COURSE DATA

DATA SUBJECT

Code: 36583
Name: Basic Statistics P-M
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1928 - Double Degree Program Physics-Mathematics	Facultat de Ciències Matemàtiques	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1928 - Double Degree Program Physics-Mathematics	Primer Curso (Obligatorio)	COMPULSORY

COORDINATION

FORTE DELTELL ANABEL

SUMMARY

The subject "Basic Statistics" is conceived as an essential course for the training of any experimental scientist. For this reason, it is incorporated as part of the basic curriculum in the Double Degree in Mathematics and Physics. Its objective is to provide students with the basic tools and concepts necessary to formulate statistical hypotheses, recognize simple probabilistic models, statistically analyze data obtained through direct observation of the environment or as a result of controlled experiments in laboratories, industries, etc., and make decisions based on the conclusions drawn from this analysis. An additional goal of this course is to motivate students to study the theoretical aspects of Probability Theory and Mathematical Statistics, applying tools from these disciplines to solve real-world 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

COMPETENCES / LEARNING OUTCOMES

DESCRIPTION OF CONTENTS

1. Basic Concepts of Statistics and Exploratory Data Analysis
1.1. Experimental research and data analysis. The need for statistical techniques. Some examples.
1.2. Sources of error.
1.3. Populations and samples.
1.4. Numerical descriptions of one or two categorical variables: absolute and relative frequencies, contingency table, total, row, and column proportions.
1.5. Graphical descriptions of one or two categorical variables: bar chart.
1.6. Graphical and numerical descriptions of a numerical variable: location and dispersion statistics, empirical distribution function, box plot, histogram.
1.7. Graphical and numerical descriptions for two numerical variables: correlation, scatter plot.
1.8. Joint description of a numerical and a categorical variable: scatter plot and box plot.

2. Basic Concepts of Probability
2.1. Experiments, events, and probability.
2.2. Basic properties of probability.
2.3. Random variable. Probability function, density function, and distribution function.
2.4. Mean and variance of a probability distribution.

3. Discrete Probability Distributions
3.1. Bernoulli trial and Bernoulli distribution.
3.2. Binomial and Geometric distributions.
3.3. Poisson distribution.

4. Study of a Proportion
4.1. Statistical inference.
4.2. Sampling variability and point estimation of a proportion.
4.3. Hypothesis testing on a proportion.
4.4. Confidence intervals.

5. Analysis of Normal Populations
5.1. Normal distribution, t-Student, chi-squared.
5.2. Point estimation of the mean and variance of a normal distribution.
5.3. Confidence intervals for the mean and variance of a normal distribution.
5.4. Hypothesis tests on the mean and variance of a normal distribution.
5.5. Comparison of means in two normal populations.

6. Regression
6.1. Least squares line.
6.2. Simple linear regression.
6.3. Least squares fitting with multiple variables.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	22,00
Other activities	6,00
Computer classroom practice	17,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	0,00
Preparation of lessons	45,00
Preparation for assessment activities	22,50
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

The theoretical part will be covered in lectures, where the professor will gradually introduce the content and statistical methodology.
In each topic, in addition to the corresponding theoretical knowledge, numerous examples will be provided, as well as the resolution of typical problems related to the topic. Additionally, at the end of each topic, exercise lists will be provided for students to work on.
Both in the practical sessions (in the computer lab, using statistical software) and in the seminars, students will work in groups.

EVALUATION

The evaluation of the learning outcomes and competencies acquired by the students will be continuous throughout the course and will consist of the following evaluation components:

1. 30% for continuous assessment tests: activities carried out in the seminars, practical sessions, or at home.
2. 70% for the final exam, with both theoretical and practical content, in which students must obtain at least a grade of 4.5 out of 10 to pass the course.

The total grade must be greater than or equal to 5 to pass the course.
The criteria for obtaining the final grade will be the same in both the first and second calls. Seminar/tutorial activities and continuous assessment tests will not be recoverable for the second call.

REFERENCES

- Montes, F. (2010). Introducción a la Estadística. Notas de clase.
- Openintro https://www.openintro.org/download.php?file=os0&referrer=/stat/textbook.php
- Verzani, J. simpleR (Using R for Introductory Statistics) https://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf
- Samuels, M.L, Witmer, J.A.y Schaffner A. (2012). Fundamentos de estadística para las ciencias de la vida. Pearson Educación.
- Ayala G. Estadística Básica. Notas de clase. https://www.uv.es/ayala/docencia/nmr/nmr13.pdf

Additional Bibliography

- Montgomery, D.C y Runger, G.C. (1996). Probabilidad y Estadística Aplicadas a la Ingeniería. McGraw-Hill.