Statistical Data Analysis

Academic Year: (2023 / 2024) **Review date: 26/04/2023 16:15:47**

Department assigned to the subject: Statistics Department

Coordinating teacher: MARIN DIAZARAQUE, JUAN MIGUEL

Type: Basic Core ECTS Credits : 6.0

Year : 2 Semester : 1

Branch of knowledge: Social Sciences and Law

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None

OBJECTIVES

1. Analyze univariate and bivariate data
2. Solve probability problems
3. Use random variables
4. Show and understand basic concepts in Estimation techniques
5. Be able to solve problems in Estimation
6. Be able to solve problems using the statistical software R.

1. Capacity for analysis and synthesis.
2. Knowledge of statistical software.
3. Resolution of problems.
4. Team working.
5. Critical reasoning.
6. Oral and written communication skills.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction.
1.1. Concepts and use of Statistics.
1.2. Statistical terms: populations, subpopulations, individuals and samples.
1.3. Types of variables.

2. Analysis of univariate data with R.
2.1. Representations and graphics of a qualitative variable: bar plots.
2.2. Representations and graphics of a quantitative variable: histograms, densities and box-plots.
2.3. Graphics for related observations in time and space: line graphics and map visualization.
2.4. Numerical summaries.

3. Analysis of bivariate data with R.
3.1. Association among quantitative variables: scatter plots and correlograms.
3.2. Association among qualitative variables: mosaic plots.
3.3 Association among qualitative and quantitative variables: box-plots.
3.4 Associations among statistical units and variables: heat maps.
3.4 Numerical summaries of associations: covariance and correlation.

4. Probability and probabilistic models.
4.1. Random experiments, sample space, elemental and composite events.
4.2. Properties of Probability. Conditional Probability and its properties.
4.3. Random variables and their characteristics.
4.4. Discrete probability models: Bernoulli variables and related distributions.
4.5. Continuous probability models: the normal distribution and related distributions.

4.6. Introduction to the bivariate normal distribution.

5. Introduction to Statistical Inference.
5.1. Parameter point estimation.
5.2. Goodness-of-fit to a probability distribution. Graphical methods.
5.3. The sample mean distribution.
5.4. Confidence interval for the mean.
5.5 Hypothesis testing on a mean: use and interpretation of a p-value.

LEARNING ACTIVITIES AND METHODOLOGY

14 Theoretical support materials available on the Web, and 14 sessions based on problem-solving sessions and practical computing tasks.
No group tutorials except during the last week before the final exam.

ASSESSMENT SYSTEM

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

60% of the final grade will be achieved by a final examination for assessing the acquired knowledge. A minimum of 4 points (out of 10) is required in the final exam. The remaining 40% is obtained by two midterm exams (15%+20%) and the compulsory tasks assigned in the computational labs (5%). Theoretical questions as well as queries on computational laboratories can be asked in the exams.

BASIC BIBLIOGRAPHY

- Newbold, P. Estadística para los Negocios y la Economía. , Prentice-Hall, 1997

- Newbold, P., Carlson, W., & Thorne, B. Statistics for business and economics. , Pearson., 2012

BASIC ELECTRONIC RESOURCES

- Charte Ojeda, F. . Análisis exploratorio y visualización de datos con R. : http://www.fcharte.com/libros/ExploraVisualizaConR-Fcharte.pdf