UAB
Universitat Autònoma de Barcelona

2020/2021

Statistics I

Code: 102386
ECTS Credits: 6

Degree	Type	Year	Semester
2501572 Business Administration and Management	FB	1	2
2501573 Economics	FB	1	2

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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Teachers

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Use of Languages

Principal working language: catalan (cat)

Some groups entirely in English: Yes

Some groups entirely in Catalan: Yes

Some groups entirely in Spanish: Yes

Prerequisites

It is recommended that the student has passed the course of Mathematics I and is taking (or have passed) Mathematics II.
Thus the student has achieved all the skills needed to approach the study of Statistics I with the best guarantees of success.

Objectives and Contextualisation

The aim of this course is that students understand and are able to use data analysis and the basic probabilistic tools that are necessary to address the study of statistical inference. In this sense, the subject is clearly linked, in terms of its immediate application, to the course Statistics II.

However, the skills in data analysis and probabilistic tools that the student has acquired in this course are also useful in other subjects, such as microeconomics, macroeconomics, econometrics and, in general, those in which random phenomena play an important role.

Competences

Business Administration and Management
- Analyse quantitative and qualitative information referring to economic phenomena and variables.
- Apply the basic statistics for improving processes of analysis and systematisation of business information and learn rigorously and scientifically about the company chain of value.
- Capacity for oral and written communication in Catalan, Spanish and English, which enables synthesis and oral and written presentation of the work carried out.
- Organise the work in terms of good time management, organisation and planning.
- Select and generate the information necessary for each problem, analyse it and take decisions based on that information.
- Take decisions in situations of uncertainty, demonstrating an entrepreneurial and innovative attitude.

Economics
- Analyse quantitative and qualitative information referring to economic phenomena and variables.
- Apply the basic statistics for improving processes of analysis and systematisation of business information and learn rigorously and scientifically about the company chain of value.
- Capacity for independent learning in the future, gaining more profound knowledge of previous areas or learning new topics.
- Demonstrate initiative and work individually when the situation requires it.
- Organise the work in terms of good time management, organisation and planning.
- Select and generate the information necessary for each problem, analyse it and take decisions based on that information.
- Take decisions in situations of uncertainty, demonstrating an entrepreneurial and innovative attitude.
- Use of the available information technology and adaptation to new technological environments.
- Work well in a team, being able to argue proposals and validate or reject the arguments of others in a reasoned manner.

Learning Outcomes

1. A capacity of oral and written communication in Catalan, Spanish and English, which allows them to summarise and present the work conducted both orally and in writing.
2. Capacity to continue future learning independently, acquiring further knowledge and exploring new areas of knowledge.
3. Collect, represent, summarise and analyse quantitative and qualitative information referring to economic phenomena and variables.
4. Demonstrate initiative and work independently when required.
5. Identify situations characterised by the presence of randomness and analyse them using basic probabilistic tools.
6. Make decisions in situations of uncertainty and show an enterprising and innovative spirit.
7. Organise work, in terms of good time management and organisation and planning.
8. Represent economic and non-economic variables with random elements.
9. Select and generate the information needed for each problem, analyse it and make decisions based on this information.
10. Use available information technology and be able to adapt to new technological settings.
11. Work as part of a team and be able to argue own proposals and validate or refuse the arguments of others in a reasonable manner.

Content

Unit 1 Data Analysis
1.1. Collecting data: Sampling and properties.
1.2. Types of variables and frequency distribution tables.
1.3. Graphical representations.
1.4. Measures of position, dispersion, and shape
1.5. Covariance and correlation coefficient.
1.6. Mean and variance of linear combinations of variables.
1.7. Mean vector and covariance matrix.

Unit 2 Probability theory
2.1. Random events and sample spaces.
2.2. Probability: Axiomatic definition and interpretations.
2.3. Probability computation and its properties.
2.4. Conditional probability and stochastic independence.
2.5. Total probability and Bayes Theorems.

Unit 3 Discrete random variables
3.1. Definition of random variable.
3.2. Probability function and distribution function.
3.3. Numeric characteristics: Expectation and Variance.
3.4. Classical discrete distributions: Bernoulli, Binomial, Poisson and Geometric.
3.5. Multidimensional random variables.
3.6. Joint and marginal probability functions.
3.7. Conditional probability function and conditional expectation. The concept of Independence.
3.8. Covariance and correlation coefficient. Covariance matrix.

Unit 4 Continuous random variables
4.1. Density function and distribution function.
4.2. Numeric characteristics: Expectation and variance.
4.3. Classical continuous distributions: Uniform, Exponential, Normal, Uniform and Normal multivariate analysis.
4.4. Normal approximation to the Binomial distribution.

Methodology

The teaching methodology, unless the situation prevents it, will be face-to-face

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

1. Theory lectures where the instructor will teach 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. Practice lectures

The aim of this activity is to comment on and solve any possible doubt that students may have had solving the problem assignment. This way they will be able to understand and correct any errors they may have had during this process.

4. Lab activities

This activity will be developed, on the programmed days, in the computer rooms of the faculty. The students will learn to use computational tools for the treatment and analysis of data.

5. Tutoring hours

Students will have some tutor hours in which the subject instructors will help them solve any doubts they may have. The level of use of ICT will be subject to availability and the number of students registered in the groups.

The proposed teaching methodology may undergo some modifications according to the restrictions imposed by the health authorities on on-campus courses.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab activities	8	0.32	2, 3, 9, 10
Lectures	33	1.32	5, 6, 3, 8, 9, 10
Resolution of exercises	5	0.2	2, 5, 6, 3, 8, 9, 11, 10
Type: Supervised			
Tutoring and monitoring work in progress	10.5	0.42	1, 2, 5, 4, 7, 6, 3, 8, 9, 11, 10
Type: Autonomous			
Individual study	90	3.6	2, 5, 4, 7, 6, 3, 8, 9, 11, 10

Assessment

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 50 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 quizzes

Students will submit, at the request of the teaching staff and following their instructions, various exercises and/or essays to be solved individually and/or in groups of between 2 and 4 students. Some of these exercises may consist of one or more quizzes in the lab in order to evaluate the learning of the computer activites carried out.

Evaluation criteria

The grade of the midterm exam will wieght a 30% 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 quizzes in the lab will weight a 20% of the average grade of the subject.

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

> average grade of the subject = 30% (grade of the midterm exam) +
> + 50% (grade of the final exam) +
> + 20% (grade exercises/essays/lab quizzes)

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 recevie 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 (exercises in the classroom, assignments, ...) will be announced well in advance during the semester.
The dates of the midterm exam and the final exam are 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 activitycannot 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 115. 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 https://eformularis.uab.cat/group/deganat_feie/application-for-exams-reschedule

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 3 of Article 112 ter. The recovery (UAB Academic Regulations).
Additionally, it is required that the student to have achieved an average grade of the subject between 3.5 and 4.9.

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

In spite of other disciplinary measures deemed appropriate, and in accordance with current academic regulations, "in the case that the student makes any irregularity that could lead to a significant variation in the grade of an evaluationactivity, it will be graded with a 0, regardless of the disciplinary process that can be instructed. In case of various irregularities occur in the evaluation of the same subject, the final grade of this subject will be 0". Section 10 of Article 116. Results of the evaluation. (UAB Academic Regulations).

The proposed evaluation activities may undergo some changes according to the restrictions imposed by the health authorities on on-campus courses.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Exam	50%	2	0.08	1, 5, 4, 7, 6, 3, 8, 9
Midterm exam	30%	1	0.04	1, 5, 4, 7, 6, 3, 8, 9
Submission of problem sets and essays and/or laboratory quizzes	20%	0.5	0.02	1, 2, 5, 4, 7, 6, 3, 8, 9, 11, 10

Bibliography

- Canavos, GC Applied probability and statistical methods. McGraw-Hill. 1998

- Lind, DA *et al.* Statistical Techniques in Business and Economics. McGraw-Hill. 2012

- Newbold P. Statistics for business and economics. Pearson-Prentice Hall. 2005

Other references:

http://www.seeingstatistics.com