1. **Title of the module**

MACT5370 (MA537) Mathematics of Financial Derivatives

MACT8370 (MA837) Mathematics of Financial Derivatives

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 (Level 4, Level 5, Level 6 or Level 7)**

MACT5370: Level 6; MACT8370: Level 7

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)**

Level 6 Spring, Level 7 Spring and Summer

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

**Level 6:**

Pre-requisites: MAST5007 Mathematical Statistics or alternatively students would be expected to have studied material equivalent to that covered in MAST5007.

Co-requisite: None

**Level 7:**

Co-requisites: MAST7290 Probability and Statistics for Actuarial Science 2 or alternatively students would be expected to have studied material equivalent to that covered in MAST7290.

1. **The programmes of study to which the module contributes**

**Level 6:** BSc Actuarial Science, BSc Financial Mathematics (including programmes with a Year in Industry), BSc Actuarial Science with a Foundation Year, MSc in Statistics with Finance (including programme with an Industrial Placement)

**Level 7:** MSc in Actuarial Science (including programme with an Industrial Placement), International Masters in Applied Actuarial Science (including programme with an Industrial Placement)

1. **The intended subject specific learning outcomes.  
   On successfully completing the level 6 module students will be able to:**

8.1 describe, interpret and discuss the mathematics of financial derivatives;

8.2. demonstrate the capability to deploy established approaches accurately to analyse and solve problems using a basic level of skill in calculation and manipulation of financial derivatives;

8.3 demonstrate a basic appreciation of recent developments in the mathematics of financial derivatives and the links between the theory of the mathematics of financial derivatives and its practical application.

**On successfully completing the level 7 module students will be able to:**

8.4 describe, interpret and discuss key aspects and concepts involved in the mathematics of financial derivatives;

8.5 demonstrate the capability to deploy established approaches accurately to analyse and solve complex problems using a high level of skill in calculation and manipulation of financial derivatives;

8.6 demonstrate an appreciation of recent developments in the mathematics of financial derivatives and the links between the theory of the mathematics of financial derivatives and its practical application;

8.7 apply the principles of mathematics of financial derivatives to complex financial instruments.

1. **The intended generic learning outcomes.  
   On successfully completing the level 6 module students will be able to:**
2. use a logical mathematical approach to solve problems;
3. solve problems and communicate in writing effectively to both a technical and non-technical audience;
4. manage their time and work independently.

**On successfully completing the level 7 module students will be able to:**

1. use a logical mathematical approach to solve complex problems;
2. solve problems and communicate in writing effectively to both a technical and non-technical audience;
3. manage their time and work independently;
4. demonstrate a high level of higher order numeracy and communication skills.
5. **A synopsis of the curriculum**

The aim of this module is to provide a grounding in the principles of modelling as applied to actuarial work – focusing particularly on the valuation of financial derivatives. These skills are also required to communicate with other financial professionals and to critically evaluate modern financial theories.

Indicative topics covered by the module include theories of stochastic investment return models and option theory.

The additional 4 contact hours for level 7 students will be devoted to applications of the principles of option pricing techniques, valuation methods and hedging techniques for complex financial derivative concepts.

This module will cover a number of syllabus items set out in Subject CM2 – Actuarial Mathematics published by the Institute and Faculty of Actuaries.

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

Hull, John, Options, futures and other derivatives, 8th Edition, Prentice Hall, 2012.

Baxter, Martin; Rennie, Andrew, Financial Calculus : an introduction to derivative pricing, Cambridge University Press, 1996 (E-book version also available)

Study notes published by the Actuarial Education Company for Subject CM2.

1. **Learning and teaching methods**

**Level 6:**

Total contact hours: 36

Private study hours: 114

Total study hours: 150

**Level 7:**

Total contact hours: 40

Private study hours: 110

Total study hours: 150

1. **Assessment methods**
   1. Main assessment methods

**Level 6:**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 10%

Examination 2 hours 80%

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

**Level 7:**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 3 Exercises, requiring on average between 10 and 15 hours to complete 10%

Examination 2 hours 70%

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)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Level 6 Module learning outcome** | 8.1 | 8.2 | 8.3 | 9.1 | 9.2 | 9.3 |
| **Learning/ teaching method** |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **x** | **x** | **x** | **x** |  |  |
| **Assessment method** |  |  |  |  |  |  |
| Assessment 1 | **x** | **x** | **x** | **x** | **x** | **x** |
| Assessment 2 | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 7 Module learning outcome** | 8.4 | 8.5 | 8.6 | 8.7 | 9.4 | 9.5 | 9.6 | 9.7 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |
| Private Study | **X** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **X** | **x** | **x** | **x** | **x** |  |  | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |
| Assessment 1 | **X** | **x** | **x** | **x** | **x** | **x** | **x** |  |
| Assessment 2 | **X** | **x** | **x** | **x** | **x** | **x** | **x** |  |
| Assessment 3 | **X** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **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

1. **Internationalisation**

This module covers key principles, theories and concepts of actuarial science that are used in a global environment. Mastery of the subject-specific learning outcomes, outlined in Section 8, will equip students to apply these principles, theories and concepts 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, research collaboration and of working within the financial sector.

Examples covering various international economic/financial frameworks are included in the module where appropriate.

**FACULTIES SUPPORT OFFICE USE ONLY**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 03/12/19 | Major | Sep 20 | 5-7 | No |
| Ju;y 2023 | Minor | September 2023 | 13 | No |