GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Financial Mathematics: Discrete Stochastic Models (C000242)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 165 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 1)	Dutch	Gent	seminar independent work lecture

Lecturers in academic year 2025-2026

Vyncke, David	WE02	lecturer-in-charge

Offered in the following programmes in 2025-2026	crdts	offering
Master of Science in Teaching in Science and Technology(main subject Mathematics)	6	A
Master of Science in Mathematics	6	A

Teaching languages

Dutch

Keywords

Stochastic models, martingales, binomial model, financial derivatives, arbitrage, complete markets, hedging

Position of the course

This course introduces the students to the mathematics of financial markets, stocks and options. Using discrete stochastic models students get acquainted with the most important concepts and techniques in financial mathematics, preparing them for the course "Financial mathematics: continuous stochastic models".

Contents

- Introduction to financial markets and instruments
- Probability theory: martingales, Markov process, Radon-Nikodym theorem
- Binomial model: single-period, multi-period
- Arbitrage, risk-neutral pricing, complete market, fundamental theorem of asset pricing
- Financial derivatives: European put and call options, American options, exotic options
- Optimal stopping theorem
- Cox-Ross-Rubinstein pricing formula

Initial competences

- Basic knowledge of probability and statistics as taught in the course Statistics I in the Bachelor of Mathematics.
- Preferably knowledge of deterministic financial mathematics as taught in the course "Financial mathematics" in the minor Economics.

Final competences

1 Describe financial markets and instruments.
2 Analyze, discuss and apply probabilistic concepts and properties from financial mathematics.
3 Build and discuss the binomial market model.
4 Explain the fundamental concepts in financial mathematics (arbitrage, complete market, ...) and apply them to the binomial market model.
5 Identify and discuss financial derivatives.
6 Calculate the price of financial derivatives in a correct and efficient way.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture, Independent work

Study material

Type: Handbook

Name: Stochastic Calculus for Finance I
Indicative price: € 40
Optional: no
Language : English
Author : Steven E. Shreve
ISBN : 978-0-38724-968-1
Number of Pages : 187

References

- T. Björk; Arbitrage Theory in Continuous Time (Oxford University Press, 1998)
- P. Glasserman, Monte Carlo Methods in Financial Engineering (Springer, 2004)
- J. Hull; Options, Futures and other Derivatives (Prentice Hall, 2000)
- P. Wilmott, S. Howison, J. Dewynne; The Mathematics of Financial Derivatives: A Student Introduction (Cambridge University Press, 1995)

Course content-related study coaching

Interactive coaching via Ufora (forum); appointment by email

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

- Permanent evaluation: project
- Periodic evaluation: written exam

Calculation of the examination mark

The final score is a weighted average of the periodic evaluation (75%) and the permanent evaluation (25%).
Students however must pass both parts to pass the course. Otherwise, a final score of 10 or more to 20 will be reduced to 9/20.