MATH 3014 FINANCIAL MATHEMATICS

Credit Points 10

Legacy Code 301380

Coordinator Rehez Ahlip (https://directory.westernsydney.edu.au/search/name/Rehez Ahlip/)

Description This subject is an introduction to stochastic calculus and relevant simulation techniques applied to modern finance and the mathematical modelling of financial markets. The core topics developed in the subject are the Ito stochastic integral, Ito's formula, and basic stochastic differential equations, as well as computer simulation techniques with emphasis on Monte Carlo simulations. Some mathematical background is assumed, but the subject will cover any necessary material that is not contained in prerequisites subjects.

School Computer, Data & Math Sciences

Discipline Mathematics

Student Contribution Band HECS Band 1 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) MATH 1014 AND
MATH 1015 AND
MATH 2010 AND
MATH 2003

Assumed Knowledge

Calculus, Riemann integration, QR factorisation and generalised inverses of matrices, first and second order differential equations.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Analyse the concept of No Arbitrage and its consequences.
2. Apply the binomial model to price options on non-dividend stock (using computer software such as MATLAB or R), for instance by employing Monte Carlo techniques and control variates.
3. Apply key definitions and results on martingales and stochastic calculus to financial modelling.
4. Explain the solution to the Black-Scholes equation for European Call and Put Options, using the general solution of the initial value problem.
5. Deduce the bond pricing equation from the yield curve.

Subject Content

- Basic option theory
- Binomial model for stock options applied to derivatives
- Asset price random walk
- Monte Carlo simulation
- The Black-Scholes model
- Partial differential equations
- Black-Scholes formulae
- Variations on the Black-Scholes model
- Martingales
- Numerical methods
- Binomial approach to option pricing
- Put-Call parity

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Quiz	40 minutes per Quiz	30	N	Individual
Intra-session Exam	50 minutes	20	N	Individual
Final Exam	2 hours	50	N	Individual

Prescribed Texts

- P. Willmott, S. Howison, J. Dewynne: The Mathematics of Financial Derivatives ? A Student Introduction. Cambridge University Press, 1995.

Teaching Periods

Spring (2024)

Parramatta - Victoria Rd

On-site

Subject Contact Rehez Ahlip (https://directory.westernsydney.edu.au/search/name/Rehez Ahlip/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH3014_24-SPR_PS_1#subjects)