

Academic Year: (2022 / 2023)

Review date: 24-05-2022

Department assigned to the subject: Statistics Department

Coordinating teacher: MEILAN VILA, ANDREA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Stochastic Processes

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

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

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

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>