

**Statistics I**

Code: 102386  
ECTS Credits: 6

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

**Contact**

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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

**Teachers**

Juan Enrique Martínez Legaz  
Xavier Vilà Carnicero  
Mikel Esnaola Acebes

**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.

**Skills**

**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 multivariate frequency distributions.
- 1.3. Univariate frequency distribution tables. Conditional and marginal frequencies.
- 1.4. Measures of central tendency, measures of dispersion and other characteristic measures.
- 1.5. Graphic representations.
- 1.6. Covariance and correlation coefficient.
- 1.7. Mean and variance of linear combinations of variables.
- 1.8. 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. 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 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. 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.

**Activities**

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Lectures	30	1.2	5, 6, 3, 8, 9, 10
Resolution of exercises	15	0.6	2, 5, 6, 3, 8, 9, 11, 10

**Type: Supervised**

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Tutoring and monitoring work in progress	7.5	0.3	1, 2, 5, 4, 7, 6, 3, 8, 9, 11, 10
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**Type: Autonomous**

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Individual study	90	3.6	2, 5, 4, 7, 6, 3, 8, 9, 11, 10
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## Evaluation

### Assessment criteria

Students assessment will be conducted in accordance with the following activities:

#### 1. A written midterm exam

During these written exams, students will not be allowed to consult any kind of help. The maximum time allowed for these exams will be 50 minutes. These exams do not exclude contents from the final exam.

#### 2. A final exam that will include all the course contents

This exam's goal is to assure the students final learning effort to consolidate the contents acquired throughout the course. This double assessment system guarantees the success of the learning process of the majority of students. The maximum time allowed for this exams will be 2 hours. Students will not be allowed to consult any kind of help.

#### 3. Submission of problem sets and papers

Students will submit, upon the instructor's request, exercises and/or papers done individually and/or in groups of 2-4 students.

### Assessment computation

(a) Students will get for the midterm exam a grade which will represent a 25% of the final course grade.

(b) The final exam, which is compulsory, will represent a 60% of the final course grade.

(c) The exercise list submission and/or papers will get a global grade which represents a 15% of the final course grade.

(d) If the final exam grade is 3 or higher, the FINAL COURSE GRADE is

$FINAL\ COURSE\ GRADE = 25\% (MIDTERM\ EXAM\ GRADE) + 15\% (TASKS\ SUBMISSIONS\ GRADE) + 60\% (FINAL\ EXAM\ GRADE)$

however, if the final exam grade is lower than 3, the FINAL COURSE GRADE is

$FINAL\ COURSE\ GRADE = FINAL\ EXAM\ GRADE$

(e) The subject will be considered passed if the final grade is 5 or higher.

(f) A student will be considered "Not evaluable" if he/she has not participated in any of the assessment activities.

(g) All the students must take the exams and do the assigned tasks on the dates announced in the subject calendar. There won't be extra exams on dates other than the official dates announced in the subject calendar.

### Assessment Calendar.

The date of the midterm will be announced with anticipation during the semester. The date for the final exam will be included in the School exam calendar.

### **Grade publication and revision.**

By the time of the final exam the day and means of publication of final grades will be announced. Following the University regulations, the procedure, place, date and time of the exam revision will also be announced. .

### **Post-Assessment.**

For those students who have obtained in the assessment a degree equal or higher than 4 and lower than 5, there will be a post-assessment whose form will be announced when the final degrees are published.

This post-assessment will be programmed in the School exam calendar. Students who take the exam and obtain a pass degree, will pass the subject with a degree of 5. Otherwise, the first grade will remain valid.

### **Honor Code**

Notwithstanding other relevant discipline actions, always in accordance with the regulations in place, any dishonest behavior on the side of a student that might lead to an inappropriate alteration of the qualification of an activity will result on that activity being graded with a zero mark.

Thus, copying (or allowing others to copy your work) on any assignment, test, or other evaluation activity will result on that activity receiving a mark of zero.

If such activity is necessary for passing the course, the student will fail the course. Furthermore, the student will not be allowed to re-take any of the activities where such dishonest behavior is detected. The student will therefore fail the course for the current academic year.

### **Evaluation activities**

Title	Weighting	Hours	ECTS	Learning outcomes
Exercises and essays	15%	2.5	0.1	1, 2, 5, 4, 7, 6, 3, 8, 9, 11, 10
Final Exam	60%	3	0.12	1, 5, 4, 7, 6, 3, 8, 9
Midterm exam	25%	2	0.08	1, 5, 4, 7, 6, 3, 8, 9

### **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>