COURSE SPECIFICATION DOCUMENT

Academic School:	**Business and Economics**
Programme:	**Combined Studies**
***FHEQ* Level:**	**Level 6**
Course Title:	**Financial Mathematics**
Course Code:	MTH 6120
Course Leader:	**David Munyinyi**
Student Engagement Hours:	120
Lectures:	35
Seminar / Tutorials:	10
Independent / Guided Learning:	75
Semester:	Fall or Spring
Credits:	12 UK CATS credits 6 ECTS credits 3 US credits

Course Description:
This course will cover: Essential mathematics (calculus, differential equations, linear algebra and elementary probability theory), mathematics in finance (Central Limit Theorem and Brownian motion, Stochastic calculus and random behaviour, Markov Processes and Martingales, Wiener process, Monte Carlo simulation of pricing and simple trading models), Binomial and Black-Scholes Models and their significance in asset pricing and analysis of financial derivatives.

Prerequisites: MTH 5140 or MTH 5110

Aims and Objectives:
The course will provide students with the essential mathematical foundations underpinning Mathematical Finance and Economics. The topics cover will reflect their importance in a proper understanding of the financial theory and practice. Calculus, linear algebra, Probability theory and stochastic processes provide the language in which students need to express and solve mathematical problems in finance and economics due to the inherent randomness of asset prices. By the end

of this course, students are expected to achieve a sufficient level of competence in selected mathematical methods and techniques to facilitate further study of Quantitative Finance or Mathematical Economics; they will also find it easier and rewarding to take up careers in Investment Banking, Asset and Wealth Management and Financial Risk Management.

Programme Outcomes:

Combined Studies: Aii, Aiv, Bi, Bii, Biii, Ci, Ciii, Dii

A detailed list of the programme outcomes are found in the Programme Specification.

This is located at the archive maintained by the Academic Registry and found at: http://www.richmond.ac.uk/content/academic-schools/academic-registry/program-and-course-specifications.aspx

Learning Outcomes:
By the end of this course, successful students should be able to:

- Have a good understanding of the relevant mathematical concepts in Calculus, Linear Algebra and Probability Theory and apply them to problems of quantitative finance and economics.

- Use the language and tools of probability theory with confidence in the context of financial models and applications.

- Acquire an understanding of stochastic processes in discrete and continuous time and be familiar with the basic examples and properties of such processes appearing in financial modelling.

- Recognise the central role of stochastic calculus for mathematical models in finance, and show familiarity with basic notions and tools, at informal level *Threshold criteria*: Be able to apply practically established mathematical financial models such as Binomial and Black-Sholes models to solve financial and business problems in conjunction with stochastic calculus and other tools.

Indicative Content:

- Probability measures
- Central Limit Theorem
- Brownian Process and stochastic calculus

- Random processes, Wiener process
- Markov process and martingales, and Monte Carlo Simulation
- Binomial Model, Black-Scholes Model and Asset pricing
- Pricing Financial derivatives, Options and Futures

Assessment:

This course conforms to the MATHS Assessment Norms approved at Learning and Teaching Policy Committee found at: http://www.richmond.ac.uk/wp-content/uploads/2014/10/ALL-ASSESSMENT-NORMS-CATEGORIES-with-descriptions-Jan-2014.pdf

Teaching Methodology:
This course will be taught through a combination of lectures and problem solving-type activities, including group work, sub-group activities, and classroom discussion. The general approach to classes is informal, and discussion is viewed as an essential part of an interactive and participatory learning program. Audio-visual aids, study materials and electronic learning resources will be used as appropriate and where and when needed.

Lectures provide a framework for the course, and are designed to ensure students have an overview of main issues and concerns on a particular topic, receive clarification on the major points of debate understand the broad dimensions of core problems, and are aware of relevant literature in the specific area of concern. It is essential that lectures are supplemented with assigned readings; together, the readings and the lectures are designed to provide guidance for class discussion and directed problem-solving tasks. Students will be introduced to computer software for symbolic language manipulation e.g. Mathematica, Maple or Math World for a more robust approach to concept applications and analysis of functions.

Bibliography:

See syllabus for complete reading list

Indicative Text(s):

P. Wilmott, "*Paul Wilmott Introduces Quantitative Finance*" (2nd edition), 2007, John Wiley

J.C. Hull, "*Options, Futures and Other Derivatives*" (5th edition), 2011, Prentice-Hall.

Journals
Journal of Financial Derivatives
IMA Mathematics and Its Applications

Web Sites

Please Note: The core and the reference texts will be reviewed at the time of designing the semester syllabus

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Change Log for this CSD:

Major or Minor Change?	Nature of Change	Date Approved & Approval Body (School or LTPC)	Change Actioned by Academic Registry