# Statistical inference methods II

**Academic Year: ( 2022 / 2023 )** **Review date: 13-05-2022**

**Department assigned to the subject: Department of Statistics**

**Coordinating teacher: ALONSO FERNANDEZ, ANDRES MODESTO**

**Type: Compulsory ECTS Credits : 6.0**

**Year : 2 Semester : 2**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Exploratory data analysis
Elementary statistical theory I
Elementary statistical theory II
Statistical inference techniques I

## OBJECTIVES

1. Understand the methodology in the construction of parametric hypotheses tests.
2. Understand nonparametric hypotheses tests and their applications in different situations.
3. Basic notions of the Analysis of Variance.
4. Acquire handling of the different association measures.
5. Computer skills related to the previous points.

1. Decision making.
2. Analyzing and summarizing information.
3. Organizing facts.
4. Understand a real problem and define it as a statistical problem.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Basic concepts in hypothesis testing

2. One-sample parametric hypothesis testing
2.1. Tests for a single normal population mean
2.2. Tests for a single normal population variance
2.3. Large sample tests for a population mean

3. Two-sample parametric hypothesis testing
3.1 Tests for two independent samples.
3.2. Tests for two paired samples.
3.3. Large sample tests

4. Analysis of Variance
4.1. Model assumptions
4.2. ANOVA table
4.3. Two sample comparisons
4.4. Two-way ANOVA and interactions.

5. Nonparametric goodness of fit tests
5.1. Chi-square tests.
5.2. Kolmogorov-Smirnov tests.
5.3. Kolmogorov-Smirnov-Lilliefors tests for normality.

6. Nonparametric one-sample location tests
6.1. Sign test
6.2. Wilcoxon signed-rank test

7. Non parametric multiple-group tests
7.1. Chi-square tests
7.2. Kolmogorov-Smirnov tests
7.3. Mann-Whitney-Wilcoxon tests

7.4. Kruskall-Wallis tests

8. Association measures
8.1. Pearson linear correlation coefficient
8.2. Spearman rank correlation coefficient
8.3. Kendall  rank correlation coefficient

## LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS). Lectures will be taught face-to-face mode with available material posted in Aula Global. Problems (2 ECTS) Problem Solving classes. Computational exercises using the statistical software R. Work assignments in groups. Weekly office hours to assist students on an individual and group basis.

## ASSESSMENT SYSTEM

Written test (40%). Group project (20%) Two individual quizzes (20% each). The delivery of computational exercises and practices will be positively valued.

In the ordinary call, students who have not followed the continuous assessment will be allowed to take a final exam worth 60% of the subject.
In the extraordinary call, the final grade will be the maximum between the previous system and 100% of the final exam.

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|---|---|
| **% end-of-term-examination:** | 40 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 60 |

## BASIC BIBLIOGRAPHY


- Casella, G. y Berger, R. L. Statistical Inference, Wadsworth and brooks.
- Dalgaard, Peter Introductory statistics with R , Springer, 2008
- Gibbons, J.D: y Chakraborti, S.C. Nonparametric Statistical Inference, Marcel Dekker.
- Ugarte, María Dolores Probability and statistics with R , CRC Press, 2008


## ADDITIONAL BIBLIOGRAPHY


- Mukhopadhayay. Probability and Statistical Inference, Marcel Dekker.
- Rohatgi, V.K. An introduction to probability theory and mathematical statistical., Wiley.