1. OVERVIEW

Subject area	Statistics and Scientific Data Analysis
Degree	Bachelor's Degree in Physics
School/Faculty	Architecture, Engineering and Design
Year	2
ECTS	6
Type	Compulsory
Language(s)	Spanish
Delivery mode	On campus
Semester	2

2. INTRODUCTION

The overall aim of the subject area is to equip students with the knowledge, tools and statistical methods needed to analyse and solve different problems, such as qualitative and quantitative data analysis or interpreting the results of a scientific study. The subject area also develops elements associated with Mathematics, such as critical perspective, the need for verification, evaluation of accuracy and questioning of intuitive judgements. In addition, it promotes reasoning and the application of mathematical methodology in multiple aspects of professional training.

3. SKILLS AND LEARNING OUTCOMES

Key skills (CB, by the acronym in Spanish):

- CB1: Students have shown their knowledge and understanding of a study area originating from general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.

- CB2 - Students can apply their knowledge to their work or vocation in a professional manner and possess the skills which are usually evident through the forming and defending of opinions and resolving problems within their study area.

- CB3: Students have the ability to gather and interpret relevant data (usually within their study area) to form opinions which include reflecting on relevant social, scientific or ethical matters. or CB4 - Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

- **Transversal skills (CT, by the acronym in Spanish):**

  - CT2 - Self-confidence: Ability to evaluate one's own results, performance and skills with the self-determination necessary to complete tasks and meet any objectives.
  - CT6. Oral or written communication: Ability to communicate and gather information, ideas, opinions and viewpoints to understand and be able to act, spoken through words or gestures or written through words and/or graphic elements.
  - CT15. Responsibility: Ability to fulfil commitments to themselves and others when undertaking a task and try to meet a range of objectives within the learning process. Ability to face and accept the consequences of actions taken freely. or CT17. Teamwork: Ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals.

- **Specific skills (CE, by the acronym in Spanish):**

  - CE8. Ability to solve the mathematical problems that can arise in engineering. Ability to apply knowledge about linear algebra, differential and integral calculus, numerical methods, numerical algorithms, statistics and optimisation.

- **Learning outcomes (RA, by the acronym in Spanish):**

  - RA1: To use the basic principles of probability and combinatorics.
  - RA2: To model and solve problems involving random processes.
  - RA3: To apply the principles of statistical inference.
  - RA4: To estimate the value of population parameters.
  - RA5: To perform statistical data processing using specialist statistical software.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB1, CB2, CB3, CB4, CT2, CT6, CT15, CE8	**RA1**
CB1, CB2, CB3, CB4, CT3, CT6, CT15, CT17, CE8	**RA2**
CB1, CB2, CB3, CB4, CT2, CT6, CT17, CE8	**RA3**
CB1, CB2, CT2, CT6, CE8	**RA4**
CB3, CB4, CT2, CT6, CT15, CT17, CE8	**RA5**

4. CONTENTS

The subject area is divided into five units:

1. Descriptive statistics
2. Combinatorics and probability
3. Random variables 4. Probabilistic models

5. Statistical inference

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Clase magistral/Lectures
- Aprendizaje cooperativo/Collaborative learning
- Aprendizaje basado en problemas ABP/Problem-based learning
- Aprendizaje basado en proyectos/Project-based learning
- Actividades académicas dirigidas/Guided academic activities

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Individual or group tutorials	10
Exercises, problems, tests and practical work	20
Presentations by the teacher (lectures)	19.5
Asynchronous presentations by the teacher (Master classes)	5.5
Preparation of real or simulated projects (using project-based learning methodology)	52.5
Information searches and/or written work and reports	12.5
Independent study	25
Assessment tests	5
TOTAL	**150**

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:

On Campus.

ASSESSMENT SYSTEMS	Min%	Max. %
Tests to assess theoretical/practical cognitive objectives (objective tests, written presentations, oral presentations, case studies/problems)	20%	40%
Tests to assess skill-based objectives (Participation in group sessions, simulation tests, participation in case studies/problems, role playing, reports)	20%	40%
Tests to assess attitude (Participation in class, attitude assessment rubrics)	10%	10%
Final skill-based exam (final comprehensive test, including different types of the aforementioned tests)	20%	40%

On the Virtual Campus, when you open the subject area, you'll find details of your assessable tasks, including the submission dates and assessment procedures for each task.

8. BIBLIOGRAPHY

The reference material for the subject area is as follows:

- R.E.WALPOLE, R.H. MYERS (2000) Pearson. *Probabilidad y estadística para ingeniería y ciencias*

The recommended bibliography is indicated below:

- W. Navidi. Estadística para ingenieros y científicos. 5ª edición. McGraw-Hill.