

**COURSE DATA****Data Subject**

<b>Code</b>	34152
<b>Name</b>	Basic statistics
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2022 - 2023

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. Period</b>
1107 - Degree in Mathematics	Faculty of Mathematics	1 First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1107 - Degree in Mathematics	2 - Statistics	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
BELENGUER RIBERA, JOSE MANUEL	130 - Statistics and Operational Research
MARTINEZ GAVARA, ANNA	130 - Statistics and Operational Research

**SUMMARY**

The subject Basic Statistics is conceived as an essential subject for the training of any experimental scientist, therefore it is incorporated as part of the basic training in the Mathematics Degree. Its objective is to provide students with the tools and basic concepts of Statistics, necessary to formulate statistical hypotheses, recognize simple probabilistic models, statistically analyze data obtained by direct observation in the environment or as a result of controlled experiences in laboratories, industries, etc., and make decisions based on the conclusions obtained from this analysis. An additional purpose of this subject is to motivate students in the theoretical study of Probability Calculus and Mathematical Statistics, applying tools from those disciplines in solving real problems.



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

There are no specified enrollment restrictions with other subjects of the curriculum.

## OUTCOMES

### 1107 - Degree in Mathematics

- Solve problems that require the use of mathematical tools.
- Ability to work in teams.
- Learn autonomously.
- Apply the knowledge in the professional world.
- Argue logically in decision-making.
- Expressing mathematically in a rigorous and clear manner.
- Capacity of abstraction and modeling.
- Participate in the implementation of software and learn mathematical software.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.
- Visualize and interpret the solutions obtained.

## LEARNING OUTCOMES

This subject aims to provide the student with the basic techniques for data management: description, estimation and contrast of hypotheses.

## DESCRIPTION OF CONTENTS

### 1. Exploratory data analysis

- 1.1.- Population and samples
- 1.2.- Types of variables
- 1.3.- Graphic description of variables
- 1.4.- Numerical description of samples



## 2. Introduction to probability

- 2.1.- Events and probability
- 2.2.- Random variables
- 2.3.- Binomial distribution
- 2.4.- Normal Distribution

## 3. Analysis of a sample

- 3.1.- Parameters of the population
- 3.2.- Estimation of the population mean
- 3.3.- Contrasts of hypotheses for the mean

## 4. Analysis of two samples

- 4.1.- Independent samples
  - 4.1.1.- Design of experiments with independent observations.
  - 4.1.2.- Confidence interval for the difference in population means
  - 4.1.3.- Test t for the comparison of means
- 4.2.- Related samples
  - 4.2.1.- Design of experiments with related observations
  - 4.2.2.- Confidence interval for the difference of related population means
  - 4.2.3.- Test t for the comparison of population means

## 5. Unit 5: Analysis of categorical data

- 5.1.- Analysis of proportions.
- 5.2.- Goodness-of-Fit Analysis.
- 5.3.- Analysis of contingency tables.

## 6. Linear regression

- 6.1.- Description of the relationship between two numerical variables
- 6.2.- The regression line
- 6.3.- Parametric interpretation of the linear regression
- 6.4.- Statistical inference for the slope of the regression line
- 6.5.- Other regression models

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	22,50	100
Other activities	7,50	100
Preparation of evaluation activities	20,00	0
Preparing lectures	40,50	0
Preparation of practical classes and problem	22,00	0
<b>TOTAL</b>	<b>142,50</b>	

**TEACHING METHODOLOGY**

In the theory classes some problems are proposed whose resolution requires the methodology corresponding to each topic. Then the appropriate statistical technique will be introduced and applied to solving the problem using statistical software. For the preparation of the subject the student will have a collection of problems, separated by topicschemes, which he will have to solve on his own.

The practical sessions, in the computer classroom and synchronized with the theory, will allow the student to apply these procedures to solve problems.

The small group tutoring sessions will serve to discuss and focus the concepts seen so far.

**EVALUATION**

The evaluation of the learning of the knowledge and competences achieved by the students will be done continuously throughout the course, and will be carried out in the following way:

1. Theory and Practices. Given that the objectives of the Basic Statistics course are focused on the application of statistical techniques to experimental research problems, the evaluation will consist of solving problems and practical exercises, but not exclusively, because the final exam may also contain a part of test questions or some theoretical question.



This evaluation will consist of two sections: i. 30% (3 points) of practices and seminars, which in turn are distributed as follows: a. 1 point for attendance, participation and academic progress in seminars, which will be lost if there is more than 1 absence or participation is inadequate. This point can be evaluated with adhoc tests.

a. 2 points that will evaluate the practices through practice exercises or problems to be solved throughout the course in the practical hours or theory. The 2 points will be lost if there are more than 2 absences to practices or the participation is inadequate.

ii. 70% (7 points) of the final exam.

The marks obtained in section 1.i will be kept in the two calls of the academic year, given that their evaluation will only be possible throughout the semester and never in the second session .

Observation. - To pass the subject it will be necessary to obtain a grade equal to or greater than 5 points, and in any case a grade higher than 4.5 in the final exam. All activities under 1.i are not recoverable.

## REFERENCES

### Basic

- Referencia b1: Samuels, M. L.; Witmer, J.A. y Schaffner, A. (2012). Fundamentos de Estadística para las Ciencias de la Vida (4ª Edición). Person Educación S.A..
- Referencia b2: James G.; Witten D.; Hastie T.; Tibshirani R. (2017). An introduction to Statistical Learning with Applications in R. Springer.

### Additional

- Referencia c1: Chase, W. y Brown, F. (1992), General Statistics. Wiley.
- Referencia c2: Montgomery, D.C y Runger, G.C. (1996). Probabilidad y Estadística Aplicadas a la Ingeniería. McGraw-Hill.
- Referencia c3: Bruce, P.; Bruce, A. (2017). Practical Statistics for Data Scientists. OReilly Media, Inc.