

## 39814 - Statistics II

### Syllabus Information

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**Academic Year:** 2022/23

**Subject:** 39814 - Statistics II

**Faculty / School:** 326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 634 - Joint Programme in Computer Engineering - Business Administration

**ECTS:** 6.0

**Year:** 2

**Semester:** First semester

**Subject Type:** Compulsory

**Module:**

### 1. General information

### 2. Learning goals

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

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

#### 4.1. Methodological overview

Several teaching methods will be used in the learning process, based on the objectives of the course and the competencies the students have to acquire. Expository techniques will be used in the lectures, aiming to explain and develop the basic concepts. Also collaborative techniques will be adopted to encourage the students' participation in class in order to develop their abilities to organize, plan and make decisions.

Furthermore, computer tools and solving case studies will be used to tackle the competencies related to the use of technological tools, problem solving and the ability to analyze and extract information from external sources.

Teaching materials as well as the information necessary for the development of the course, including this teaching guide, will be published in Moodle.

#### 4.2. Learning tasks

**Lectures (30 classroom hours and 45 autonomous working hours):** They will be mainly invested in the introduction of the basic concepts and the theoretical developments of each lesson. Expository lectures will be used, always encouraging the participation and discussion in the classroom. The lectures will be supported by slides. Class attendance, participation and note-taking are highly recommended.

**Applied sessions (28 classroom hours and 43 autonomous working hours):** These activities aim to show the student how to address and solve problems. The sessions will take place either in the classroom or in the computer lab.

This methodology is planned for in person teaching. Nevertheless, if health issues arise during the semester, that impose restrictions, the sessions may be taught in a blended manner or even completely online.

#### 4.3. Syllabus

### PART 1. DISCRETE AND CONTINUOUS RANDOM VARIABLES

**Unit 1:** Discrete random variable.

Random variables. Probability distribution. Discrete and continuous random variables. Discrete random variable: Probability distribution or mass function. Expected value and its properties. Binomial, Hypergeometric and Poisson distributions.

**Unit 2:** Continuous random variable.

Continuous random variable: density and probability density functions. Characteristics of a continuous variable. Uniform, Exponential and Normal distributions. Continuous approximations of discrete distributions.

## **PART 2. INTRODUCTION TO SAMPLE THEORY**

**Unit 3:** Introduction to sampling theory.

Basic concepts: population, sample, parameters and statistics. Sampling methods. Simple Random Sampling. Sampling with and without replacement. Sampling distribution of statistics. The importance of the sample-size. Central Limit Theorem.

## **PART 3. INFERENCE METHODS: ESTIMATION AND HYPOTHESIS TESTS**

**Unit 4:** Point and interval estimation.

Concept of estimator. Point estimators. Confidence interval estimation. Construction of a confidence interval: the pivot method. Confidence intervals to estimate the population mean, the population variance and the population proportion. Sample size determination.

**Unit 5:** Hypotheses testing.

Basic concepts: Simple, composite, null and alternative hypotheses, significance level, p-value and power of a test and types of errors. Parametric hypothesis testing. Hypothesis Tests about the mean and the variance of a normal distribution, tests about the Bernoulli parameter. Non parametric hypothesis tests.

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

The workload of the course is 6 ECTS credits (150 hours of study), distributed between classroom hours and individual homework in the following way:

<b>Activities</b>	<b>Classroom hours</b>	<b>Individual homework hours</b>	<b>Total study load</b>
<b>Lectures (full group)</b>	30	45	75
<b>Practical classes and Computer labs (two subgroups)</b>	28	43	71
<b>Continuous monitoring tests</b>	2	0	2
<b>Final exams</b>	2	0	2
<b>TOTAL</b>	<b>62</b>	<b>88</b>	<b>150</b>

### **Academic important dates**

*Presentation of the course:* The first day of class, the objectives and contents of the course, the teaching methodology and the assessment criteria will be explained in detail.

*Continuous monitoring tests:* a test will be held at the end of each of the five sections of the program, approximately one every two weeks.

*Final exam:* According to the calendar established by the centre, during the exam period the student will take a global test as described in section 3.1.

The teaching materials developed during the course, as well as the examination calls and the grades will be published in the teaching platform.