

Academic Year: (2021 / 2022)

Review date: 04/06/2021 13:45:17

Department assigned to the subject: Statistics Department

Coordinating teacher: D AURIA , BERNARDO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Stochastic Processes

OBJECTIVES**GENERAL COMPETENCES.**

CG4 - Identify or create the appropriate model for the specific problem that arises in each business activity (finance, marketing, planning and control of production, etc.). Manipulate computationally and analytically established models, taking advantage of the power of statistical methods, optimization, etc., and perform the analysis of the results obtained.

SPECIFIC COMPETENCES.

CE02 - Model and analyze statistical data, both static and dynamic, using statistical techniques

CE09 - Prepare, construct and validate statistical models that reproduce the fundamental characteristics of the problems under analysis.

CE10 - Interpret the results of a quantitative analysis and draw practical conclusions about the real problem for which the statistical models have been constructed. Write reports and communicate the conclusions with the help of advanced graphic representation techniques.

CE14 - Identify and use financial tools to solve problems such as risk estimation, calculating the cost of capital, valuation of assets and / or derivatives or estimating the movement of the interest rate and / or exchange rates.

TRANSVERSAL COMPETENCES.

CT3 - Be able to organize and plan your work, making the right decisions based on the information available, gathering and interpreting relevant data to make judgments and critical thinking within your area of study.

DESCRIPTION OF CONTENTS: PROGRAMME**1 - Brownian motion****1.1 Definition and properties****1.2 Derived Processes****1.3 Simulation****2 - Martingales in continuous time****2.1 Definition and properties****2.2 Optional sampling theorem****3 - Stochastic Integration****3.1 Definition and properties****3.2 Lema of Itô****3.3 Girsanov's theorem****3.4 Martingale Representation Theorem****4 - Introduction to differential stochastic equations****4.1 Itô's Stochastic Differential Equations**

4.2 Linear Differential Equations
4.3 Digital solutions

5 - Applications of stochastic calculus to Finance
5.1 The Black-Scholes formula
5.2 Risk neutral measures
5.3 Pricing Exotic options
5.4 Pricing American options

LEARNING ACTIVITIES AND METHODOLOGY

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

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

The subject will be evaluated through the completion of exercises throughout the course and a final delivery of a work

BASIC BIBLIOGRAPHY

- H. Bühlmann Mathematical Methods in Risk Theory., Springer, 1996 (2nd. ed)
- R. Durrett Essentials of stochastic processes, Springer, 2012 (2nd ed.)
- S. Asmussen and H. Albrecher Ruin Probabilities, World Scientific, 2010 (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>