# 1. OVERVIEW

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|---|---|
| **Subject area** | Statistics |
| **Degree** | Bachelor's Degree in Industrial Organisation Engineering |
| **School/Faculty** | Faculty of Science, Engineering and Design |
| **Year** | First |
| **ECTS** | 6 ECTS |
| **Type** | Core |
| **Language(s)** | Spanish |
| **Delivery Mode** | On campus and Online |
| **Semester** | 1 |

# 2. INTRODUCTION

Statistics is the branch of mathematics which principally deals with the collection, organisation, analysis, presentation and interpretation of a data set. This subject is particularly relevant in academic and professional fields such as economics, politics, engineering, social sciences, and so on. Furthermore, in an increasingly global society and resulting from the huge volume of data to be processed, statistics has become an essential tool in analysis and decision making.

This subject aims to provide students with the basics of both descriptive and inferential statistics. Students will obtain basic tools to analyse and process a data set using critical reasoning to reach useful conclusions. The subject will also provide a base for other subjects in following years.

# 3. SKILLS AND LEARNING OUTCOMES

**Basic 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.

- CB4: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

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

- CT2: Independent learning: skills for choosing strategies to search, analyse, evaluate and manage information from different sources, as well as to independently learn and put into practice what has been learnt.

- CT3. Teamwork: ability to integrate and collaborate actively with other people, areas and/or organisations to reach common goals.

- CT4. Written/spoken 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.

- CT5. Analysis and problem-solving: be able to critically assess information, break down complex situations, identify patterns and consider different alternatives, approaches and perspectives in order to find the best solutions and effective negotiations.

- CT6. Adapting to change: be able to accept, consider and integrate different perspectives, adapting your own approach as required by the situation at hand, and to work effectively in ambiguous situations.

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

- CE1. Ability to solve mathematical problems which may arise in engineering and data science by applying linear algebra, geometry, differential and integral calculus, discrete mathematics and optimisation.

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

RA1: Successfully solve maths problems which may arise in engineering and data science projects, whether they involve algebra, calculus, statistics or optimisation.

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

| Skills | Learning outcomes (RA, by the acronym in Spanish) |
|---|---|
| CB1, CB4, CT02, CT3, CT4, CT5, CT6, CE1 | RA1: Successfully solve maths problems which may arise in engineering and data science projects, whether they involve algebra, calculus, statistics or optimisation. |

## 4. CONTENTS

1. Descriptive statistics: numerical and graphical tools.
2. Probability. Sampling.
3. Regression.
4. Inference.
5. Introduction to data analysis with R.

## 5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Collaborative learning: students learn to work with other people (colleagues and professors) to find creative, comprehensive and constructive solutions to questions and problems that arise from the given case studies, using relevant knowledge and available resources in relation to each subject.

- Problem-based learning: students face problems they must solve either working as a team or independently.

- Master Lecture: presentations by the professor using the appropriate technological tools to facilitate understanding of the subject matter.

- Gamification: students learn through game-based 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 |
|---|---|
| Master lectures | 30 |
| Problem-solving | 23 |
| Case studies and field studies | 10 |
| Debates and discussions | 8 |
| Learning contract (definition of interests, needs and objectives) | 2 |
| Autonomous learning | 67 |
| Tutorials | 8 |
| Knowledge tests | 2 |
| **TOTAL** | **150** |

**Online:**

| Learning activity | Number of hours |
|---|---|
| Master lectures and online lectures | 30 |
| Problem-solving | 23 |
| Case studies | 10 |
| Online forum (debates and discussions) | 8 |
| Learning contract (definition of interests, needs and objectives) | 2 |
| Study of course content and additional documentation (independent working) | 67 |
| Online tutorials | 8 |
| On campus knowledge tests | 2 |
| **TOTAL** | **150** |

# 7. ASSESSMENT

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

**On campus:**

| Assessment system | Weighting |
|---|---|
| On campus knowledge tests, either theoretical or practical | 60% |
| Off-site tests to assess theory/practical learning (case studies/problem-solving) | 20% |
| Attitude assessment tests (attitude assessment rubrics, class participation) | 5% |
| Self- and co-assessment (learning contract, learning outcomes, activities performed during classes) | 5% |
| Laboratory, workshop or simulation tests (activity reports, oral presentations) | 10% |

**Online:**

| Assessment system | Weighting |
|---|---|
| On Campus knowledge test | 60% |
| Off-site activities | 25% |
| Attitude | 5% |
| Self-assessment | 10% |

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

# 8. BIBLIOGRAPHY

The reference publication to accompany this subject area is:

- J. Esteban García et al. Estadística Descriptiva y nociones de probabilidad (2011). Ed Paraninfo

The recommended bibliography is indicated below:


- M. Spiegel, J. Schiller, R. Srinivasan. Probabilidad y Estadística (2014). Ed. Mc Graw-Hill.
- L. Ruiz-Maya Pérez, J. Martín-Pliego López. Fundamentos de Inferencia Estadística (2005). Ed. Praninfo.
- M.A. Gómez Villegas. Inferencia Estadística. (2013) Ed. Díaz de Santos.