Liverpool John Moores University

Title:	ADVANCED MATHEMATICS AND FINANCE
Status:	Definitive
Code:	**6006MATHS** (117481)
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	24
Practical	24
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Report based on questions on Fourier series and vector calculus.	25	
Report	AS2	Report on applications of financial mathematics.	25	
Exam	AS3	Examination.	50	3

Aims

To further develop the student's ability to understand and use a wide range of mathematical methods in the solution of problems arising in the field of applicable mathematics.

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	Using Complex analysis and separation of variables to solve problems in calculus.
2	Determine the gradient, divergence and curl of scalar and vector quantities as appropriate, state the theorems of Gauss, Green and Stokes and apply them in a selection of case studies from physics and engineering.
3	Analyze periodic phenomena into corresponding Fourier series, using both analytic and numerical techniques.
4	Model and solve problems involving basic financial mathematics.
5	Apply standard models that influence investment decision making.
6	Model and solve financial investment problems involving risk.

Learning Outcomes of Assessments

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

Fourier series	1	3	
Financial maths	4		
Examination	2	5	6

Outline Syllabus

Fourier series: functions of arbitrary period, Odd and even functions, half range series.
Vector calculus: gradient, divergence and curl.
Partial differential equations: solution by separation of variable with applications to the wave and diffusion eqautions.
Differentiation and integration of complex functions. Poles, holomorphic and meromorphic functions, Taylor and Laurent series, path integration.
Multiple integrals in Cartesian co-ordinates only. Theorems of Gauss, Green and Stokes with physical applications.
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.

Learning Activities

Lectures incorporating demonstrations will be followed by tutor-led practical sessions. These will be supported by practical hands-on work in the laboratory.

Notes

This module gives students the opportunity to apply mathematics to scientific and financial problems.