

PROGRAMME NAME: : B.Sc. (H) Mathematics

COURSE NAME : Mathematical Finance

SEMESTER DURATION : January to May

Week	Topic(s)	Teaching Methodology Adopted/ Continuous Internal Evaluation
1	Interest rates, Types of rates, measuring interest rates	Self Instruction
2	zero rates, Bond pricing, Forward rate, Duration, Convexity	Discussions
3	Exchange Traded Markets and OTC markets, Derivatives- Forward contracts	Lectures
4	Futures contract, Options, Types of traders, Hedging, Speculation, Arbitrage	Presentations
5	No Arbitrage principle, Short selling, Forward price for an investment asset.	Assignments
6	Types of Options, Option positions, Underlying assets, Factors affecting option prices.	Lectures
7	Bounds on option prices, Put-call parity, Early exercise, Effect of dividends	Discussions
8	Binomial option pricing model, Risk neutral Valuation	Lectures
9	Lognormal property of stock prices, Distribution of rate of return, expected return	Tutorials
10	Volatility, estimating volatility from historical data.	Presentation
11	. Extension of risk neutral valuation to assets following GBM , Black-Scholes formula for European options.	Lectures / Discussions
12	Hedging parameters (the Greeks: Delta, Gamma, Theta, Rho and Vega)	Lectures
13	Trading strategies Involving options.	Discussions
14	Swaps, Mechanics of interest rate swaps, Comparative advantage argument, Valuation of interest rate swaps, Currency swaps, Valuation of currency swaps	Demonstrations

Course Objectives: This course is an introduction to the application of mathematics in financial world, that enables the student to understand some computational and quantitative techniques required for working in the financial markets and actuarial mathematics.

Course Learning Outcomes: In this course, the student will learn the basics of:

- i) Financial markets and derivatives including options and futures.
- ii) Pricing and hedging of options, interest rate swaps and no-Arbitrage pricing concept.
- iii) Stochastic analysis (Ito formula and Ito integration) and the Black-Scholes model.