# **Mathematics** BSc (Hons)

**UCAS Code: G100 | Duration: 3 years | Full-time | Hope Park | 2026/2027**

Accredited | Placement year opportunities available

## Course Overview

**Mathematics is a fascinating and dynamic subject, connecting abstract concepts with real-world applications across business, engineering, science and technology. At Liverpool Hope, the Mathematics degree is designed to help you develop a passion for the subject while building strong analytical and numerical abilities.**

This Mathematics course covers areas such as calculus, algebra, statistics, and differential equations, equipping you with critical thinking, problem-solving and analytical skills. These are highly valued across diverse careers in finance, technology, research, and education. Mathematics is not just about equations – it's about understanding patterns, structures and the principles that shape natural and artificial systems.

The Mathematics degree includes pure mathematics, applied mathematics, and statistics, giving you the confidence to approach real-world challenges mathematically. With expert tuition and excellent support, you will benefit from an outstanding student experience, ensuring you gain the most from your studies at Liverpool Hope.

## Entry Requirements

This course follows the standard University entry requirements. Please see the website for further information.

## Fees and Additional Costs

**The tuition fees for 2026/2027 are £9,790 for full-time undergraduate courses.**

As well as your tuition fees, you need to consider the cost of books, software, and general computer consumables such as USB flash drives and printing. We estimate this to cost around £300.

You will also need to consider the cost of your accommodation each year whilst you study at university. Visit our accommodation webpages for further details about our Halls of Residence: **www.hope.ac.uk/halls**

Applicants will need access to a computer if course delivery is switched to online. The University has a laptop lending service if remote study is necessary.

## Accreditation

This single honours BSc degree has been accredited by the Institute of Mathematics and its Applications. This degree will meet the educational requirements of the Chartered Mathematician designation, awarded by the Institute of Mathematics and its Applications, when it is followed by subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught masters degrees.

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# **Mathematics** BSc (Hons) Curriculum

## Year One

This year is designed to ensure that you have all the fundamentals you need for a Maths degree, from mathematical logic and proof to calculus and linear algebra.

### Core Mathematics

The purpose of this course is to cover the fundamentals of mathematics that a new undergraduate should know.

### Calculus

We will look at the basics of functions, differentiation, integration and basic differential equations. In the second half of the course, we look at multivariable calculus and vector calculus.

### Mathematical Modelling

This part of the course will introduce students to the theory of mathematical modelling, and how to approach real world problems that need solving mathematically.

### Application of Mathematics

This module looks at three fundamental areas that we believe are important for mathematical graduates to be skilled in.

- Mathematical Communication: We teach you the fundamentals of how to communicate your mathematics with others.
- Graph Theory: We look at various methods of creating graphs and look at some famous graph theory problems such as the Chinese postman problem.
- Financial Mathematics: We look at how mathematics is used to address problems in finance, from the simple banking interest problems to utilising probabilistic methods to predict how a financial situation will evolve over time.

## Year Two

### Explorations in Mathematics (Core 1)

With the fundamentals covered at Year 1, we keep the Year 2 topics quite broad but start to focus in on some areas of mathematics.

### Multivariable and Vector Calculus

We extend the calculus covered at year 1 to include functions of several variables.

### Differential and Algebraic Geometry

For differential geometry, we look at some geometrical techniques that utilise calculus. Algebraic geometry is a branch of mathematics that studies the solutions of systems of polynomial equations using geometric methods.

### Linear algebra

We extend the linear algebra topics covered in first year and look at vector spaces, matrix factorisation, orthogonal spaces and applications of linear algebra.

### Statistics & R programming

We look at distributions, regression analysis, and a variety of statistical tests including chi squared, ANOVA, and t-tests.

### Number theory and abstract algebra

Number theory is a vast area of mathematics, and we look at a small part of it and its applications to cryptography.

### Explorations in Mathematics (Core 2)

For those doing single honours Mathematics, we have designed this part of the course to give students exposure to areas of mathematics that can be applied to other areas of science and technology. Topics include:

- Ordinary differential equations
- Partial differential equations
- Laplace Transforms
- Fourier analysis
- Numerical analysis
- Z-Transforms

## Year Three

### Advanced Studies in Mathematics (Core 1)

In year 3, we study topics that are at the forefront of the research interests of the staff currently teaching on the programme.

### Statistics and data modelling

Building up from the statistical methods learnt previous years, we look at some practical applications in the real world.

### Mathematical Physics

We start by defining quantities known as Lagrangian and Hamiltonian, and we show how the Euler-Lagrange equations emerge naturally from the least-action principle.

### Group theory

In this topic we start with some basic definitions and examples of groups, such as groups of permutations, groups of symmetries of regular polygons, and groups of congruence classes modulo an integer.

### Complex analysis

Just as previously studied in the calculus of real functions, we can define limits, continuity, and differentiation for complex functions.

### Advanced Studies in Mathematics (Core 2)

This course will cover topics that are at the forefront of the research interests of the staff currently teaching on the programme.

### Symmetries of differential equations

In this topic, we present Lie's method and apply it in finding the symmetries of ordinary differential equations.

### Hamiltonian systems

In this topic, we cover methods and theorems, such as Louiville integrability, Louiville-Arnold theorem and Lax representation, to study the properties of these systems, as well as their solutions.

### Chaos theory and fractal geometry

Chaos theory looks at how we can use mathematical techniques to study how equations that give us solutions that are deterministic exhibit what seems like random behaviour.

### Perturbation methods

Sometimes equations (algebraic or differential) can contain small valued parameters. We show techniques that handle these types of equations and enable us to extract solutions.

### Research Projects and Dissertations

All students will undertake project work either as a research project (combined students) or as a dissertation (single honours students).

## COURSE STRUCTURE

Teaching on this degree is structured into lectures, where all students are taught together, and tutorial type classes that are used for problem solving and sometimes project work.

If you are studying Mathematics as a single honours degree, in your first and second year of study there are approximately 12 teaching hours each week, which reduces to approximately 8 hours hours in your third year. If you are studying Mathematics as a combined honours degree, in your first year of study there are approximately 6 teaching hours each week, which reduces to approximately 4 teaching hours in your third year.

On top of teaching hours, you are also expected to spend a number of hours studying independently each week, as well as studying in groups to prepare for any group assessments you may have.

## ASSESSMENT AND FEEDBACK

There are a number of assessments across your three years of study, including written exams, portfolios and coursework.

You will be given feedback on your assessments, and you will have the opportunity to discuss this with your tutor in more detail.