BSC (HONS) FINANCIAL MATHEMATICS AND ACTUARIAL SCIENCE

Overview

NFQ Level 8, Major Award

Regulations and Programme Requirements

Students enter the Single Honours BSc (Hons) Financial Mathematics and Actuarial Science through CK407 (Mathematical Sciences) Area of Study (https://ucc-ie-public.courseleaf.com/programmes/bscms/).

Notes:

1. *The final set of electives and 'project-related' modules offered is subject to the availability of adequate staff resources and therefore may need to be a subset of those indicated. Within the FMAS degree programme, priority will always be given to maintaining coverage of syllabi of the Institute and Faculty of Actuaries. Students should consult with School staff for guidance on their selections and the implications thereof.*
2. *The BSc Single Honours Degree in Financial Mathematics and Actuarial Science does not seek to provide a professional training programme for the examinations of the Faculty and Institute of Actuaries. Graduates who wish to pursue an actuarial career may qualify for exemption from some of the professional actuarial examinations, depending on their performance and choice of electives, and will have the necessary preparation to undertake the remaining examinations.*

Eligibility for Entry to Second Year Programmes

Students from the Mathematical Sciences Area of Study (CK407) who pass First Science may opt to enter the Single Honours programme in Financial Mathematics and Actuarial Science.

BSc Ordinary Degree - NFQ Level 7, Major Award

Students who pass Third Year may choose not to proceed to Fourth Year and may opt instead to be conferred with a BSc Ordinary Degree (https://ucc-ie-public.courseleaf.com/programmes/bscpas/).

Programme Requirements

For information about modules, module choice, options and credit weightings, please go to Programme Requirements (p. 1).

Programme Requirements

Code	Title	Credits
Year 1		
Students take **60** credits as follows – all listed core modules (**40** credits) and **20** credits of elective modules:		
Core Modules		
AM1052	Introduction to Mechanics	5
AM1053	Introduction to Mathematical Modelling	5
AM1054	Mathematical Software	5
MA1057	Introduction to Abstract Algebra	5
MA1058	Introduction to Linear Algebra	5
MA1059	Calculus	5
MA1060	Introduction to Analysis	5
ST1051	Introduction to Probability and Statistics	5
Elective Modules		
Students take modules to the value of **20** credits from the following (subject to corequisites):		20
AC1107	Investment in Capital Assets	
AC1108	Introduction to Valuation and Risk	
BL1006	Habitats and Ecosystems	
CM1006	Introduction to Chemistry for Physicists and Mathematicians	
CS1061	Programming in C	
CS1065	Computer Applications Programming	
CS1069	Introduction to Internet Technologies	
MS2013	Geometry	
PA1003	Principles of Market Analysis	
PY1052	Introductory Physics I	
PY1053	Introductory Physics II	
ST1050	Statistical Programming in R	
Year 2		
Students take **60** credits as follows:		
Core Modules		
AM2071	Fourier Methods	5
MA2051	Mathematical Analysis I	5
MA2054	Ordinary Differential Equations	5
MA2055	Linear Algebra	5
MA2071	Multivariable Calculus	5
MF2050	Discrete Time Financial Models	5
MF2052	Introduction to Financial Mathematics	10
MF2053	Financial Modelling for Actuarial Science 1	5
ST2053	Introduction to Regression Analysis	5
ST2054	Probability and Mathematical Statistics	10
Year 3		
Students take **60** credits as follows - all listed core modules (**40** credits) and **20** credits of elective modules:		
Core Modules		
AM2060	Object Oriented Programming with Applications	5
MA3051	Mathematical Analysis II	5
MF3052	Derivatives, Securities and Option Pricing	5
MF3053	Financial Modelling for Actuarial Science 2	5
ST3053	Stochastic Modelling I	5
ST3055	Generalised Linear Models	5
ST3061	Statistical Theory of Estimation	5
ST3062	Statistical Theory of Hypothesis Testing	5
Elective Modules		
Students take modules to the value of **20** credits from the following: [1]		20
PA1003	Principles of Market Analysis (10) [2]	
AM2052	Mathematical Modelling (5)	
AM2061	Computer Modelling and Numerical Techniques (5)	
AM3051	Vector and Tensor Methods (5)	
AM3063	Partial Differential Equations with Applications I (5)	
AM3064	Computational Techniques (5)	
AM3065	Dynamical Systems and Bifurcation Theory (5)	
MA3054	Complex Analysis (5)	
MA3056	Metric Spaces and Topology (5)	

ST3054	Survival Analysis (5)	
ST3074	Statistical Methods for Non-Life Insurance (5)	
ST3075	Methods of Reporting in Actuarial Science (5)	
Year 4		
Students take **60** credits as follows - all listed core modules (**40** credits) and **20** credits of elective modules:		
Core Modules		
MA4058	Measure Theory and Martingales	5
MF4051	Continuous Time Financial Models	5
MF4052	Computational Finance	5
MF4054	Stochastic Analysis	5
MF4056	Computational Finance II	5
ST4064	Time Series	5
MS4090	Mathematical Sciences Project	10
or ST4050	Statistical Consulting	
Elective Modules		
Students take modules to the value of **20** credits from the following: [3]		20
AC4119	Securities Analysis (5)	
AC4409	Corporate Financing (5)	
AM3051	Vector and Tensor Methods (5)	
AM3063	Partial Differential Equations with Applications I (5)	
AM3064	Computational Techniques (5)	
AM3065	Dynamical Systems and Bifurcation Theory (5)	
AM4063	Partial Differential Equations with Applications II (5)	
AM4064	Perturbation and Asymptotic Methods (5)	
AM4065	Network Science: Theory and Applications (5)	
MA3054	Complex Analysis (5)	
MA3056	Metric Spaces and Topology (5)	
MA4052	Functional Analysis (5)	
MA4062	Topics in Modern Algebra (5)	
MA4063	Topics in Differential Geometry (5)	
ST3054	Survival Analysis (5)	
ST3074	Statistical Methods for Non-Life Insurance (5)	
ST3075	Methods of Reporting in Actuarial Science (5)	
ST4060	Statistical Methods for Machine Learning I (5)	
ST4061	Statistical Methods for Machine Learning II (5)	
ST4068	Contingencies (10)	
Total Credits		**240**

1 Choice of Electives in Year 3 will have a direct bearing on the number of recommendations for exemptions from professional actuarial examinations for which a FMAS graduate may be eligible. FMAS students are strongly encouraged to discuss this matter with actuarial staff members before finalising their Electives. Students should consult the University's *Book of Modules* as the availability of many Fourth Year electives will be dependent on prerequisites having been taken as part of Third Year.

2 Students who have not taken PA1003 or [EC1213 and EC1214] in Year 1 must take PA1003 (10 credits) as an elective

3 Any elective module selected in Fourth Year must not have been taken in any previous year.
Choice of electives in Year 4 will have a direct bearing on the number of recommendations for exemptions from professional actuarial examinations for which an FMAS graduate may be eligible. FMAS students are strongly encouraged to discuss this matter with actuarial staff members before finalising their electives.
Students are also encouraged to consult the University's *Book of Modules,* to ensure they meet the pre-requisites required for each Fourth Year elective.

Examinations

Full details and regulations governing Examinations for each programme will be contained in the *Marks and Standards Book* and for each module in the *Book of Modules*.

Programme Learning Outcomes

Programme Learning Outcomes for BSc in Financial Mathematics and Actuarial Science (NFQ Level 8, Major Award)

On successful completion of this programme, students should be able to:

- Apply basic mathematical concepts, theories, principles and techniques for analysis of theoretical and practical problems of a mathematical nature;
- Construct and work with basic financial-mathematical models that are used for financial prediction, contract valuation (including option valuation) and financial decision making;
- Make use of mathematical software to analyze and solve problems in financial mathematics, actuarial science and related areas;
- Communicate effectively with the quantitative financial community and with the actuarial community;
- Provide a grounding in the fundamental concepts of actuarial science as they affect the operation of insurance and other financial bodies;
- Provide grounding in the mathematical and statistical techniques which can be used to model, analyze and manage risks;
- Present fundamental actuarial ideas and arguments to others outside the actuarial profession and use such ideas to analyze business and social issues and to formulate, justify and present plausible and appropriate solutions to business and social problems.