

## 29611 - Statistics

### Syllabus Information

**Academic Year:** 2019/20

**Subject:** 29611 - Statistics

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

**Degree:** 430 - Bachelor's Degree in Electrical Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** 430-First semester o Second semester

107-First semester

**Subject Type:** Basic Education

**Module:** ---

### 1.General information

#### 1.1.Aims of the course

#### 1.2.Context and importance of this course in the degree

#### 1.3.Recommendations to take this course

### 2.Learning goals

#### 2.1.Competences

#### 2.2.Learning goals

#### 2.3.Importance of learning goals

### 3.Assessment (1st and 2nd call)

#### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

### 4.Methodology, learning tasks, syllabus and resources

#### 4.1.Methodological overview

The methodology proposed for this subject is to promote the continued work in the student focuses on both actual data treatment and the introduction of the fundamental aspects of Statistics. In sessions with the whole group theoretical aspects are based in the form of master class complemented by its application to solving real problems. Treatment with actual data is done in sessions in the computer lab where you learn to manage statistical computer programs.

#### 4.2.Learning tasks

The course is divided into four hours of class a week for 15 weeks. Two hours are for exposure of theoretical concepts and examples, in the complete group, and the other two hours to develop skills in planning, resolution, and interpretation of realistic problems, in the lab class.

A problem is proposed for each student to resolve. In addition throughout the course application proposed in a real case of the techniques presented. This activity will take place continuously during the course, making periodic reviews.

#### 4.3.Syllabus

The course will address the following topics:

Module 1: Exploratory Data Analysis.

1. Exploratory analysis of a variable. descriptive measures and graphical tools

- 2.- Fitting distributions. Calculation of percentiles and probability plots
3. Exploratory analysis of several variables. Linear regression

#### Module 2: Probability and Random Variables

1. Introduction to probability. Definition of probability. Bayes theorem. Independence
2. Random variables: Definition of a random variable: discrete and continuous. Probability function. Density function. Distribution function. Characteristics of a random variable: mean, variance, skewness, and direction. Chebychev inequality
3. Discrete variables: Binomial, Hypergeometric, Geometric, Negative Binomial and Poisson
4. Continuous variables: Uniform, Normal, Exponential, Gamma, Weibull
5. Poisson Process
6. Multivariate probability models

#### Module 3: Sampling, estimation and hypothesis test.

1. Simple random sample. Statistics. Distributions Pearson chi-square, Student's t and Snedecor F-Fisher. central limit theorem. Fisher theorem. Calculation of sample sizes
2. Point and interval estimation. Confidence interval estimation. Confidence intervals for means, variances and proportions.
3. Hypothesis test: null and alternative hypotheses. critical region. Type I and II errors. The significance level of contrast and power. Relationship between confidence intervals and hypothesis testing. The hypothesis of means, variances and proportions. Contrasts associated with quality control: graphics Xbar, S. contingency tables. Contrast independence. Contrast goodness of fit. Analysis of variance of a factor

Module 4: Introduction to Optimization. Optimization problems: decision variables, objective function and constraints. Linear programming problems: graphic resolution

### **4.4.Course planning and calendar**

Master class: 30 h.

Resolution of case studies in the computer lab: 30 h.

Making a report on a real case with group work: 15 h.

Personal study of theoretical aspects: 30 h.

Troubleshooting: 34 h.

Evaluation Activities: 6 h.

### **4.5.Bibliography and recommended resources**