Liverpool John Moores University

Title:	MATHEMATICAL MODELS IN FINANCE
Status:	Definitive
Code:	**6002MATHS** (103238)
Version Start Date:	01-08-2016
Owning School/Faculty:	Applied Mathematics
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Paul Strickland	Y

Academic Level:	FHEQ6	**Credit Value:**	24	**Total Delivered Hours:**	75
Total Learning Hours:	240	**Private Study:**	165		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42
Practical	12
Tutorial	18

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Report on modelling a problem in basic financial mathematics.	12	
Report	AS2	Report on modelling a problem in derivative pricing.	13	
Exam	AS3	Examination.	75	3

Aims

To apply mathematical and statistical knowledge and skills to the development and use of mathematical models in finance, together with their applicability to real-life problems encountered in business and industry.

Learning Outcomes

After completing the module the student should be able to:

1 Model and solve problems involving basic financial mathematics.
2 Apply standard models that influence investment decision making.
3 Model and solve financial investment problems involving risk.
4 Apply the "no arbitrage" principle.
5 Apply derivative security models commonly used in major investment centres.
6 Model and solve derivative pricing problems.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Financial mathematics	1			
Derivative pricing	6			
Exam	2	3	4	5

Outline Syllabus

The Theory of Interest: Nominal, Compound and Continuously Compounded Interest rates, Simple Cash Flows: Perpetuities and Annuities, Sinking funds and Amortization
Investments: Decision-making using Net Present Value and Internal Rate of Return, Investment under Certainty, Investment under Uncertainty.
Bonds, Bond pricing, Duration and Convexity, Immunisation of Bond Portfolios.
Portfolio Theory: Risk and Return, Markowitz portfolio theory, Risk-free Assets.
Capital Asset Pricing Model, the Single Factor Model, Arbitrage Pricing Theory.
Utility theory and risk analysis
Introduction to Derivatives: Forwards, Futures & Swaps, Basic arbitrage arguments.
Binomial Option Pricing Models, European & American Options
Modelling Asset Pricing Movements, Geometric Brownian motion: Weiner Processes, Ito Processes.

Learning Activities

Lectures reinforced by tutorial classes and computer based modelling.

Notes

In the first half of the module, basic financial models are presented which are then applied to the financial aspects of investments and debt.

In the second half of the module, further financial models are established and applied to derivative securities. Hedging techniques are applied to financial scenarios.