

Academic Year: ( 2024 / 2025 )

Review date: 09-05-2024

Department assigned to the subject: Statistics Department

Coordinating teacher: CASCOS FERNANDEZ, IGNACIO

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Social Sciences and Law

## OBJECTIVES

Once successfully having studied this subject, the students should be able to:

- Analyze problems involving random phenomena
- Define populations for a statistical study
- Build Hypothesis about a distribution
- Test hypothesis about the parameters of the chosen model
- Evaluate how well does the model fit to reality
- Understand the limitations of the methods that have been studied and the conditions under which they lead to wrong conclusions

## DESCRIPTION OF CONTENTS: PROGRAMME

### BLOCK 0: DESCRIPTIVE STATISTICS

#### 0. Descriptive Statistics

### BLOCK I: PROBABILITY

#### 1. Introduction to Probability

##### 1.1 Introduction

##### 1.2 Random phenomena

##### 1.3 Definition of probability and properties

##### 1.4 Assessment of probabilities in practice

##### 1.5 Conditional probability

##### 1.6 Bayes Theorem

#### 2. Random variables

##### 2.1 Definition of random variable

##### 2.2 Discrete random variables

##### 2.3 Continuous random variables

##### 2.4 Characteristic features of a random variable

##### 2.5 Transformations of random variables

##### 2.6 Independence of random variables

### BLOCK II: PARAMETRIC MODELS AND INFERENCE

#### 3. Distribution models

##### 3.1 Binomial distribution

##### 3.2 Geometric distribution

##### 3.3 Poisson distribution

##### 3.4 Uniform distribution (continuous)

##### 3.5 Exponential distribution

##### 3.6 Normal distribution (with CLT)

#### 4. Statistical Inference

##### 4.1 Introduction

##### 4.2 Estimators and their distributions

##### 4.3 Confidence Intervals

##### 4.4 Hypothesis testing

##### 4.5 Particular tests on a single sample

#### 4.6 Comparison of two populations

### BLOCK III: APPLICATIONS

#### 5. Quality control

##### 5.1 Introduction, control charts

##### 5.2 Variables control charts, the X-bar chart

##### 5.3 Attributes control charts, the p and np charts

#### 6. Linear regression

##### 6.1 Introduction

##### 6.2 Simple linear regression

##### 6.3 Multiple linear regression

### LEARNING ACTIVITIES AND METHODOLOGY

- Lectures: introducing the theoretical concepts and developments with examples, 2.2 ECTS
- Problem solving sessions: 2.2 ECTS
- Computer (practical) sessions: 0.6 ECTS -- 4 SESSIONS
- Evaluation sessions (continuous evaluation and final exam): 1 ECTS

### ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

There will be continuous evaluation by means of two partial examinations (40%+55%) and computer lab assignments (5%). At the partial examinations there will be some questions about the computer sessions at those exams.

If the grade obtained at the continuous evaluation is 6 or higher (has followed the continuous evaluation satisfactorily), the student should not attend the final exam and his/her final grade will be the grade of the continuous evaluation.

If the grade obtained at the continuous evaluation is lower than 6, the student will have to attend the final exam. For those students, the final grade will be computed giving a 40% weight to the partial examinations, and a 60% weight to the grade at the final exam.

### BASIC BIBLIOGRAPHY

- MONTGOMERY, D.C., RUNGER, G.C. Applied Statistics and Probability for Engineers, John Wiley & Sons, 2003
- Navidi, W. Statistics for Engineers and Scientists, McGraw-Hill, 2006

### ADDITIONAL BIBLIOGRAPHY

- GUTTMAN, L., WILKS, S.S., HUNTER, J.S. Introductory Engineering Statistics, Wiley, 1992.