Loughborough University

Mathematical Sciences

Postgraduate programmes

Why choose Loughborough University?

Loughborough's Department of Mathematical Sciences has a long history of innovation in teaching and a firm research base with strengths in both pure and applied mathematics.

As a postgraduate student within the Department you will join a stimulating academic community of staff and students from all over the world. You will also benefit from our computing laboratory and our £4.5 million refurbished department building with its spacious student activity area and designated state-of-the-art resources, as well as all the facilities our outstanding campus has to offer.

The department attracts staff and students from all over the world, making it a diverse and stimulating environment in which to study. Active in high quality research across the broad spectrum of mathematics, Mathematical Sciences at Loughborough has an international reputation, with four fifths of research rated internationally leading or better in REF 2014.

In addition, the Department works very closely with the award-winning Mathematics Education Centre that has been providing academic support to Loughborough students and leading research on the way mathematics is taught and learnt since 2002. Loughborough University won the Outstanding Support for Students award at the Times Higher Education Awards 2011, for its work in Mathematics and Statistics support.

We are proud to be part of the London Mathematical Society's Good Practice Scheme which supports mathematics departments interested in embedding equal opportunities for women within their working practices.

Equality and diversity in STEM
The School of Science is committed to creating a diverse and inclusive working, learning, social and living environment that enables students to achieve their potential and which celebrates and encourages diversity. Our aim is to maximise opportunities for all.

EXCELLENT FACILITIES
DEPARTMENT BASED IN
£4.5M REFURBISHMENT

TOP 5 UNIVERSITY
THE TIMES HIGHER
EDUCATION TABLE OF
TABLES 2020

TOP 15 FOR
MATHEMATICS
THE COMPLETE
UNIVERSITY GUIDE 2021

Contents

Maximising your career prospects

The Department of Mathematical Sciences is committed to helping you develop the skills and attributes you need to progress successfully in your chosen career.

Graduate employment spans a wide range of industries encompassing aerospace, automotive electronics and computer interests, as well as software houses, insurance companies and research establishments and institutions. Graduates of our MSc programmes go on to work in diverse roles within a wide variety of organisations and recent employers include BAE Systems, Citigroup, Experian, GE Aviation, Mercedes Benz, Nuclear Labs USA, and PwC.

Supporting you
Studying a postgraduate qualification is not just about your academic programme or area of research. It is also about developing the right skills and experiences to reach your future career goals.

Our University Careers Network can help you with one-to-one advice and drop-ins with professional careers consultants, workshops on career planning and job hunting, links to thousands of job vacancies and internships, practice job interviews and assessment centres, and access to specialist support for international students.

For more information: lboro.ac.uk/careers

Our international students

Loughborough University has a community of more than 3,600 international students from all over the world. In the Department of Mathematical Sciences you will join a diverse team of postgraduate students from outside of the UK and EU.

The Department attracts students from across the globe, including from Europe, Asia, the Middle East and Africa, and international students at Loughborough can expect to receive excellent support services from the University, International Office and Loughborough's award-winning Students' Union.

Supporting your application
Loughborough University has a dedicated International Office to give you support and advice on applying to us. This can be done by email, telephone, or even in person – our International Office staff visit more than 30 countries each year. Further information about these visits can be found at lboro.ac.uk/international/visits

Additionally, we have a number of international advisers and representatives in many countries around the world, details of which can be found at lboro.ac.uk/international/agents

English language, study skills and orientation
Loughborough University has its own Student Advice and Support Service (SASS), which runs a number of courses designed to help you improve your English. So, whether you wish to boost your confidence in using the language, improve your study skills, or want an introduction to living and learning at Loughborough, the SASS offers bespoke courses to help you.

The university's International Office holds a residential induction week for international students immediately before the start of the academic year. It provides practical information about living and studying in Loughborough, and allows you to meet fellow students and settle into your new environment before starting your studies.

More information can be found at boro.ac.uk/international

Pre-sessional English language courses
The Pre-Sessional Courses are for international students who have not yet reached the required level of English for their chosen academic course at Loughborough University.

If you have an offer for a Loughborough University degree programme but have not yet achieved the minimum English language requirements, you may be eligible to join one of our pre-sessional courses.

We also deliver programmes that are suitable for students who may have achieved the minimum English language requirements but who wish to prepare more fully for their studies. Please contact our team for advice on the best course for you.
lboro.ac.uk/services/alss/pre-sessional-courses

Supporting international students
Loughborough Students' Union strives to provide the very best experience for international students and encourages you to get involved by engaging with their Global Development Officer and Global Committee.

Throughout the year the Students' Union puts on a number of social and cultural events for international students to get involved in, including trips to popular tourist destinations in the UK and abroad, sporting activities, cultural celebrations, opportunities to teach local communities about international cultures and an annual International Day.
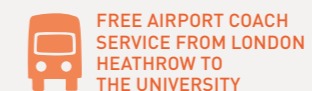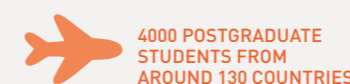
The Global Development Officer and the Global Committee are there for you to voice your ideas and opinions to both the University and the Students' Union.

Web chats for prospective students
We also understand that studying in a foreign country away from your family and friends can be a daunting, yet exciting experience. Online web chats provide you with the opportunity to have your questions answered by staff from our International Office as well as academic staff and current students. Previous chats have focused around a range of topics including postgraduate study options, making a visa application, an introduction to Loughborough, accommodation, in addition to country-specific chats.

For a full list of scheduled web chats visit:
lboro.ac.uk/international/web-chat

4000 POSTGRADUATE STUDENTS FROM AROUND 130 COUNTRIES

FREE AIRPORT COACH SERVICE FROM LONDON HEATHROW TO THE UNIVERSITY

INTERNATIONAL QS STARS SCHEME 2020 FIVE-STAR PLUS RATING

Ryan
MSc Industrial Mathematical Modelling, graduate

"The summer project, allowing me to deep dive into a subject I knew nothing about, was thrilling. This research opened up what was possible with current technology, so I came into a position knowing that we can make significant improvements."

Industrial Mathematical Modelling

MSc

Full-time length: 1 year
Part-time length: Not available

Entry requirements
A 2:1 honours degree or equivalent international qualification in mathematics or an engineering or science subject with a high mathematical content.

See full entry requirements online.
The School reserves the right to vary the list of all modules.

Our MSc Industrial Mathematical Modelling will equip you with the skills and techniques required by industrial mathematics, including the real world problem-solving abilities in applied mathematics that are highly sought after within industry and commerce.

Industrial mathematics is a branch of applied mathematics that focuses on a modelling, simulating and solving problems of relevance to industry. Mathematical modelling is a valuable skill for solving the real problems and challenges faced by companies and provides a useful language to describe, solve and validate the problem. As such, our industrial mathematics master's is especially suitable if you have undertaken a three-year bachelor's degree in mathematics, science or engineering and wish to apply your enhanced skills in an industrial context. The programme also also provides excellent preparation for PhD study.

Our master's degree in industrial mathematics modelling enables you to explore mathematical models of real-world processes and their formulation, with a strong emphasis on how these techniques can be applied in industry, culminating in a 12-week summer project which is usually carried out within a local business. Your project is supported by our well-established links to industry and will give you a practical, real-life insight into how mathematical theory and technique is applied in organisational scenarios.

MSc Industrial Mathematical Modelling will see you work in small groups to solve industry-based problems using mathematical models and statistics, whilst also covering areas such as regular and chaotic dynamics, partial differential equations and fluid mechanics.

As a postgraduate student within the Department of Mathematical Sciences, your studies will be enhanced by the research insights of our international staff, as well as our recently refurbished building with dedicated modern facilities for mathematics.

Modules
Semester 1
Compulsory modules:
Regular and Chaotic Dynamics; Programming and Numerical Methods; Mathematical Modelling.

Optional modules (choose one):
Stochastic Modes in Finance; Mathematical Methods for Interdisciplinary Sciences.

Semester 2
Compulsory modules:
Elements of PDEs, Static and Dynamic Optimisation; Mathematical Modelling; Fluid Mechanics, Research Project.

Learning, teaching and assessment
You will be assessed by a combination of exams, reports, individual and group projects, and verbal presentations. You will spend approximately 14 weeks at the end of the programme devoted to an individual project, either in an industrial or engineering company, or at the University. For full details, please see the module descriptions above.

Career prospects
Recent graduate destinations include: software engineer in New Zealand; PhD study in plasma liquid interactions; lecturer in higher education; modeller in the Energy Technology Institute.

Jinxia
MSc Mathematical Processes in Finance, graduate

"I think the MSc programme is challenging and definitely can change your career path if you want to seek diversity for life experience, just like me. The Department at Loughborough is very considerate and the friendly and brilliant teachers help not just with studying but also with settlement guidance and future career advice."

Mathematical Finance

MSc

Full-time length: 1 year
Part-time length: Up to 4 years

Entry requirements
A 2:1 honours degree or equivalent international qualification in a subject with a high mathematical content.

See full entry requirements online.
The School reserves the right to vary the list of all modules.

The depth of maths taught in our mathematical finance master's will give you the skills you need to succeed in the finance sector. It is also the ideal preparation if you want to pursue a research career in stochastic analysis, financial mathematics and other relevant areas.

The programme is designed to provide you with the strong mathematical skills, computational techniques and finance background needed to work in the financial sector. It could also open up careers in investment banking, hedge funds, insurance companies and the finance departments of large corporations.

Drawing on the expertise within our Department of Mathematical Sciences, you will undertake core specialised modules in stochastic analysis and measure theory, whilst also choosing optional modules covering wide-ranging topics of interest, including corporate finance, functional analysis and asset management. This makes the programme suitable both for those who are interested in an academic pathway (eg progressing to a PhD), as well as students seeking to enter the quantitative finance sector.

In addition, the 14 weeks at the end of the programme are devoted to an individual project (worth 60 credits), which you will complete under the supervision of your departmental supervisor - an excellent opportunity to connect with cutting-edge research ideas, as well as to build personal links with the finance industry.

As a postgraduate student, you will enjoy access to our computing laboratory which boasts a dedicated team to help you with any IT queries. You will also benefit from our £4 million refurbished department building, which has a spacious student activity area and dedicated state-of-the-art resources.

Modules
Semester 1
Compulsory modules:
Introduction to Measure Theory and Martingales; Stochastic Models in Finance.

Optional modules (choose one):
Regular and Chaotic Dynamics; Lie Groups and Lie Algebras; Programming and Numerical Methods; The Financial System; Financial Economics.

Semester 2
Compulsory modules:
Stochastic Calculus and Theory of Stochastic Pricing; Research Project.

Optional modules (choose two):
Functional Analysis; Elements of PDEs; Static and Dynamic Optimisation; Risk Management and Derivatives; Corporate Finance.

Learning, teaching and assessment
You will be assessed by a combination of exams, reports, individual and group projects, and verbal presentations. You will spend approximately 14 weeks at the end of the programme devoted to an individual project.

Career prospects
Past graduate destinations include: Business Analyst (Deloitte); Finance Analyst (HSBC); Data Analysis (JPSS); Risk Analyst (JPSS).

Chinasa
PhD student

"I love the fact that my 'complete' life is all within the university. I can play tennis for two hours and return to the computer laboratory to continue my simulations without having to travel down to town, I can go for my salsa dance classes at the student union and still return to the office to move on with my studies. The multicultural nature of the university makes me happy and has given me the great privilege of making friends from different part of the world."

Research degrees

PhD: 3 years full-time, 6 years part-time
MPhil: 2 years full-time, 4 years part-time

Entry requirements
An honours degree (high 2:1 or above) or equivalent international qualification in mathematics.

See full entry requirements online.

Active in high-quality research across the broad spectrum of mathematics, the Department has an excellent international reputation for research spanning analysis and PDEs, dynamical systems, geometry and mathematical physics, linear and nonlinear waves, mathematical modelling, statistics and stochastic analysis.

As a PhD student within the Department of Mathematical Sciences you will be part of a vibrant community of researchers from around the world and benefit from the advice and support of your academic supervisors.

A PhD programme will give you the opportunity to develop new and highly sought after skills which can set you up for a range of careers. It's a chance to make a novel contribution to knowledge, to become a world expert in a particular field, and it can open a range of doors with different employers. You'll also enhance your interpersonal skills, such as networking and relationship building, which will be invaluable in your future career.

If you can't find a suitable PhD project that fits your interests and experience from our advertised opportunities, you can submit a research proposal to the Department of Mathematical Sciences to find a supervisor who will work with you on your project.

Our areas of research

Analysis and PDEs
The research interests of the group include analysis of partial differential equations (PDEs), including hyperbolic equations and systems with multiplicities, microlocal, spectral and harmonic analysis, eigenvalue estimates for Dirac and Schrödinger type operators, inverse spectral transform method for integrable PDEs, applications to approximation theory, as well as other topics.

Dynamical Systems: This group studies a wide range of aspects of dynamical systems theory, such as Hamiltonian and dissipative dynamics, dynamical chaos in classical and quantum systems, dynamics of multi-scale systems, ergodic theory, random matrix theory, and bifurcation theory.

Geometry and Mathematical Physics: The research of the group covers a broad range of topics in geometry and related areas of mathematical physics, including the theory of both classical and quantum integrable systems. Another research focus is algebraic geometry, in particular, birational geometry and mirror symmetry.

Linear and Nonlinear Waves: The group's interests are in wave motion in a variety of physical situations including geophysical fluid dynamics, water waves, solid mechanics, Bose-Einstein condensates, electromagnetism and acoustics. The group develop and apply exact, numerical, asymptotic and perturbation techniques to pursue research on linear and nonlinear waves with a focus on solitary waves and soliton theory, stochastic wave systems, wave generation, and diffraction and scattering by obstacles.

Mathematical Modelling: Members of the group apply a variety of techniques from applied mathematics to diverse problems in medicine, biology, fluid dynamics, materials and soft matter science. The biological systems studied range from intracellular processes to those at the scale of organisms and populations. The fluid flows studied range from environmental buoyancy-driven flows to technologically important micro- and nano-fluidic flows.

Stochastic Analysis: Stochastic analysis is currently a very active and important basic research area in mathematics. Rooted in probability and measure theory, and beginning with the fundamental work of Wiener, Kolmogorov, Levy and Ito, stochastic analysis has intrinsic and deep connections. Furthermore, it has many applications in analysis and partial differential equations, geometry, dynamical systems, physics, geophysics, engineering, biology etc, in which many problems are modelled by stochastic differential equations or stochastic partial differential equations.

Statistics: The Statistics group is involved in methodological research in contemporary issues in mathematical and computational statistics, as well as in making diverse applications to the natural, biological and social sciences, including engineering, medical imaging, astrophysics, materials science, ecology, testing theory, etc.

TOP 10

IN EVERY UK
UNIVERSITY
LEAGUE TABLE

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