

Academic Year: (2020 / 2021)

Review date: 22-07-2020

Department assigned to the subject: Statistics Department

Coordinating teacher: JIMENEZ RECAREDO, RAUL JOSE

Type: Basic Core ECTS Credits : 6.0

Year : 2 Semester : 2

Branch of knowledge: Social Sciences and Law

OBJECTIVES

SPECIFIC SKILLS

Students will acquire knowledge and skills necessary to:

1. Knowing the theoretical foundations and calculus rules of Probability Theory.
3. Resolution of problems of Probabilistic Nature.

GENERAL SKILLS

Students will be able to:

1. Develop their ability to think analytically
1. Become familiar with a statistical software
2. Establish a framework to solve problems
3. Develop their interactive skills
4. Enhance their critical thinking
5. Improve their learning skills and communication

DESCRIPTION OF CONTENTS: PROGRAMME

1. Probability and random phenomena.
 - 1.1 Random phenomena, sample space, events.
 - 1.2 Axioms of Probability and elementary properties.
 - 1.3 Conditional probability and independence.
 - 1.4 Total probability rule and Bayes's formula.
2. Random variables.
 - 2.1 Definition of random variable.
 - 2.2 Expectation, characteristic features, and moments of a random variable.
 - 2.3 Discrete probability models.
 - 2.4 Continuous probability models.
 - 2.5 Transformations of random variables.
3. Jointly distributed random variables
 - 3.1 Definition of random vector, joint, marginal, and conditional distributions.
 - 3.2 Independent random variables.
 - 3.3 Some multivariate distribution models.
 - 3.4 Transformations.
4. Properties of the expectation.
 - 4.1 Expectations of transformation of random variables.
 - 4.2 Covariance, variance of sums, and correlation.
 - 4.3 Conditional expectation.
 - 4.4 Moment generating functions.
5. Limit Theorems.
 - 5.1 Chebyshev's inequality.
 - 5.2 Convergence in probability, the Weak Law of Large Numbers.
 - 5.3 Almost sure convergence, the Strong Law of Large Numbers.
 - 5.4 Convergence in distribution, the Central Limit Theorem.

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures: introducing the theoretical concepts and developments with examples, 2.2 ECTS
- Problem solving sessions: 2.2 ECTS
- Computer (practical) sessions: 0.6 ECTS
- Evaluation sessions (continuous evaluation and final exam): 1 ECTS

ASSESSMENT SYSTEM

40% of the final qualification is obtained in a final exam. The remaining 60% is the result of continuous evaluation based on the acquired abilities of the student by two midterm exams (50%), carry out practical data analyses, computer labs and explain the results they have obtained (10%).

In the extraordinary examination, the final grade will be the maximum between the previous system and 100% of the final exam.

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

BASIC BIBLIOGRAPHY

- Jeffrey S. Rosenthal A First Look at Rigorous Probability Theory, .World Scientific Publishing, 2006
- Sheldon M. Ross A First Course in Probability, Prentice Hall, 2010