1. **Title of the module**

MACT9160 (MA916) - Derivative Securities

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)**

Level 7

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

30 credits (15 ECTS)

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

Autumn and Spring

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

Co-requisite: MA921 Actuarial Risk Management 1 and MA922 Actuarial Risk Management 2

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

MSc in Applied Actuarial Science also with an Industrial Placement and International Masters

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

8.1 Demonstrate knowledge and understanding of complex techniques applicable to solve problems in Derivative Securities in the context of current professional actuarial practice.

8.2 Demonstrate knowledge and understanding of complex current issues in Derivative Securities in the context of current professional actuarial practice.

8.3 Demonstrate a high level of understanding of the main body of knowledge for the module.

8.4 Demonstrate skill in calculation and manipulation of the material written within the module.

8.5 Apply a range of concepts and principles of Derivative Securities in various contexts.

8.6 Demonstrate skill in solving problems in Derivative Securities by various appropriate methods.

8.7 Demonstrate skills in the specific mathematical and statistical techniques used in the actuarial practice of Derivative Securities and their application to solving problems in that subject.

8.8 Demonstrate understanding of the current practical applications of the module material.

1. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

9.1 Demonstrate ability for logical argument.

9.2 Demonstrate ability to work with relatively little guidance.

9.3 Demonstrate high-level problem-solving skills, relating to qualitative and quantitative information, demonstrating self-direction and originality of thought.

9.4 Demonstrate communications skills, covering both written and oral communication, with the ability to communicate clearly to both specialist and non-specialist audiences using the appropriate information technology.

9.5 Demonstrate judgemental skills.

9.6 Demonstrate numeracy and computational skills.

9.7 Demonstrate time-management and organisational skills, as evidenced by the ability to plan and implement efficient and effect modes of working, and to act autonomously.

9.8 Demonstrate study skills needed for continuing professional development.

9.9 Demonstrate decision-making skills in complex situations.

1. **A synopsis of the curriculum**

This module introduces different financial derivative contracts available in the market, develops pricing techniques and risk management tools to manage risks associated with a portfolio of derivative contracts. Principle of no-arbitrage, or absence of risk-free arbitrage opportunities, is applied to determine prices of derivative contracts, within the framework of binomial tree and geometric Brownian motion models. Interest rate models and interest rate derivatives are discussed in detail. Credit risk models are introduced in the context of pricing defaultable bonds and credit derivatives. Outline syllabus includes: An introduction to derivatives, futures and forward, options and trading strategies, binomial tree model, Black-Scholes option pricing formula, Greeks and derivative risk management, numerical techniques, exotic options, interest rate models and interest rate derivatives, credit risk and credit derivatives.

To follow professional curriculum of the Faculty and Institute of Actuaries examination ST6 – https://www.actuaries.org.uk/studying/plan-my-study-route/fellowshipassociateship/specialist-technical-subjects. This is a dynamic syllabus, changing regularly to reflect current practice.

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

The following textbooks are recommended: JC Hull: Options, Futures and Other Derivatives 6th Edition (Prentice Hall) (E)

Baxter & Rennie: Financial Calculus (Cambridge University Press 1997) (E)

The students will be provided with the study notes published by the Actuarial Education Company for Subject ST6. These are ordered from the Company by the Lecturer.

1. **Learning and teaching methods**

**Standard Delivery**

Total contact hours: 72

Private study hours: 228

Total study hours: 300

**Tutorial Delivery**

Total contact hours: 36

Private study hours: 264

Total study hours: 300

Teaching methods will differ according to the number of students registered on the module.

The standard format, for more than 6 students registered:

The module will be taught by means of 72 hours of lectures over two terms, including example classes, computer laboratory classes and presentations.

The tutorial format, for 6 students or less registered:

The module will be taught by means of 36 small group tutorials over two terms, including example classes, computer laboratory classes and presentations.

Lectures, tutorials and classes given by a wide variety of teachers with recent practical experience in the subject.

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

Assessment 1 Exercises, requiring on average between 8 and 12 hours to complete 6.6%

Assessment 2 Exercises, requiring on average between 8 and 12 hours to complete 6.6%

Assessment 3 Exercises, requiring on average between 8 and 12 hours to complete 6.8%

Examination 3 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement in 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 | 8.4 | 8.5 | 8.6 | 8.7 | 8.8 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 | 9.9 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Standard Delivery** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lectures & classes | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Tutorial Delivery** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tutorials | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **x** | **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

1. **Internationalisation**

Actuarial Science is an international subject with techniques developed and refined by actuaries, mathematicians and statisticians across the globe. Mastery of the subject-specific learning outcomes (section 8) will equip students to apply the 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.

Examples with an international dimension are included in the module where appropriate.

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

**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) |
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Revised FSO Jan 2018