1. **Title of the module**

MAST6091 (MA6591) Mathematics in the World of Finance

1. **School or partner institution which will be responsible for management of the module**

School of Mathematics, Statistics and Actuarial Science

1. **The level of the module (e.g. Level 4, Level 5, Level 6 or Level 7)**

Level 6

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn

1. **Prerequisite and co-requisite modules**

Pre-requisite: MAST4010 (Real Analysis 1)

Co-requisite: None

1. **The course(s) of study to which the module contributes**

BSc Mathematics, BSc Mathematics and Statistics (including courses with a Year in Industry), BSc Mathematics with a Foundation Year, MMath Mathematics.

International MSc Mathematics and its Applications, MSc Mathematics and its Applications (including courses with an Industrial Placement).

1. **The intended subject specific learning outcomes.**

**On successfully completing the module students will be able to:**

* 1. demonstrate a systematic understanding of several important applications of mathematics in finance and an understanding of the work of the main practitioners of mathematical finance including actuaries, investment analysts and accountants;
	2. demonstrate the capability to make sound judgements in accordance with the basic theories and concepts and demonstrate a reasonable level of skill in calculation and manipulation of the material in the following areas: time value of money, characteristics of different financial securities, valuation of securities, project evaluation and decisions, interest rates, loans, capital structure and the cost of capital;
	3. apply key mathematical concepts and methods in well-defined contexts in finance, showing an ability to evaluate the appropriateness of different approaches to solving problems in this area.
1. **The intended generic learning outcomes.**

**On successfully completing the module students will be able to:**

1. manage their own learning and make use of appropriate resources;
2. understand logical arguments, identifying the assumptions made and the conclusions drawn;
3. communicate straightforward arguments and conclusions reasonably accurately and clearly;
4. manage their time and use their organisational skills to plan and implement efficient and effective modes of working;
5. solve problems relating to qualitative and quantitative information;
6. make competent use of information technology skills such as online resources (Moodle), internet communication;
7. communicate technical material competently;
8. demonstrate an increased level of skill in numeracy and computation;
9. demonstrate the acquisition of the study skills needed for continuing professional development.
10. **A synopsis of the curriculum**

This module provides an overview of analytical careers in finance and explores the mathematical techniques used by actuaries, accountants and financial analysts. Students will learn about different types of financials assets, such as shares, bonds and derivatives and how to work out how much they are worth. They will also look at different types of debt and learn how mortgages and other loans are calculated. Developing these themes, the module will explain how to use maths to make financial decisions, such as how much an investor should pay for a financial asset or how a company can decide which projects to invest in or how much money to borrow. Risk management is a vital part of most mathematical careers in finance so the module will also cover different mathematical techniques for measuring and mitigating financial risk. Extension topics may include complex derivatives, economic theories of finance and the dangers of misusing mathematics. The module provides an opportunity to apply complex mathematical techniques to important real-world questions and is excellent preparation for those considering a financial career.

**Introduction to financial mathematics**:Key uses of mathematics in finance; key practitioners of financial mathematics.

**Financial valuation and cash flow analysis**: Discounting, Interest rates and time requirements, Future and Present value. Project Evaluation.

**Characteristics and valuation of different financial securities**: Debt capital, bonds and stocks, valuation of bonds and stocks.
**Loans and interest rates**: term structure of interest rates, spot and forward rates, types of loan, APR, loan schedules.

**Capital structure and the cost of capital:** Gearing, WACC, understanding betas.

**Additional topics that may be covered:** arbitrage and forward contracts, efficient markets hypothesis, pricing and valuing forward contracts, option pricing and the Black Scholes model, credit derivatives and systemic risks, limitations of mathematical modelling.

1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually)**

Herbert B. Mayo, Basic Finance: An Introduction to Financial Institutions, Investments and Management, 10th Edition, South-Western College Pub, 2011.

Garratt, S.J. An introduction to the mathematics of finance. A deterministic approach, 2nd Edition, Butterworth-Heinemann, 2013.

1. **Learning and Teaching methods**

42 contact hours, comprising lectures, exercise classes and revision sessions

108 hours of private study

Total number of study hours: 150

1. **Assessment methods**

13.1Main assessment methods

4 x MCQ Test 1 hour each 5% each giving a total of 20% coursework mark

Examination 2 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

13.2 Reassessment Methods

Like-for-like

1. ***Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section12) and methods of Assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* | *9.6* | *9.7* | *9.8* | *9.9* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Lectures/Exercise classes | **X** | **X** | **X** |  | **X** | **X** |  | **X** |  | **X** | **X** |  |
| Revision classes | **X** | **X** | **X** |  | **X** | **X** |  | **X** |  | **X** | **X** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Examination | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  | **X** | **X** | **X** |
| Coursework | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered:** Canterbury
2. **Internationalisation**

Mathematics is an international language with techniques developed and refined by mathematicians across the globe. Mastery of the subject-specific learning outcomes, 8.1 to 8.3, will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Mathematics, Statistics and Actuarial Science, which includes many members of staff with international experience of teaching and research collaboration.

In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material.

The support SMSAS provides to its students is also internationally attuned given our international student body.

**DIVISIONAL USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

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| Date approved | Major/minor revision | Start date of delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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