COURSE DETAILS
Course Code: F71DT
Full Course Title: Discrete - Time Finance
SCQF Level: 11
SCAF Credits: 10
Available as Elective: No

DELIVERY LEVEL
Undergraduate: No
Postgraduate Taught: Yes
Postgraduate Research: No

COURSE AIMS
To introduce, in a discrete time setting, the basic probabilistic ideas and results needed for the later stochastic process and derivative pricing modules. By the end of the module students will be expected to understand discrete martingale theory and its relationship with financial concepts such as arbitrage.

LEARNING OUTCOMES – SUBJECT MASTERY

- Identify and solve problems involving conditional expectation
- Demonstrate a thorough understanding of the Cox-Ross-Rubinstein binomial model and apply it to option pricing problems
- Demonstrate an understanding of the role of the risk-neutral pricing measure
- Demonstrate an understanding of the main aspects of discrete-time martingale theory
- Demonstrate an understanding of the Doob's optional stopping theorem
- Critical understanding of the Cox-Ross-Rubinstein model
- Conceptual understanding of the role of the risk-neutral pricing measure
- Conceptual understanding of the role of equivalent martingale measures in financial mathematics
- Conceptual understanding of the optional stopping problem.

LEARNING OUTCOMES – PERSONAL ABILITIES

- Show an awareness of the relationship between martingale theory and arbitrage and derivative-pricing theory
- Use the martingale representation theorem to derive self-financing hedging strategies
- Plan and organize self-study and independent learning
- Find problem solutions in groups
- Communicate effectively problem solutions to peers

SYLLABUS

- Introduction to background probability theory.
- Conditional expectation.
- Discrete-time martingales, sub- and supermartingales.
- Stopping Times, Optional Stopping Theorem, Snell Envelopes.
- Arbitrage and martingales, risk neutral measures.
• Complete markets and discrete option pricing.
• The binary tree model of Cox, Ross and Rubinstein for European and American option pricing.
• Dividends in the binomial models.

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