

**Statistics II**

Code: 102114  
ECTS Credits: 6

| Degree                                      | Type | Year | Semester |
|---|------|------|----------|
| 2501231 Accounting and Finance              | FB   | 2    | 1        |
| 2501232 Business and Information Technology | FB   | 2    | 1        |

**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: No

**Teachers**

Anabel Blasco Moreno  
Nestor Garcia Alvarez  
David Moríña Soler

**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.

**Objectives and Contextualisation**

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 of quantitative content (Econometrics or Forecasting Models in Accounting & Finance; Operations Research in Business & Information Technologies); as well as tools that will help them with a better understanding of subjects such as Macroeconomics or Decision Support Systems (B&IT) in which some statistical concepts (theoretical or practical) can play an important role.

**Skills**

**Accounting and Finance**

- Analysing, summarising and assessing information.
- Communicating in oral and written form in Catalan, Spanish and English, in order to be able to summarise and present the carried out project in both forms.

- Interpreting and using mathematical tools and statistics in order to identify and solve problems of the economical and business scope with deterministic or/and random components.

### **Business and Information Technology**

- Appropriately drawing up technical reports according to the customer's demands.
- Interpreting and using mathematical and statistic tools in order to identify and solve problems of the economical and business scope with deterministic or/and random components.
- Students must be capable of analysing, summarising, organising, planning and solving problems and making decisions.
- Students must be capable of searching and analysing information of different sources.

## **Learning outcomes**

1. Analysing and establishing both quantitative and qualitative conclusions about the behaviour of variables with random components.
2. Analysing, summarising and assessing information.
3. Analysing the variables through the contrast of hypothesis about their main characteristics.
4. Appropriately drawing up technical reports according to the customer's demands.
5. Communicating in oral and written form in Catalan, Spanish and English, in order to be able to summarise and present the carried out project in both forms.
6. Describing and analysing the causal relationship between economic variables.
7. Students must be capable of analysing, summarising, organising, planning and solving problems and making decisions.
8. Students must be capable of searching and analysing information of different sources.

## **Content**

### **Unit 1 Introduction to Inferential Statistics**

- 1.1 Inferential Statistics: Definition and Inference Methods
- 1.2 Definition and properties of Simple Random Sampling
- 1.3 Distribution of the main sample statistics: mean, variance and proportion
- 1.4 Central Limit Theorem

### **Unit 2 Estimation**

- 2.1 Objective of statistical estimation
- 2.2 Definition and characteristics of estimators
- 2.3 Properties of estimators: bias, efficiency and consistency
- 2.4 Methods of point estimation: maximum likelihood and method of moments
- 2.5 Methods of interval estimation

### **Unit 3 Parametric hypothesis tests**

- 3.1 Concept of parametric test: null hypothesis and alternative hypothesis
- 3.2 Test statistic, p-value and error type
- 3.3 Tests on the population mean, population variance and population proportion
- 3.4 Test of differences
- 3.5 Analysis of Variance

### **Unit 4 Goodness-of-fit and analysis of the relationship between variables**

- 4.1 Chi-Square goodness-of-fit test for discrete variables
- 4.2 K-S goodness-of-fit test for continuous variables
- 4.3 Test of independence between qualitative variables
- 4.4 Analysis of the correlation between quantitative variables: correlation coefficient and hypothesis test

### **Unit 5 Introduction to the regression model**

- 5.1 Presentation and objectives of the model
- 5.2 Hypothesis of the model specification
- 5.3 Estimation by Ordinary Least Squares (OLS) and their properties

5.4 Model testing

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

5.6 Forecasting

## 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 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. 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.

### 5. Lab sessions

The aim of this activity is to use statistical software to better grasp the statistical concepts and methods. 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>                    |       |      |                   |
| Lab sessions                             | 6     | 0.24 | 1, 3, 6           |
| Lectures with ITC support                | 30    | 1.2  | 1, 3, 6           |
| Resolution of exercicis                  | 9     | 0.36 | 1, 3, 6           |
| <b>Type: Supervised</b>                  |       |      |                   |
| Tutoring and monitoring work in progress | 7.5   | 0.3  | 1, 3, 6           |
| <b>Type: Autonomous</b>                  |       |      |                   |
| Exercici solving                         | 90    | 3.6  | 1, 3, 6           |

## Evaluation

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

### **1. One written midterm exam**

During this written exam, students will not be allowed to consult any kind of help. The maximum time allowed for this exam will be 60 minutes. This exam does 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 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 the paper 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 dates of the two midterms 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, 3, 2, 6, 4, 8, 5 |
| Final exam           | 60%       | 3     | 0.12 | 1, 3, 6, 7          |
| Midterm exam         | 25%       | 2     | 0.08 | 1, 3, 6             |

## Bibliography

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

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

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

### Links:

<http://www.seeingstatistics.com>