

Mathematical Modelling Masters/MSc

Can't see the video? Try this link (</Video/college-eps/maths/maths-pgt-video-2013.flv>).

Postgraduate Masters/MSc degree programme in Mathematical Modelling

Most things in the real world are complex and difficult to understand, from biological systems to the financial markets to industrial processes, but explaining them is essential to making progress in the modern world. Mathematical modelling is a fundamental tool in the challenge to understand many of these systems, and is an essential part of contemporary applied mathematics. By developing, analysing and interpreting mathematical and computational models we gain insight into these complex processes, as well as giving a framework in which to interpret experimental data.

To fully capitalise on these tools, there is a fundamental need in both academic research and industry for a new generation of scientists trained to work at the interdisciplinary frontiers of mathematics and computation. These scientists require the ability to assimilate and understand information from other disciplines, communicate with and enthuse other researchers, as well as having the advanced mathematical and computational skills needed.

[Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14 \(<http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx>\)](http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)

Course fact file

Type of Course: Taught

Study Options: Full time

Duration: 1 year full-time

Start date: September

Related courses

[Postgraduate degree courses, School of Mathematics Graduate school \(</schools/mathematics/postgraduate/index.aspx>\)](/schools/mathematics/postgraduate/index.aspx)

Contact

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[School of Mathematics \(</schools/mathematics/index.aspx>\)](/schools/mathematics/index.aspx)

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Details

In the Autumn and Spring semesters, you will take masters-level courses in both advanced mathematical modelling and computation, in addition to the core interdisciplinary skills needed for a career in this field. In the summer you will undertake a research skills project, working with research leaders in a related area such as biosciences, systems biology, chemical engineering or medicine, alongside mathematics and computation. This will provide directly relevant training for a career in academic, industrial or clinical research, for example biotechnology, industrial engineering or the pharmaceutical industry. A key component will be training specifically in multidisciplinary research and communication, a vital skill for whichever career path the MSc leads you to.

Related Links

- [Postgraduate degree courses, School of Mathematics Graduate school \(</schools/mathematics/postgraduate/index.aspx>\)](/schools/mathematics/postgraduate/index.aspx)**

Why study this course

MSc Mathematical Modelling is a one year master's level course at the interfaces of Mathematics, Computer Science, Systems Biology and Chemical Engineering. Interdisciplinary mathematical modelling in the School of Mathematics at the University of Birmingham takes place in a thriving outward-facing community with specialities including mathematical biology, fluid mechanics, mathematical finance and industrial modelling. The School collaborates widely with multiple disciplines, including Biological and Medical Sciences, Chemical Engineering and within industry. In particular, Birmingham is an emerging centre for multidisciplinary Biological Systems Science research, and is in a unique position, being adjacent to one of the largest super-hospitals in Europe, catering for a highly diverse population.

The programme is specifically tailored to develop students from a strong mathematics background into becoming genuinely multidisciplinary scientists. You will have the opportunity to develop your mathematical and computational modelling skills, whilst at the same time being trained in cutting-edge interdisciplinary techniques, including the option of practical work. You will learn how to diversify your skills into other fields, and how to work with research leaders and other students from different disciplines.

Modules

This course consists of 180 credits.

Compulsory:

- Mathematical biology
- Computational methods and frontiers

- Research skills in mathematical modelling
- Research frontiers in applied mathematics

Optional modules will be from the following courses (subject to availability):

- Partial Differential Equations
- Computational tools for modelling and analysis
- Bioscience for graduates from other scientific disciplines
- Essentials, Ideas and Techniques of Biology
- Viscous flow with applications
- Continuum mechanics
- Perturbation theory and chaos
- Numerical methods in linear algebra
- Introduction to evolutionary computation
- Intelligent data analysis
- Game Theory
- Mathematical Finance
- Further Mathematical Finance
- Waves
- PDEs and Reaction Diffusion Systems in Chemistry and Biology
- Computation Geometry

These courses are assessed by a mixture of written examinations (usually 75-80%, taking place in May/June) and coursework, typically involving homework, computer or wet laboratory practicals or in-class assessment. Please note that not all optional modules may be available.

The summer research skills project involves working closely with supervisors from both Mathematics/Computer Science and another discipline such as biosciences, chemical engineering or medicine on a modelling project. You will produce a substantial dissertation, and will present your work in an oral presentation. Additional assessment will require participation in problem-solving workshops and peer group learning in order to prepare you for 'real life' work as a research scientist.

Fees and funding

Tuition fees

Tuition fees for 2015/2016 are as follows:

- £6,840 for **home/EU students**
- £14,140 for **international students**

Standard fees ([/postgraduate/pgt-fees/fees.aspx](#)) apply (non lab based)

Learn more about **fees and funding** ([/postgraduate/pgt-fees/index.aspx](#))

Scholarships and studentships

Scholarships may be available. International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

For further information contact the School directly or email financialsupport@bham.ac.uk (<mailto:financialsupport@bham.ac.uk>)

Entry requirements

The programme is for strong (1st, 2.1 or equivalent) BSc or MSci graduates from programmes in mathematics, or programmes with advanced mathematical components, including physics and some engineering subjects, who wish to study interdisciplinary research at the interfaces of mathematics and computation.

International students:

Learn more about **international entry requirements** (<http://www.birmingham.ac.uk/students/pg/requirements/international>)

Standard English language requirements (<http://www.birmingham.ac.uk/students/requirements/requirements-pg/international/index.aspx>) apply

How to apply

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the **How to apply pages** (<http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx>)

Apply now (<https://pga.bham.ac.uk/lpages/EPSo75.htm>)

Related links

[Postgraduate degree courses, School of Mathematics Graduate school \(/schools/mathematics/postgraduate/index.aspx\)](#)

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Related research

- [Metabolomics in the Life Sciences - School of Biosciences \(/research/activity/metabolomics/index.aspx\)](/research/activity/metabolomics/index.aspx)
- [Systems Science for Health \(/research/activity/ssfh/index.aspx\)](/research/activity/ssfh/index.aspx)

Related staff

[Dr Rosemary Dyson \(/staff/profiles/maths/dyson-rosemary.aspx\)](/staff/profiles/maths/dyson-rosemary.aspx)

Employability

Career Opportunities

This course is tailored to train students for careers in scientific research, and for employment in a wide range of industrial contexts, for example biotechnology, industrial engineering or the pharmaceutical industry. There is a considerable need for scientists with a strong mathematical and computational background who can communicate with experimental scientists; this MSc will provide you with specialised training, and through your research skills project, evidence that you can work in this multidisciplinary context.

Further transferrable skills developed through this course include team-working, oral and written presentation, problem-solving and time-management, particularly developed through the summer research skills project. Additional careers support is available through the School of Mathematics and from the University's career support team.

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