

# Stochastic Methods in Finance

## Course Outline

Academic Semester: 2025/26

### 1. General

School	School of Finance and Statistics		
Academic Unit	Department of Banking and Financial Management		
Level of Studies	Undergraduate		
Course Code	XPΣMX01		
Semester	5th or 7th		
Course Title	Stochastic Methods in Finance		
Independent Teaching Activities	Weekly Teaching Hours	Credits	
Lectures	4	7,5	
Course Type	Special topic (elective course)		
Prerequisite Courses			
Language of Instruction and Examinations	Greek		
Is the course offered to Erasmus Students?	Yes (in English)		
Url (Eclass)	https://eclass.unipi.gr/modules/auth/courses.php?fc=64		

### 2. Learning Outcomes

#### Learning Outcomes

The course's main subject is to study the fundamental principles of mathematical modeling of some of the basic financial problems, such as the pricing in complete and incomplete markets and the optimization of the investment portfolio. The main part of the course material is dedicated to discrete time models. At the first two weeks, we will introduce the basic probabilistic continuous time models and analyze some of their applications.

After the successful completion of the course a student will be able to:

- Understand the mathematical tools that are needed for the modeling and the analysis of the valuation and the portfolio selection problems.
- Develop and reproduce the basic valuation and pricing models with real data.
- Study the related scientific literature and understand the basic principles of risk measurement and management in markets of financial derivatives

#### General Competences

- Autonomous work
- Team work
- Work in inter-scientific environment

### 3. Syllabus

- The binomial model and the no-arbitrage asset pricing.
- Complete and incomplete markets.
- Optimal investment strategies.
- Pricing of path-dependent options.

- The Brownian Motion as the limit of the symmetric random walk.
- Basic continuous time models.

## 4. Teaching and Learning Methods - Evaluation

Delivery	In classroom	
Use of Information and Communications Technology		
Teaching Methods	<b>Activity</b>	<b>Semester Workload</b>
	Lectures	52
	Independent Study	100
	Homeworks	35,5
	<b>Course Total</b>	<b>187,5</b>
Student Performance Evaluation	Writing exams (90%) that refers to the theoretical questions and exercises on the material developed in the class.	
	Homeworks (10%) that ask students to solve some related to the course exercises.	

## 5. Attached Bibliography

### Suggested Bibliography

The main textbook (not required though) is the “Stochastic Finance, Vol. 1”, of Steve Shreve.

### Related Academic Journals