

# BSC (HONS) MATHEMATICAL SCIENCES

## Overview

NFQ Level 8, Major Award

## Regulations and Programme Requirements

Students enter the Single Honours BSc (Hons) Mathematical Sciences 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.*

## 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 Mathematical Sciences.

## 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
<b>Year 1</b>		
Students take <b>60</b> credits as follows – all listed core modules ( <b>40</b> credits) and <b>20</b> credits of elective modules:		
<i>Core Modules</i>		
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
<i>Elective Modules</i>		
Students take modules to the value of <b>20</b> credits from the following (subject to corequisites):		
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

AM2052	Mathematical Modelling	5
AM2060	Object Oriented Programming with Applications	5
AM2061	Computer Modelling and Numerical Techniques	5
AM2071	Fourier Methods	5
MA2051	Mathematical Analysis I	5
MA2054	Ordinary Differential Equations	5
MA2055	Linear Algebra	5
MA2071	Multivariable Calculus	5
MA3054	Complex Analysis	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 (**35** credits) and **25** credits of elective modules:

#### Core Modules

AM3051	Vector and Tensor Methods	5
AM3063	Partial Differential Equations with Applications I	5
AM3064	Computational Techniques	5
MA3051	Mathematical Analysis II	5
MA3052	Ring and Field Theory	5
ST3061	Statistical Theory of Estimation	5
ST3062	Statistical Theory of Hypothesis Testing	5

#### Elective Modules

Students take modules to the value of **25** credits from List A (subject to co/prerequisites):

#### List A

AM3052	Introduction to Fluid Mechanics and Wave Theories (5)	
AM3062	Optimisation and the Calculus of Variations (5)	
AM3065	Dynamical Systems and Bifurcation Theory (5)	
MA3056	Metric Spaces and Topology (5)	
MA3062	Introduction to Modern Algebra (5)	
MA3063	Introduction to Differential Geometry (5)	
ST3053	Stochastic Modelling I (5)	
ST3054	Survival Analysis (5)	
ST3055	Generalised Linear Models (5)	
ST3074	Statistical Methods for Non-Life Insurance (5)	
ST4060	Statistical Methods for Machine Learning I (5)	

### Year 4

Students take **60** credits as follows - all listed core modules (**10** credits) and at least **40** credits of elective modules from List B and at most **10** credits of elective modules from List A (not previously taken):<sup>1</sup>

#### Core Modules

MS4090	Mathematical Sciences Project	10
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**Elective Modules** 50

Students take, at most, modules to the value of **10** credits from the following (not previously taken):

**List A**

AM3052	Introduction to Fluid Mechanics and Wave Theories ()
AM3062	Optimisation and the Calculus of Variations ()
AM3065	Dynamical Systems and Bifurcation Theory ()
MA3054	Complex Analysis (5)
MA3056	Metric Spaces and Topology ()
ST3053	Stochastic Modelling I ()
ST3054	Survival Analysis ()
ST3055	Generalised Linear Models ()
ST3074	Statistical Methods for Non-Life Insurance ()
ST4060	Statistical Methods for Machine Learning I ()

Students take modules to the value of at least **40** credits from the following (subject to co/prerequisite):

**List B**

AM4063	Partial Differential Equations with Applications II ()
AM4064	Perturbation and Asymptotic Methods ()
AM4065	Network Science: Theory and Applications ()
AM4067	Applications of Machine Learning ()
MA4052	Functional Analysis ()
MA4058	Measure Theory and Martingales ()
MA4062	Topics in Modern Algebra ()
MA4063	Topics in Differential Geometry ()
MF4054	Stochastic Analysis ()
ST4050	Statistical Consulting ()
ST4061	Statistical Methods for Machine Learning II ()
ST4064	Time Series ()
PY4112	Gravitation and Cosmology ()

**Total Credits** 240

<sup>1</sup> Any elective module selected in Fourth Year must not have been taken in the previous year.

## 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 Mathematical Sciences (NFQ Level 8, Major Award)

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

- Apply their knowledge and understanding of the basic concepts, theories, principles and practical methods of the mathematical sciences to analyse and solve theoretical and practical problems;
- Give clear and organized written and verbal explanations of mathematical and statistical ideas;
- Demonstrate mastery of the core concepts of several areas of pure mathematics, applied mathematics and statistics;
- Extend course material to solve original problems;

- Recognize the interdependency of different areas of the mathematical sciences;
- Contribute effectively as members of project teams dealing with mathematical/statistical topics, including the delivery of oral presentations and written reports.