

Academic Year: (2021 / 2022)

Review date: 22-06-2021

Department assigned to the subject: Statistics Department

Coordinating teacher: JIMENEZ RECAREDO, RAUL JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Elementary Statistical Theory I
 Elementary Statistical Theory II

OBJECTIVES**SPECIFIC SKILLS.**

1. Knowing the theoretical foundations and the basic properties of stochastic processes.
2. Solve problems based on the studied stochastic models.
3. Simulating techniques for Markov Chains.

CUTTING SKILLS:

1. Capacity for analysis and synthesis.
2. Problem solving.
3. Critical Thinking.

DESCRIPTION OF CONTENTS: PROGRAMME

- 1 - Introduction
 - 1.1 - Random Variables
 - 1.2 - Random Vectors
 - 1.3 - Conditioned Expectation
 - 1.4 - Stochastic processes
- 2 - Markov chains in discrete time
 - 2.1 Definition
 - 2.2 State classification
 - 2.3 Stopping times
 - 2.4 Limit Theorems
 - 2.5 Limit and stationary distributions
- 3 - Martingales in discrete time
 - 3.1 Definition
 - 3.2 Optional Stopping Theorem
 - 3.3 Wald's Equation
 - 3.4 Gambler's ruin problem
- 4 - Continuous-time Stochastic Processes
 - 4.1 Motivation
 - 4.2 Various examples of processes with discrete state spaces.
 - 4.3 Various examples of processes with continuous state spaces.
 - 4.4 Applications

LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS). Lectures.
 Practice (2 ECTS). Problem solving lessons.

ASSESSMENT SYSTEM

Final examination 40%. The remaining 60% will be grade through continuous evaluation, which will consist of tests, assignments and projects. All tests can contain application exercises, theoretical questions, and questions on computational practices. The student obtains a good grade in the

continuous assessment may exempt the final exam.

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

BASIC BIBLIOGRAPHY

- R. Durrett Essentials of stochastic processes, Springer, 2012 (2nd ed.)
- S.M. Ross Stochastic Processes, John Wiley & Sons, inc., 1996 (2nd. ed.)

BASIC ELECTRONIC RESOURCES

- R. Durrett . Essentials of Stochastic Processes: <http://www.math.duke.edu/~rtd/EOSP/EOSP2E.pdf>