

## Resampling Techniques

Academic Year: ( 2022 / 2023 )

Review date: 30-05-2022

Department assigned to the subject: Statistics Department

Coordinating teacher: MARIN DIAZARAQUE, JUAN MIGUEL

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

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

Probability I  
Probability II  
Técnicas de Inferencia Estadística I  
Técnicas de Inferencia Estadística II  
Métodos de Regresión

## OBJECTIVES

General objectives:

1. Capacity for analysis and synthesis.
2. To model and solve problems.
3. Oral and written communication skills.

Specific objectives:

1. To know the basic techniques of resampling methods
2. To know and use statistical software to work with resampling techniques.

## DESCRIPTION OF CONTENTS: PROGRAMME

- 1 Introduction to resampling methods: bootstrap and permutations
  - 1.1 Examples of classical problems of estimation
  - 1.2 Introduction to resampling methods
- 2 Applications of bootstrap methods and permutations methods in data structures
  - 2.1 Theoretical issues of bootstrap methods
  - 2.2 Introduction to program bootstrap methods in R
- 3 Bootstrap based confidence intervals
  - 3.1 Justification of alternatives of bootstrap confidence intervals
  - 3.2 Application of bootstrap confidence intervals with R
- 4 Bootstrap based tests of hypotheses
  - 4.1 Bootstrap hypothesis tests
  - 4.2 Permutation hypothesis tests
5. Jackknife methods
  - 5.1 Properties of jackknife estimators
  - 5.2 Application of jackknife methods with R
- 6 Resampling methods in linear models and time series analysis.
  - 6.1 Regression models with bootstrap
  - 6.2 Time series analysis with bootstrap

## LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS). Theoretical classes with support material available on the Web. Practice (2 ECTS) problem-solving classes. Computing practices in computer labs. Presentations and debates.

## ASSESSMENT SYSTEM

Final Exam (30%)  
Exercises and practices (70%)

<b>% end-of-term-examination:</b>	30
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	70

## BASIC BIBLIOGRAPHY

- A.C. Davison, D.V. Hinkley Bootstrap Methods and their Applications, Cambridge University Press., (1997)
- B. Efron, R. Tibshirani An Introduction to the bootstrap, Chapman and Hall., (1993)
- Phillip I. Good Introduction to Statistics Through Resampling Methods and R, Wiley, (2013)

## ADDITIONAL BIBLIOGRAPHY

- Michael R. Chernick Bootstrap Methods: A Guide for Practitioners and Researchers, Wiley, (2007)
- Phillip I. Good Resampling Methods A Practical Guide to Data Analysis, Birkhauser, (2006)