less than 5.

The date of the retake exam will be posted in the calendar of evaluation activities of the Faculty. Students who take this exam and pass, will get a grade of 5 for the subject. If the student does not pass the retake, the grade will remain unchanged, and hence, student will fail the course.

Irregularities in evaluation activities

The completion of assessment activities is subject to the provisions set out in this course guide and in the "[Policy of the School of Economics and Business on the Detection of Irregularities during Assessment Activities](#)", which regulates the conditions under which assessment tasks are conducted and the procedures applicable in cases where indications of irregularities are detected. Students are encouraged to consult the policy.

IMPORTANT INFORMATION:

For this subject, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support actions, such as searching for information on the different concepts covered in the subject, explanations of error messages generated by RStudio or on the use of RStudio commands. In no case may it be used to generate or write answers to exercises and assignments, or to determine the interpretations and conclusions of the different activities carried out during the course.

In short, AI tools may be used to learn how to start and develop an activity, but they cannot replace the student at the time of carrying it out and, above all, to interpret and write the results and reach conclusions.

The student must clearly identify which parts have been generated with this technology, specify the tools used and include a critical reflection on how these have influenced the process and the final result of the activity. The lack of transparency of the use of AI in this assessable activity will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

Bibliography

- **Canavos, GC** Applied probability and statistical methods. McGraw-Hill. McGraw-Hill. 1998
- Heumann C, Schomaker M. and Shalabh Introduction to Statistics and Data Analysis Springer 2016
<https://link.springer.com/content/pdf/10.1007%2F978-3-319-46162-5.pdf>
- Illowsky, B., and Dean, S. Introductory Statistics OpenStax Rice University 2018
<https://openstax.org/details/books/introductory-statistics>
- **Lind, D. A. et al.** Statistical Techniques in Business and Economics. McGraw-Hill. 2018
- **Newbold P.** Statistics for business and economics. Pearson-Prentice Hall. 2013

Software

R and RStudio

R is a mighty programming language for doing statistics. It covers from the most basic concepts, like computing the mean of a list of numbers, to the most advanced techniques as linear and nonlinear modeling, statistical tests, time series analysis, classification, clustering, etc. As a matter of fact, R is considered to be one of the most widely used statistical software tools in the industry and the academia. R is a highly versatile and easy to expand open source project, which means that is freely distributable and that there is a community of thousands of users and developers continuously contributing to this software. You can learn everything about R by visiting the Comprehensive R Archive Network at CRAN. R Studio is a powerful IDE (Integrated Development Environment) for working with R, and is the tool that will be used throughout this course.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	first semester	morning-mixed
(TE) Theory	2	Catalan	first semester	morning-mixed
(TE) Theory	4	English	first semester	morning-mixed
(TE) Theory	8	English	first semester	morning-mixed
(PLAB) Practical laboratories	11	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	12	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	21	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	22	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	41	English	first semester	morning-mixed
(PLAB) Practical laboratories	42	English	first semester	morning-mixed
(TE) Theory	51	Catalan	first	afternoon

semester				
(PLAB) Practical laboratories	51	Catalan	first semester	afternoon
(TE) Theory	52	Catalan	first semester	afternoon
(PLAB) Practical laboratories	52	Catalan	first semester	afternoon
(TE) Theory	60	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	81	English	first semester	morning-mixed
(PLAB) Practical laboratories	601	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	602	Catalan	first semester	morning-mixed