

Academic Year: (2024 / 2025)

Review date: 11-04-2024

Department assigned to the subject: Statistics Department

Coordinating teacher: PRIETO FERNANDEZ, FRANCISCO JAVIER

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester :

Branch of knowledge: Social Sciences and Law

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The curriculum provides no prerequisite for courses. However, it is recommended that the students know the basic properties of real numbers, inequalities and are familiar with elementary functions, derivatives and integrals at a high school level.

OBJECTIVES

Cognitive skills (knowledge): Summarize data information using basic graphical, tabular and numerical methods. Basic probability concepts. Conditional probability. Independence. Elementary calculus of probabilities. Discrete random variables. Probability mass functions. Continuous random variables. Probability distribution functions. Probability density functions. Calculus and interpretation of the expected value and variance of a given random variable. Binomial model, hypergeometric, geometric, Poisson, uniform, exponential, normal and gamma. Introduction to multivariate discrete random variables. Introduction to statistical software.

Transversal competences: Capacity development and model building and validation. Identification of relevant information to solve a problem. Visualization and interpretation solutions. Identification and location of logical errors. Logical argumentation in decision-making. Application of knowledge into practice.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Statistical description of data.
 - 1.1. Variable types.
 - 1.2. Frequency distributions.
 - 1.3. Numerical measures to describe univariate data.
 - 1.4. Graphical methods for data visualization.
2. Basic concepts of probability spaces.
 - 2.1. Probability definition and properties.
 - 2.2. Conditional probability and total probability rule.
 - 2.3. Independence.
 - 2.4. Bayes theorem.
 - 2.5. Combinatorial notions and elementary calculus of probabilities.
3. One-dimensional discrete random variables.
 - 3.1. Probability mass function, expected value and variance of discrete random variables.
 - 3.2. Common discrete distribution models.
4. One-dimensional continuous random variables.
 - 4.1. Probability density function, expected value and variance of continuous random variables.
 - 4.2. Common continuous distribution models.
 - 4.3. Distribution of transformations of random variables.

- 5. Multivariate discrete random variables
- 5.1 Definition and probability function
- 5.2 Independence of random variables
- 5.3 Mean and covariance matrix for multivariate random variables

LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS). Theory classes with additional material available on the Web. Practical classes (2 ECTS) Problem solving classes. Problem-based learning classes.

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

50% of the semester grade will be awarded from the final exam.

The remaining 50% will be based on a continued assessment during the term. Students will be required to demonstrate their understanding of theoretical concepts as well as their ability to apply the theory to solve problems.

The percentages are as follows:

- 22,5% from the grade in the first midterm exam.
- 22,5% from the grade in the second midterm exam.
- 5% from the evaluation of different activities carried out in class.

The activities in class whose evaluation corresponds to this final 5% of the grade may consist of one or several exercises. They will take the form of short exercises and quizzes taken in class, corresponding to the contents for each lesson and the use of computational tools (R) implementing these contents. This number and the evaluation dates will be set by each group instructor according to the rate of progress of the teaching in the group.

BASIC BIBLIOGRAPHY

- Dalgaard, Peter Introductory statistics with R, Springer, 2008
- Durrett R. Essentials of Probability. , Duxbury Press, Belmont CA, 1993
- Grimmett, G. y D. J. A. Welsh. Probability: An introduction., Oxford University Press, 2003
- Ugarte, María Dolores Probability and statistics with R , CRC Press, 2008