

## 29815 - Statistics

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 29815 - Statistics

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** 440-First semester o Second semester

107-Second semester

444-Second semester

**Subject type:** Basic Education

**Module:**

### 1. General information

The subject is compulsory and is part of the basic training of engineering students. It is located in the second semester of the second year, once the student has acquired a basic background in Mathematics.

The subject will be useful for the future graduate by providing them with a scientific basis that will guide him/her in decision making at to analyze information from databases. It also provides a solid basis for modeling problems in presence of randomness.

The assessable contents of Statistics, in isolation, do not provide the student with any of the skills that contribute to the achievement of the 2030 Agenda. However, the contents of Statistics are essential for foundation the subsequent knowledge of the rest of the degree, which are more directly related to the SDGs of the 2030 Agenda.

### 2. Learning results

- Statistically describe a sample, summarize it using tables, graphs and descriptive measures.
- To know the concepts, fundamental results and applications of probability.
- To understand the concept of unidimensional and multidimensional random variables.
- Analyze random situations and model engineering problems of stochastic nature by means of random variables.
- Perform calculations and simulations in uncertainty situations.
- Apply sampling and parameter estimation techniques. Use the theory of statistical hypothesis testing and apply it in decision making.
- Prepare, understand and evaluate reports based on statistical analysis.
- Identify and formulate optimization problems.

### 3. Syllabus

Exploratory data analysis.

- Exploratory analysis of one variable and two or more variables.
- Goodness-of-fit contrasts.
- Statistical quality control. Control charts by variables.

Probability distribution models.

- Calculation of probabilities. Randomized experiment. Conditional probability.
- Concept of discrete and continuous random variables.
- Characteristics of random variables.
- Notable distributions: binomial, Poisson, geometric, negative binomial, hypergeometric, uniform, exponential, gamma, normal. Poisson process

Sampling, estimation and hypothesis testing.

- Sampling and estimation. Confidence interval estimation.
- Hypothesis testing.

Introduction to optimization.

- Optimization problems. Decision variables, objective function and constraints.

#### 4. Academic activities

- Lectures (30 hours).
- Laboratory practices (24 hours).
- Study and work (90 hours).
- Assessment tests (6 hours)
- Tutoring.

#### 5. Assessment system

The assessment of the subject includes the following activities carried out during the teaching period:

1. A written test carried out individually by the whole group of students during the period of teaching of the subject concerning the module Probability Distribution Models.
2. A written test carried out individually by the whole group of students in the official convocation of the course, referring to the module Sampling, estimation and hypothesis testing.
3. The contents developed in the practical classes of the subject with computer media will be evaluated by means of written tests carried out individually during the teaching period of the subject and/or in the official call, which will be established at the beginning of the course and will be applied to all the teaching groups within the same Center.
4. A statistical report made by the whole group of students where they apply some of the different statistical techniques studied during the course to be made before the official exam.

$$\text{Final grade} = 0.4 \cdot \text{Activity 1} + 0.45 \cdot (\text{Activity 2 and 3}) + 0.15 \cdot \text{Activity 4}.$$

On the dates established for the official convocations, the students will be able to make a global evaluation of all the previous activities.