Statistics I

Academic Year: (2017 / 2018) **Review date: 18-12-2017**

Department assigned to the subject: Statistics Department

Coordinating teacher: NIÑO MORA, JOSE

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Social Sciences and Law

OBJECTIVES

- To analyze univariate and bivariate data
- To solve probability problems
- To use random variables
- To demonstrate an understanding of basic concepts and techniques in estimation
- To be able to solve problems in estimation
- To be able to solve problems using a statistical software.

DESCRIPTION OF CONTENTS: PROGRAMME

The first objective of the course is to help the student to learn and understand of the basic concepts descriptive statistics (univariate and bivariate). These concepts include measures of centralization, dispersion and shape, basic graphics as histograms and boxplots, and scatterplots that relate the concepts of covariance and correlation. Secondly, some probability notions are introduced, like the definition of probability, one-dimensional random variables and their moments, with special attention to classical distributions, such as binomial, Poisson, uniform, normal, exponential, among others. Finally, some methods of point and interval estimation are presented in order to determine the values of the parameters of the previously studied probability distributions. As a particular case, the sample mean distribution is obtained and studied.

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.
2.1. Representations and graphics of qualitative variables.
2.2. Representations and graphics of quantitative variables.
2.3. Numerical summaries.

3. Analysis of bivariate data.
3.1. Representations and graphics of qualitative and discrete data.
3.2. Representations and numerical summaries of quantitative data: covariance and correlation.

4. Probability.
4.1. Random experiments, sample space, elemental and composite events.
4.2. Definition of Probability and Properties. Conditional Probability and the multiplication Law. Independence.
4.3. The law of total probability and Bayes theorem.

5. Probability models.
5.1. Random variables. Discrete random variables: The probability function and the distribution function. Mean and variance of a discrete random variable. Chebyshev's inequality.
5.2. Continuous random variables: The density function and the distribution function. Mean and variance of a continuous random variable.
5.3. Probability models. Discrete probability models: Bernoulli, Binomial and Poisson.
5.4. Continuous probability models: Uniform, Exponential and the normal distribution.

5.5. Central limit theorem.

6. Introduction to Statistical Inference.
6.1. Parameter point estimation.
6.2. Goodness-of-fit to a probability distribution. Graphical methods.
6.3. The sample mean distribution.
6.4. Confidence interval for the mean.

LEARNING ACTIVITIES AND METHODOLOGY

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

ASSESSMENT SYSTEM

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

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

BASIC BIBLIOGRAPHY

- Newbold, P. Statistics for Business and Economics, Prentice-Hall..