“Edinburgh isn’t so much a city, more a way of life … I doubt I’ll ever tire of exploring Edinburgh, on foot or in print.”

Ian Rankin
Best-selling author and alumnus
Influencing the world since 1583

For more than 400 years the University of Edinburgh has been changing the world. Our staff and students have explored space, won Nobel Prizes and revolutionised surgery. They’ve published era-defining books, run the country, made life-saving breakthroughs and laid the foundations to solve the mysteries of the universe.

Our distinguished alumni include NASA astronaut Piers Sellers, former MI5 Director-General Dame Stella Rimington, Olympians Sir Chris Hoy and Katherine Grainger and historical greats such as philosopher David Hume, suffragist Chrystal Macmillan, who founded the Women’s International League for Peace and Freedom, and physicist and mathematician James Clerk Maxwell.

International collaboration
An internationally renowned centre for academic excellence, we forge world-class collaborations with partners such as the California Institute of Technology (Caltech), Stanford University, the University of Melbourne, Peking University, the University of Delhi and the University of KwaZulu-Natal. As a member of the League of European Research Universities and the Coimbra Group, we link up with leading institutions across Europe.

Linking research and commerce
We were one of the first UK universities to develop commercial links with industry, government and the professions. Edinburgh Innovations promotes and commercialises our research excellence and can assist you in taking the first step to market, through collaborative research, licensing technology or consultancy.

Enhancing your career
We are committed to embedding employability in your University experience and have an impressive track record for graduate employment. From volunteering schemes to our sector-leading careers service, we provide you with opportunities to develop your skills, knowledge and experience, giving you an edge in the competitive job market.

TOP 50
We’re consistently ranked one of the top 50 universities in the world. We’re 18th in the 2019 QS World University Rankings.

4TH
We’re ranked fourth in the UK for research power, based on the 2014 Research Excellence Framework.*

83%
The majority of our research – 83 per cent – is considered world leading or internationally excellent.*

TOP 100
We are ranked in the top 10 in the UK and in the top 100 in the world for the employability of our graduates.†

£373m
In 2016/17 we won £373 million in competitive research grants.

24
We are associated with 24 Nobel Prize winners.

13TH
We’re ranked 13th in the world’s most international universities.‡ Since 2010, we have taught students from 82 per cent of the world’s countries.

* Times Higher Education, Overall Ranking of Institutions
† Times Higher Education, Global Employability University Ranking 2017
‡ Times Higher Education: The World’s Most International Universities 2017
Taught masters programmes

Computational Applied Mathematics

MSC 1 yr FT (2 yrs FT available for UK/EU students) PgDip 9 mths FT (Exit only)

Programme description
Computational mathematics, in particular the physical applied area and the theory and implementation of numerical methods and algorithms, have wide-ranging applications in both public and private sectors. In this era of ubiquitous, cheap computing power, there has been an explosion in the number of problems that require us to use large data sets and to understand processes by modelling them. Consequently there is high demand for computational modellers and data scientists. This programme concentrates on the overlap and synergy between these fields.

Programme structure
You will study two semesters of taught courses followed by a dissertation. The availability of courses each year may be subject to change as the curriculum develops. Your individual dissertation will be supervised by a research scientist or a member of the in-house academic team.

Career opportunities
This programme will provide training in the tools and techniques of both computational approaches and mathematical insight. This will prepare you for a wide range of roles in both public and private sectors, including careers in banking, insurance, government, and consulting. In the era of big data, demand for computational modellers and data scientists is increasing, and this programme will prepare you for these roles.

English language requirements
For fees see page 20 and for funding information see page 22.

Computational Mathematical Finance

MSC 1 yr FT (2 yrs FT available for UK/EU students) PgDip 9 mths FT

Programme description
This dynamic programme delivers high-quality training in the theory of mathematical finance and emphasises computational methods. Graduates are expected to have a working knowledge of advanced computational finance (including construction of algorithms and programming skills) and a sound knowledge of the theory of probability and stochastic analysis. These are the core theories needed in the modern valuation of complex financial instruments. The programme delivers:

• a flexible programme of study relevant to the needs of employers such as top investment banks, hedge funds and asset management firms;
• a solid knowledge in financial derivative pricing, risk management and portfolio management; and
• the transferable computational skills required by the modern quantitative finance world.

Placements
Adding depth to your learning, a work placement puts you at the heart of financial organisations such as Aberdeen Asset Management, Lloyds Banking Group, Moody’s Analytics and Royal Bank of Scotland.

Programme structure
There are two streams, each of two taught semesters and a dissertation.

Career opportunities
This masters is run jointly with Heriot-Watt University. It provides you with expertise in financial mathematics, including stochastic calculus, and a range of practical techniques for analysing financial markets. You will also learn quantitative skills for developing and managing risk that are in high demand since the recent financial crisis.

Entry requirements
A UK 2:1 degree, or its international equivalent (www.ed.ac.uk) in mathematics or a mathematical subject such as statistics, physics or engineering.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Contact
MACS PG Enquiries
Tel +44 (0)131 451 4152
Email macspgenquiries@hw.ac.uk

The University of Edinburgh
Mathematics Postgraduate Opportunities 2019
Financial Modelling & Optimization

Programme description
This programme gives you a flexible syllabus to suit the demands of employers that use modern financial tools and optimization techniques in areas such as the financial sector and energy markets. We will give you sound knowledge in financial derivative pricing, portfolio optimization and financial risk management. We will also provide you with the skills to solve some of today’s financial problems, which have themselves been caused by modern financial instruments. This expertise includes modern probability theory, applied statistics, stochastic analysis and optimization.

Placements
Adding depth to your learning, a work placement puts you at the heart of financial organisations such as Aberdeen Asset Management, Lloyds Banking Group, Moody’s Analytics and Royal Bank of Scotland.

Programme structure
This programme involves two taught semesters of compulsory and option courses, followed by a dissertation project.

COMPULSORY COURSES PREVIOUSLY OFFERED INCLUDE: Discrete-Time Finance; Finance, Risk and Uncertainty; Fundamentals of Optimization; Optimization Methods in Finance; Research-Linked Topics; Risk Neutral Asset Pricing; Simulation; Stochastic Analysis in Finance.

OPTION COURSES PREVIOUSLY OFFERED INCLUDE: Credit Scoring; Financial Risk Theory; Fundamentals of Operational Research; Integer and Combinatorial Optimization; Large Scale Optimization for Data Science; Multivariate Data Analysis; Numerical Partial Differential Equations with Applications; Object-Oriented Programming with Applications; Parallel Numerical Algorithms; Programming Skills; Python Programming; Scientific Computing; Stochastic Control and Dynamic Asset Allocation; Stochastic Modelling; Time Series.

Career opportunities
Graduates have gone on to work in major financial institutions or to continue their studies by joining PhD programmes. Recent graduates are now working as financial consultants, tax administrators and as risk, quantitative and credit analysts, for employers such as EY, Barlays Bank, Santander, Scottish Widows, Moody’s Analytics and the People’s Bank of China.

Entry requirements
A UK 2:1 degree, or its international equivalent [www.ed.ac.uk/international/graduate-entry], in mathematics or a mathematical subject such as statistics, physics or engineering.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director
Dr Sotirios Sabanis
Tel +44 (0)131 650 5064
Email fmomsc@ed.ac.uk

See also...
Taught masters programmes in related fields are also offered by the University of Edinburgh Business School, the School of Economics, School of Informatics and the School of Physics & Astronomy.
www.ed.ac.uk/studying/prospectus-request

OPERATIONAL RESEARCH/ OR with Computational Optimization

Programme description
This programme will show you how to use mathematical techniques to tackle real-life problems ranging from scheduling flights and routing mobile phone calls to managing investments and minimising risks. Operational Research (OR) is an important skill that is in high demand. Our intensive programme allows you to specialise in an area that best suits your career goals. In addition to the general MSc In Operational Research, we offer the programmes Operational Research with Risk and Operational Research with Computational Optimization.

Programme structure
These programmes involve two taught semesters of compulsory and option courses followed by your dissertation project. Many dissertation projects are carried out as part of an external placement in industry.

COMPULSORY COURSES PREVIOUSLY OFFERED INCLUDE: Fundamentals of Operational Research; Fundamentals of Optimization; Methodology, Modelling and Consulting Skills; Simulation; Stochastic Modelling.

OPTION COURSES PREVIOUSLY OFFERED INCLUDE: Option courses are generally grouped into the following areas: finance, industry, optimization and statistics.
As part of your option course choices, Operational Research with Computational Optimization requires you to study a combination from Integer and Combinatorial Optimization; Large Scale Optimization for Data Science; Object-Oriented Programming with Applications; Probability and Statistics; Python Programming; Scientific Computing; Statistical Methodology; Statistical Programming; Topics in Applied Optimization. Operational Research with Risk requires you to study a combination from Credit Scoring; Object-Oriented Programming with Applications; Probability and Statistics; Python Programming; Risk and Logistics; Scientific Computing; Statistical Methodology; Statistical Programming; Topics in Applied Operational Research; Topics in Applied Optimization.

Career opportunities
The skills you will learn are in demand by a vast range of high-profile organisations including consultancy firms, companies with operational research departments such as airlines or telecommunications providers, financial firms and the public sector. Recent graduates have joined Deloitte, PricewaterhouseCoopers, Grassictionaries, Proctor & Gamble, Lloyds, Royal Bank of Scotland and Scottish Widows.

Entry requirements
A UK 2:1 degree, or its international equivalent [www.ed.ac.uk/international/graduate-entry], in a numerate discipline such as mathematics, engineering, computer science, physical or biological sciences, economics or business. You can increase your chances of a successful application by exceeding the minimum programme requirements.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director
Dr Julian Hall
Tel +44 (0)131 650 5075
Email j.a.j.hall@ed.ac.uk

See also...
Taught masters programmes in related fields are also offered by the University of Edinburgh Business School, the School of Economics, School of Informatics and the School of Physics & Astronomy.
www.ed.ac.uk/studying/prospectus-request
Operational Research with Data Science

MSc 1 yr FT (2-3 yrs PT available for UK/EU students)

Programme description
This programme will show you how to use mathematical techniques to tackle real-life problems ranging from scheduling flights and handling large data sets to managing investments and minimizing risks. The skills of operational research and data science are in high demand. This is a new, forward-looking programme that delivers high-quality English language requirements.

A UK 2:1 degree, or its international equivalent (www.ed.ac.uk/study), is required. You will also need to study probability and statistical theory at university level.

Programme structure
This MSc consists of two semesters of taught courses, assessed by coursework and examinations. You will undertake four compulsory courses in semester one and 60 credits of option courses in semester two, before starting work on a three-month dissertation project.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director Dr Bruce Worton
Tel +44 (0)131 650 4884
Email statsmcs@ed.ac.uk

Statistics & Operational Research

MSc 1 yr FT (2 yrs PT available for UK/EU students)

Programme description
This programme will help you develop professionally in the theory and practice of statistics and operational research (OR), providing you with the basis for a successful career.

It will prepare you for work in areas such as the medical and health industry, government, the financial sector and any other area where modern statistical tools and OR techniques are required. You will also develop the nền skills required for solving problems, working in teams and time management.

You will be able to identify and apply appropriate statistical or operational techniques to practical problems. This will include specifying appropriate models and fitting these models using appropriate computer packages.

Programme structure
This MSc consists of two semesters of lecture-based courses and practical, lab-based courses assessed by a combination of exams, written reports and programming assignments. Following successful completion of the courses, you will undertake a dissertation, which may take the form of an industrial project.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director Dr Bruce Worton
Tel +44 (0)131 650 4884
Email statsmcs@ed.ac.uk

Statistics with Data Science

MSc 1 yr FT (2-3 yrs PT available for UK/EU students)

Programme description
In this digital and data-rich era, the demand for statistics graduates from industry, the public sector and academia is high, yet the pool of such graduates is small. The recent growth of data science has increased the awareness of the importance of statistics, with the analysis of data and interpretation of the results firmly embedded within this newly recognised field. This programme is designed to train the next generation of statisticians with a focus on the newly recognised field of data science.

It combines rigorous statistical theory with hands-on practical experience of applying statistical techniques to data and correctly interpreting the associated results. You will be trained in both classical and Bayesian ideologies and associated computational software, including R, for fitting a range of different models to data. There will be significant practical experience applying different statistical techniques.

Programme structure
This MSc consists of lecture-based and practical, lab-based courses assessed through exams, written reports and programming assignments. Upon successful completion of the courses you will complete a dissertation, usually in the form of a consultancy style research project.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director Dr Bruce Worton
Tel +44 (0)131 650 4884
Email statsmcs@ed.ac.uk

Career opportunities
Trained statisticians are in high demand due to an increasingly data aware society. We anticipate that the majority of graduates will be employed as statisticians within private and public institutions providing statistical advice/consultancy. The statistical analysis/interpretation and communication skills you will develop and your knowledge of the underlying statistical principles, coupled with practical experience of implementing statistical techniques using standard software across a range of applications, will ensure you are ideally placed for a range of jobs options or for further study.

Entry requirements
A UK 2:1 degree, or its international equivalent (www.ed.ac.uk/international/graduate-entry), in a numerate discipline such as mathematics, engineering, computer science, physical or biological sciences, economics or business. You must also have studied probability and statistical theory at university level.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director Dr Bruce Worton
Tel +44 (0)131 650 4884
Email statsmcs@ed.ac.uk

Career opportunities
Graduates will gain the transferrable skills required to pursue careers in a data-rich operational research environment, and will be in an ideal position to apply for work in a wide range of institutions in the public and private sector. The programme is also excellent preparation for further study in operational research, optimisation or data science.

Entry requirements
A UK 2:1 degree, or its international equivalent (www.ed.ac.uk/international/graduate-entry), in a numerate discipline such as mathematics, engineering, computer science, physical or biological sciences, economics or business. You must also have studied probability and statistical theory at university level. You can increase your chances of a successful application by exceeding the minimum programme requirements.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Programme Director Dr Julian Hall
Tel +44 (0)131 650 7765
Email orms@ed.ac.uk

The University of Edinburgh
Mathematics Postgraduate Opportunities 2019

www.maths.ed.ac.uk
www.ed.ac.uk/pg/915 08
www.ed.ac.uk/pg/660 09
Research at the School of Mathematics

We undertake research in areas of the mathematical sciences, including pure, applied, statistics, operational research and mathematical physics, and provide a stimulating and inspiring environment in which to develop your research career.

The Maxwell Institute for Mathematical Sciences (established in collaboration with Heriot-Watt University in 2003) represents a partnership of more than 70 staff members at both institutions. The Institute pools research from both universities to offer a research and postgraduate training environment that can attract the best mathematics talent from around the world. The rich environment includes a lively seminar programme, encompassing all areas of mathematics, operational research and statistics: www.maxwell.ac.uk

Since 2018 we have offered a unique PhD experience under the umbrella of the Maxwell Graduate School. PhD students from both institutions share common space in Year 1 in the new Bayes Centre in the heart of Edinburgh. High quality academic training, in the form of courses and seminar series, is offered jointly. All our PhD students receive training in transferable skills in one of four streams, based on your preference – teaching, outreach, industry or programming. The application process for the Maxwell Graduate School is separate for each institution and you will be awarded your degree from the institution where you have applied. If you are interested in any of the University of Edinburgh’s research areas listed below, please apply online:

- algebra
- computational mathematics
- geometry and topology
- mathematical analysis
- mathematics education
- mathematical physics
- operational research and optimization
- partial differential equations (PDEs)
- probability and stochastic analysis
- statistics

ICMS
With Heriot-Watt University we also created the International Centre for Mathematical Sciences (ICMS). This research institute works to develop mathematical sciences in new directions, supports and develops mathematics that is relevant and in demand from other sciences, industry and commerce, and fosters collaboration between mathematics departments across Scotland.

Postgraduate research programmes

Entry requirements
A UK first class honours degree, or its international equivalent (www.ed.ac.uk/international/graduate-entry), in an appropriate subject; or a UK 2:1 honours degree plus a UK masters degree, or their international equivalents; or relevant qualifications and experience.

Please check the specific entry requirements for your programme online before applying.

Further information about how to apply is available online: https://edin.ac/maths-phd-application

Research opportunities

www.ed.ac.uk/pg/509

Algebra

PHD 3 yrs FT (6 yrs PT available for UK/EU students)

Our algebra research group is made up of international leaders in the field who have won between them the European Mathematical Society Prize, the Whitehead Prize of the London Mathematical Society, the Waclaw Sierpinski Prize of the Polish Academy of Sciences and the Berwick Prize of the London Mathematical Society.

Our members have given invited lectures at both the International Congress of Mathematicians and the European Congress of Mathematicians.

Our research focuses on several areas: non-commutative ring theory; non-commutative algebraic geometry; the geometry of algebraic numbers; Lie-theoretic representation theory; quantum algebra; and category theory.

Much of our research is related to the areas of geometry and topology, and mathematical physics, which has led to the formation of the Hodge Institute: http://hodge.maths.ed.ac.uk

Through the School’s membership of the Maxwell Institute, we present regular seminars, and run our own informal seminars and colloquia. We also serve on editorial boards of various international journals. All of our PhD students take part in international conferences and symposia and, in part thanks to this global exposure, many have gone on to postdoctoral positions throughout the world.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Contact
pgresearch@maths.ed.ac.uk

www.ed.ac.uk/pg/510

Analysis

PHD 3 yrs FT (6 yrs PT available for UK/EU students)

Our analysis research group is one of the UK’s top centres for research in the field, especially in linear and nonlinear partial differential equations (PDEs) and harmonic analysis. Your passion for mathematical analysis will be rewarded by contact with, and supervision by, world-leading academic staff, a rich seminar and working group programme and ultimately a qualification that boasts an internationally-respected pedigree.

Research
We have a unique focus on the interplay of classical Euclidean harmonic analysis with the modern theory of PDEs. We study harmonic analytic ideas in number theory, geometric measure theory, combinatorics, and discrete geometry and geometrically invariant inequalities; we investigate applications of harmonic analysis to elliptic and parabolic PDEs with rough coefficients and/or on rough domains. We also study nonlinear hyperbolic, dispersive and kinetic equations and systems arising in the classical field theories of mathematical physics, mathematical biology and, in connection with black holes, mathematical general relativity; free-boundary problems, optimal mass transportation and Monge-Ampère equations in nonlinear elasticity and other continuum theories; and well-posedness for supercritical initial value problems with noisy initial data.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Contact
pgresearch@maths.ed.ac.uk

See also...
You may find your preferred research area in the prospectus of another School within the University, in particular the University of Edinburgh Business School or the Schools of Computer Science, Informatics or Physics & Astronomy.

www.ed.ac.uk/studying/prospectus-request
Research opportunities
Email
Contact

The Applied & Computational Mathematics research group combines expertise in dynamics, continuum and statistical mechanics, stochastic methods and advanced scientific computing to develop new techniques for applications such as data analytics, molecular dynamics, geophysical and astrophysical fluid, and material sciences.

If you have a passion for applied mathematics, our facilities, people and environment will enable you to develop your research ideas to their full potential.

You'll have access to Edinburgh Parallel Computing Centre (EPCC), one of Europe's leading supercomputing centres, and membership of the Centre for Numerical Analysis and Intelligent Software (NAIS).

Research environment

Our research themes are varied and multidisciplinary. They include numerical methods for ordinary, partial and stochastic differential equations, data science, fluid dynamics, multiscale modelling, molecular and Hamiltonian dynamics, nonlinear waves, biology, and asymptotics.

Our work is supported by first rate high performance computing facilities including the Archer supercomputer, the UK's preeminent academic computing system. The group is strengthened by its involvement in interdisciplinary initiatives and centres including the Alan Turing Institute – the UK's national data-science hub, the Edinburgh Fluid Dynamics Group, and SynthSys (Synthetic and Systems Biology) which fosters interactions with biologists. Through the Maxwell Institute we have many collaborations and shared activities with Heriot-Watt University, for example the Edinburgh chapter of the Society for Industrial and Applied Mathematics (SIAM). A rich seminar and workshop programme brings many international research leaders to Edinburgh each year, strengthening our staff and students' links with the broader community.

Valuable connections

Having access to a broad community of researchers means that your work will be well distributed and recognised. Through the NAIS collaboration, you'll create strong networks with researchers across Scotland and have access to substantial training as well as visitor and workshop programmes in numerical analysis, computer science and high-performance computing software development.

Strong links also exist with life scientists, chiefly through SynthSys (Synthetic and Systems Biology Edinburgh), a multidisciplinary Edinburgh-based centre whose mission is the analysis and design of biochemical systems using theoretical, computational, and biological techniques.

English language requirements

See page 20.

Fees and funding

For fees see page 20 and for funding information see page 22.

Contact Graduate School Administrator
Email pgresearch@maths.ed.ac.uk

For more information about research in the School of Mathematics, please visit: www.maths.ed.ac.uk/ research

Applied & Computational Mathematics

PhD 3 yrs FT (6 yrs PT available for UK/EU students)

Mathematics Postgraduate Opportunities 2019

The University of Edinburgh

Mathematical Physics

PhD 3 yrs FT (6 yrs PT available for UK/EU students)

Mathematical Physics is a multidisciplinary research group with close connections with the Hodge Institute. You'll benefit from being not only in one of the largest mathematics research groups in the UK but also part of the Edinburgh Mathematical Physics Group – a joint research collective formed in 1999 with Heriot-Watt University and now part of the Maxwell Institute.

Research environment

Our group pursues wide-ranging interests spanning a number of disciplines. A central goal is to understand the principles behind quantum gravity, through the study of black holes, cosmologies and spacetime singularities, and via the use of holography and the interplay with quantum gauge field theory through the gauge/gravity correspondence. Particularly fruitful areas of research are the geometry of higher dimensional black holes and their near-horizon geometries in the context of higher-dimensional generalisations of general relativity.

We're fascinated by the various manifestations of supersymmetry: in string theory, supergravity and gauge theory. This has led us to several classification results on supersymmetric supergravity backgrounds, including a recent proof of the homogeneity conjecture. In addition we study gauge theoretic moduli spaces using supersymmetry and via integrable systems techniques, displaying an interplay between the algebraic geometry of curves and associated function theory. This research has led to computer implementations of various algebraic geometric constructions.

Recently we have made progress in some purely mathematical problems suggested by the gauge/gravity correspondence: namely, the classification of certain exotic algebraic structures related to superconformal field theories, as well as that of certain types of homogeneous supergravity backgrounds.

Valuable connections

As well as experiencing a vibrant research environment that brings you into contact with a broad group of your peers, your membership of the Edinburgh Mathematical Physics Group will give you access to a dynamic programme of seminars, lecture courses and conferences. There is a dedicated website and blog, and a comprehensive range of graduate activities. More information: http://empg.maths.ed.ac.uk

English language requirements

See page 20.

Fees and funding

For fees see page 20 and for funding information see page 22.

Contact Graduate School Administrator
Email pgresearch@maths.ed.ac.uk

Key
FT: Full time. PT: Part time.

www.maths.ed.ac.uk
Mathematics Education

Our Mathematics Education research group undertakes evidence-based study into a wide range of aspects of university level learning of mathematics, statistics and operational research. Our aim is to develop and evaluate research-based instructional strategies, by gathering and analysing both quantitative and qualitative data, with a view to being able to improve student learning in the subject and related cognate areas.

Research environment
We are interested in undertaking research to develop an evidence-based expansion of the effective use of technology in teaching and learning mathematics, statistics and operational research at the university level. For example, we are a world leading centre for automatic online assessment of mathematics. We also have broader interests in assessment, including flipped classroom and peer instruction. Current interests within the group related to education and educational technology include:
- automatic online assessment of mathematics;
- effective use of technology in teaching and learning mathematics;
- more generally, including programming and online teaching;
- design of assessments for learning, including evaluation of curricula sequences; and
- evaluation of teaching interventions such as flipped classroom.

Valuable connections
The University of Edinburgh is a world leader in digital education, spanning the full range of activities including Massive Open Online Courses (MOOCs) and online learning of postgraduate programmes. By joining the School of Mathematics you will have opportunities to interact with educational research groups in cognate disciplines such as the Edinburgh Physics Education Group, and the interdisciplinary Centre for Research in Digital Education. As a research student you will be part of a vibrant and dynamic community of educators, with expertise in educational research and opportunities to develop and pursue your research goals. You can be certain of a rich academic setting with opportunities available for students to gain a breadth of knowledge from leading experts.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Contact Graduate School Administrator
Email pgresearch@maths.ed.ac.uk

Opimization & Operational Research

The work in the Operational Research and Optimization research group is divided into three main areas: the mathematical and computing aspects of optimization, combinatorial optimization, and energy systems. The core technology in optimization is the solution of large sparse linear and quadratic problems. We provide world-class expertise in the two main solution methods for these: the simplex method and the interior point method. In combinatorial optimization, we provide expertise for modelling real-world problems using integer linear programming formulations and for deriving efficient exact and heuristic algorithms to solve them. Specialist expertise in energy includes optimization of system planning and operation, security of supply risk analysis, and decision support for public policy.

Research environment
We also have interests in PDE-constrained optimization, global optimization, decomposition methods, parallel computing, industrial applications of optimization and stochastic optimization.

Specific topics which could yield PhD projects include:
- algorithms for linear and nonlinear nonconvex smooth optimization problems;
- optimization models for linear, integer linear, quadratic and nonlinear programming;
- development of solution methods for large-scale nonlinear nonconvex constrained optimization;
- bundle methods;
- warm starts for interior point methods;
- pooling problems;
- applications of optimization in logistics;
- parameter uncertainty in queueing theory and revenue management; and
- facility location and vehicle routing.

Valuable connections
Being part of the Operational Research and Optimization group will give you the opportunity to meet and confer with academics worldwide. You will be a member of the Edinburgh Research Group in Optimization (ERGO) which, through its regular seminar series, attracts local and international researchers interested in the development of operational research and optimization. As a group, we are currently collaborating with researchers in the Netherlands, Canada, USA, Italy, Norway, China, France, Spain, Germany and Turkey, and are invited to give addresses and organise workshops at major optimization, OR and energy conferences.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Contact Graduate School Administrator
Email pgresearch@maths.ed.ac.uk

Probability & Stochastic Analysis

Our Probability and Stochastic Analysis research group operates in what is perhaps the most widely applied area of mathematics: The financial sector. In particular, a major focus of our research, and graduates with the right research experience can make their way into highly rewarding roles in industry. As part of our small, specialised group, you’ll enjoy a research environment that features a balance between theory and practice, access to one of the most powerful computing facilities in the UK and strong links with relevant industries.

Research
Our research focuses on the following themes: stochastic differential equations and stochastic partial differential equations (PDEs) and their applications in nonlinear filtering and stochastic control; applications of stochastic analysis of PDEs, stochastic PDEs and stochastic differential equations (accelerated numerical methods in particular).

We’re also involved in the applications of probability theory, mainly to mathematical finance, particularly stochastic volatility models, equivalent martingale measures and incomplete markets. Other applications include engineering, signal processing and biological sciences.

Valuable connections
With the financial sector being the major commercial employer of our graduates, our involvement with the Scottish Financial Risk Academy, established in conjunction with Heriot-Watt University, offers valuable industry links and training. You can benefit from short project internships with leading financial institutions, visits from leading risk scholars, and a series of knowledge exchange courses and events.

Unparalleled computing
The Probability & Stochastic Analysis group also gives you access to the Edinburgh Parallel Computing Centre (EPCC), one of Europe’s leading supercomputing facilities. EPCC enables high level grid computing, data integration and computer simulation and process optimization. We offer training in all the relevant programs required to achieve your research arms.

Rewarding career options
Many of our graduates take up lucrative positions with high profile financial companies. A large number also pursue careers in academia, while others apply their skills in engineering or biological sciences.

English language requirements
See page 20.

Fees and funding
For fees see page 20 and for funding information see page 22.

Contact Graduate School Administrator
Email pgresearch@maths.ed.ac.uk
About the **School of Mathematics**

By joining the University of Edinburgh's School of Mathematics, you'll follow in the footsteps of mathematical pioneers and study alongside some of the most exciting minds working in the field today.

**Leaders in their fields**

Our status as one of the most prestigious schools in the UK for mathematics attracts highly respected staff. Many of our 50 current academics are leaders in their fields and have been recognised with international awards.

The School is home to two Fellows of the Royal Society, 14 Fellows of the Royal Society of Edinburgh and seven Philip Leverhulme Prize or Fellowship holders. Abel Prize winner and Fields medallist Professor Sir Michael Atiyah is an Honorary Professor and Professor Agata Smoktunowicz is a recent recipient of the European Mathematical Society Prize.

**Rich heritage**

The School boasts a rich heritage in pioneering mathematics. Our base, the James Clerk Maxwell Building, is named after one of the most celebrated mathematicians to study at the University. The 19th-century scientist is most famous for developing classical electromagnetic theory.

Whether you wish to follow a taught masters programme or pursue your own line of investigation, we offer a dynamic academic environment, supported by excellent facilities.

We have an outstanding reputation for mathematics teaching and research. We were judged 'excellent' in the most recent Teaching Quality Assessment. In the Research Excellence Framework (REF) 2014 we had 85 per cent of our research in mathematical sciences rated either 4* world leading or 3* internationally excellent.

**Facilities and resources**

You will enjoy excellent facilities, ranging from one of the world's major supercomputing hubs to generous library provision for research at the leading level, including the Noreen and Kenneth Murray Library at King's Buildings.

You will have access to more than 1,400 computers in suites distributed across the University's sites, many of which are open 24 hours a day. In addition, if you are a research student, you will be provided with your own workspace with desk and desktop computer. In Year 1, our PhD students will share common space within the new Bayes Centre in the Central Area of Edinburgh. This provides an exciting interdisciplinary data science environment with our partners from the Maxwell Graduate School.

**Software support**

We provide all our mathematics postgraduates with access to software packages such as Maple, Matlab and Mathematica. Research students are allocated parallel computing time on 'Eddie' – the Edinburgh Compute and Data Facility. It is also possible to arrange use of the BlueGene/Q supercomputer facility if your research requires it.

**In good company**

Mathematics is a discipline of high intellect with connections stretching across all the scientific disciplines and beyond. In Edinburgh you can be certain of thriving in a rich academic setting. Our School is one of the country’s largest mathematics research communities in its own right which includes around 60 active research students. You will also benefit from Edinburgh’s high-level collaborations, both regional and international. These include:

- the International Centre for Mathematical Sciences
- our close collaboration with Heriot-Watt University through the Maxwell Institute, which was set up in 2005 following significant funding from the Scottish Funding Council.

Research students will have a primary and secondary supervisor and the opportunity to network with a large and varied peer group. You will be carrying out your research in the company of eminent figures and be exposed to a steady stream of distinguished researchers from all over the world.

**Collections of the University**

The University of Edinburgh has one of the world’s great collections, which has been growing ever since its foundation in 1583. Our collections include rare books, archives and manuscripts, art, historical musical instruments and a wide range of museum objects from geological specimens to anatomical models. If laid out end to end, we would have almost 60 kilometres of shelving and storage space devoted to our heritage material, from 1st-century Greek papyrus fragments to new works of sculpture. It is curated by specialist staff across 45 sites and used for our teaching and research by the wider public community.

The Centre for Research Collections in the Main Library is the hub for all our collections, where specialist curators make them available for study, research and pleasure. Postgraduate students are welcome to study original objects and have made many important research discoveries while working on the archives. You will find an incredible range of material in our collections that is available nowhere else in the world.

“I experienced an egalitarian professor-student relationship and felt that student feedback was considered carefully. A number of external guest lecturers from diverse backgrounds in industry and academia enriched the programme with their expertise.”

Michel Zeidler, MSc Operational Research
You’ll have the chance to meet people through the daily bustle of the Maths Hub common room, subject-specific clubs, the weekly postgraduate colloquium – where students give talks and share cake – and at many annual events, including a residential excursion to Firbusk Point on the banks of Loch Tay in Perthshire, where everything from cycling to canoeing is on offer.

There are opportunities to get involved with our new magazine Contours, which is written for the School by our students. We also have a talented team of staff and students working on a busy calendar of outreach activities, including the annual Edinburgh International Science Festival. They demonstrate to the wider community that maths is a beautiful, elegant and creative subject, which underpins a huge amount of modern society.

Graduate School

For research students, our Graduate School offers a busy schedule of activities ranging from formal seminars to social events. The Graduate School runs its own website and YouTube channel, which features self-produced videos of lectures.

Share your work with the world

Researchers are encouraged to travel and participate in conferences and seminars. You’ll also be in the right place in Edinburgh to meet distinguished researchers – from all over the world – who are attracted to conferences held at the School, and the various collaborative centres based here. You’ll find opportunities for networking that could have far-reaching effects on your career in mathematics.

Community

We are a vibrant community of more than 50 academic and related staff supervising 60 research, and many more MSc, students. While

You will be immersed in academic discourse at the highest level, we also offer plenty of opportunities to make new connections, through a full calendar of social events.

Employability and graduate attributes

While your research will build your knowledge and skills in your chosen field, throughout your programme you’ll also gain expertise and confidence in a number of related areas, such as public speaking, presentation and written communication.

This personal and professional development, supported by services offered by the School and the University, will give you an edge when applying for academic or commercial roles.

Institute for Academic Development

All postgraduate students can benefit from our Institute for Academic Development (IAD), which provides information, events and courses to develop the skills you will need throughout your studies and in the future. IAD events also offer the perfect opportunity to meet and network with other postgraduates from across the University.

Further information is available online: www.ed.ac.uk/iad/postgraduates

For taught postgraduates, IAD provides a popular study-related and transferable skills support programme, which is designed to help you settle into postgraduate life, succeed during your studies and move confidently to the next stage of your career. We offer on-campus and online workshops and one-to-one study skills consultations, plus online advice and learning materials. Workshops and learning resources cover key topics tailored to different academic stages, including: pre-arrival sessions; getting started with your studies; critical reading, writing and thinking; managing your exams; and planning for and writing up your dissertation.

IAD also provides a comprehensive programme of transferable skills training, resources and support for researchers completing a doctorate. The workshop programme is designed to help you successfully prepare for the various milestones of your PhD, from getting started with your research, to writing up and preparing for the viva, as well as developing personal and professional skills that can be transferred to your future employment. Workshops cover topics such as writing skills, reference management tools, statistics, preparing for conferences, delivering presentations, time and project management, and personal development. IAD also offers online resources and planning tools to help get your research started, plus support for tutoring and demonstrating, and research public engagement and communication.

Careers Service

Our Careers Service plays an essential part in your wider student experience at the University, offering a range of tailored careers and personal development guidance and support. We support you to recognise the wealth of possibilities ahead, while at university and after graduation, helping you explore new avenues, tap into your talents and build your employability with confidence and enthusiasm.

We provide specialist support for postgraduate students. From exploring career options to making decisions, from CV writing to interview practice, from Employ.ed internships to graduate posts and from careers fairs to postgraduate alumni events, we will help you prepare for the future.

We sustain and continually develop links with employers from all industries and employment sectors, from the world’s top recruiters to small enterprises based in Edinburgh. Our employee team provides a programme of opportunities for you to meet employers on campus and virtually, and advertises a wide range of part-time and graduate jobs.

More information: www.ed.ac.uk/careers/postgrad

Platform One

Platform One is an online meeting place where members of the University community, past and present, can gather. It aims to provide a supportive environment where students, alumni, staff and volunteers can share knowledge and experiences. Together, we form a single community that meets on Platform One. Join us and find out more about the people and possibilities.

More information: www.ed.ac.uk/platform-one

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Applications and fees

We have an online application process for all postgraduate programmes. It’s a straightforward system with full instructions, including details of any supporting documentation you need to submit.

When applying, you will set up an account, which lets you save your application and continue at another time.

Full guidance on our application system is available at: www.ed.ac.uk/postgraduate/applying

General requirements
A UK 2:1 degree, or its international equivalent (www.ed.ac.uk/international/graduate-entry), in mathematics or another mathematical subject or numerate discipline.

You will also need to meet the University’s language requirements (see below). Entry requirements for individual programmes can vary, so check the details for the specific programme you wish to apply for.

To apply for a research degree you will need a UK first class honours degree, or its international equivalent, in an appropriate subject; or a UK 2:1 honours degree plus a UK masters degree, or their international equivalents; or relevant qualifications and experience.

References
For applications to taught programmes, the normal requirement is one reference, although an additional reference may be requested in individual cases. For applications to research programmes, two references are required. You should check the entry online for exact requirements for your intended programme of study. For general guidance on references, visit: www.ed.ac.uk/postgraduate/references

Deadlines
Taught programmes
Some programmes have application deadlines. Please check the programme entry online for details. For all other programmes, you are encouraged to apply no later than one month prior to entry to ensure there is sufficient time to process your application. However, earlier application is recommended, particularly where there is a high demand for places when a visa will be required. Should you wish to submit a late application, please contact us for guidance. If you are applying for funding, in most cases you will need an offer to study with us before you can make your funding application.

Research programmes
The early deadline for applications is 30th November 2018 and the regular deadline is 31st January 2019. This will enable you to be considered for all of our available funding opportunities. Early applications are encouraged and a limited number of early offers may be made. Late applications will be considered, but priority will be given to applications received by the deadline.

English language requirements
Students whose first language is not English must show evidence of one of the qualifications below:

- IELTS Academic: total 6.5 (at least 6.0 in each module)
- TOEFL iBT: total 92 (at least 20 in each module)
- PTE (A): total 61 (at least 56 in each of the Communicative Skills sections)
- CAE and CPE: total 176 (at least 169 in each module)
- Trinity ISE: ISE II (with distinctions in all four components)

Please note:
- English language requirements can be affected by government policy so please ensure you visit our degree finder to check the latest requirements for your programme: www.ed.ac.uk/postgraduate/degrees
- Your English language certificate must be no more than three years old at the beginning of your programme, unless you are using an English language test such as IELTS in which case it must be no more than two years old.
- We also accept recent degree-level study that was taught and assessed in English in a majority English-speaking country (as defined by UK Visas & Immigration), or at a university in a non-majority English-speaking country which has specifically been approved by the University of Edinburgh’s Admissions Qualifications Group. A list of approved universities is published online. The award date must be no more than three years prior to the start date of the programme.
- We do not require you to take an English language test before you apply.

Please contact the Graduate School Administrator for specific details: pgsearch@maths.ed.ac.uk

Abbreviations: IELTS – International English Language Testing System; TOEFL iBT – Test of English as a Foreign Language Internet-Based Test; PTE (A) – Pearson Test of English (Academic); CPE – Certificate of Proficiency in English; CAE – Certificate in Advanced English; Trinity ISE – Integrated Skills in English.

www.ed.ac.uk/english-requirements.jpg

Tuition fees
The following table provides an overview of indicative fee levels for programmes commencing in 2019.

Please note:
- International students starting full-time taught programmes of study lasting more than one year will be charged a fixed annual fee.
- All other students on full-time and part-time programmes of study lasting more than one year should be aware that annual tuition fees are subject to revision and are typically increased by approximately five per cent per annum. This annual increase should be taken into account when you are applying for a programme.
- In addition to tuition fees, your programme may be subject to an application fee and additional costs/progarme costs may apply. Please check the latest programme information online.

Asylum seeker tuition fee status and scholarship
Information for applicants seeking asylum from within the United Kingdom, who wish to commence a programme of study at the University in 2019, is available online. This includes our tuition fee rates and scholarship opportunities: www.ed.ac.uk/student-funding/asylum

Tuition fees for EU students
EU students enrolling in the 2019/20 academic year will be admitted as Scottish/ EU fee status students. Taught masters students will be eligible for the same tuition support as Scottish domiciled students from the Student Awards Agency Scotland (SAAS).

For UK/EU students

Annual fee

<table>
<thead>
<tr>
<th>Programme Type</th>
<th>FT 1-year</th>
<th>PT 2-years</th>
<th>PT 3-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taught programmes</td>
<td>£12,300</td>
<td>£6,150</td>
<td>£4,100</td>
</tr>
<tr>
<td>PhD 3-years</td>
<td>£24,500</td>
<td>£12,250</td>
<td>£4,260</td>
</tr>
<tr>
<td>PhD 6-years</td>
<td>£2,130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For international students

Annual fee

<table>
<thead>
<tr>
<th>Programme Type</th>
<th>FT 1-year</th>
<th>PT 2-years</th>
<th>PT 3-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taught programmes</td>
<td>£22,600</td>
<td>£12,250</td>
<td>£4,260</td>
</tr>
<tr>
<td>PhD 3-years</td>
<td>£18,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PhD 6-years</td>
<td>£2,130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Figure shown is the 2018/19 fee level.

All other fees quoted are indicative of 2019/20 fee levels. Because these figures are indicative, it is important you check online before you apply and check the up-to-date fee level that will apply to your specific programme: www.ed.ac.uk/student-funding/fees/postgraduate

For more information about the University of Edinburgh and its postgraduate opportunities, visit: www.maths.ed.ac.uk
A large number of scholarships, loans and other funding schemes are available for your postgraduate studies. It is only possible to show a small selection in print. To see the full range, please visit: www.ed.ac.uk/student-funding/postgraduate

Scholarships at the University of Edinburgh

- Beit Trust
- China Scholarships Council/University of Edinburgh Scholarships (China)
- Edinburgh Global Masters Scholarships
- Edinburgh Global Research Scholarships
- Edinburgh Principal’s Career Development Scholarships
- Enlightenmment Scholarships
- EPSRC and School of Mathematics Studentships
- Highly Skilled Workforce Scholarships
- Julius Nyerere Masters Scholarship (Tanzania)
- Richard Davidson Postgraduate Scholarship in Operational Research
- School of Mathematics MSC funding
- School of Mathematics and Statistics
- Scottish Funding Council/University of Edinburgh Scholarships
- UKceder

Research council awards

Research councils offer awards to masters and PhD students to support research in different areas of study. Visit the websites of the relevant research councils for more information.

Tuition fee discounts

We offer a 10 per cent discount on postgraduate fees for all alumni who have graduated with an undergraduate degree from the University. We also offer a 10 per cent discount for international graduates who spent at least one semester at the University of Edinburgh as a visiting undergraduate.

Postgraduate studies

While studying in the UK, EU and international students can also apply for a non-income assessed living cost loan: www.saas.gov.uk

Postgraduate Loans (PGL) Wales

Student Finance Wales offers eligible students postgraduate loans for taught and research masters programmes: www.studentfinancewales.co.uk

Postgraduate Loans (PGL) England

The University is eligible to certify loan applications for US loan students. Full details on eligibility and how to apply can be found online:

Student Finance England offers a tuition fee loan for taught and research masters programmes to eligible students, divided equally across each year of the doctoral programme: www.gov.uk/postgraduate-student-loan/eligibility

Postgraduate Doctoral Loans Wales

Student Finance Wales offers loans for postgraduate doctoral study, payable to eligible students and divided equally across each year of the doctoral programme: www.studentfinancewales.co.uk/postgraduate-students/postgraduate-doctoral-loan.aspx

Postgraduate Loans (PGL) England

Student Finance England offers postgraduate loans for taught and research masters programmes to eligible students: www.gov.uk/postgraduate-loan

Other sources of funding

The following are examples of the many scholarships and support schemes available to students from particular countries who meet certain eligibility criteria.

- Chevening Scholarships
- Commonwealth Scholarships
- European Commission’s Erasmus+ Programme
- Marshall Scholarships
- Scotland’s Saltire Scholarships

The Scottish Government’s initiative to attract international students through the Saltire Scholarship Scheme, as well as the University of Edinburgh’s help and support for international students, has helped provide me with an opportunity that I would never have conceived of prior to starting my studies at Edinburgh.

Robert Starr, MSc High Performance Computing, Scotland’s Saltire Scholarship
The School of Mathematics is situated in the James Clerk Maxwell Building at the University’s King’s Buildings campus, which is about two miles south of the city centre and well served by buses, including a free University shuttle service during semester time.

For more information on our taught MSc programmes, please email:
- Computational Applied Mathematics cammsc@ed.ac.uk
- Computational Mathematical Finance cmfmsc@ed.ac.uk
- Financial Mathematics macspgenquiries@hw.ac.uk
- Financial Modelling & Optimization fmomsc@ed.ac.uk
- Operational Research ormsc@ed.ac.uk
- Statistics & OR/with Data Science statsmsc@ed.ac.uk

For more information on postgraduate research, email pgresearch@maths.ed.ac.uk

Alternatively, contact:
Graduate School Administrator
Tel +44 (0)131 650 5085
Email pgresearch@maths.ed.ac.uk

Chat online
We offer all postgraduate students monthly online information sessions. To find out more and see when the next session will be: www.ed.ac.uk/postgraduateonline-events

For international students, Edinburgh Global runs two online chat sessions each month. These are timed to give students in all timezones a chance to get involved. You can find out more and register online: www.ed.ac.uk/international/chat-to-us-online

If you are interested in visiting the School outside the Open Day system as an individual, you are encouraged to contact any relevant member of staff directly to arrange a meeting or an informative video chat. Larger groups should contact Grace Sansom, the Teaching & Recruitment Development Officer, to arrange a visit: grace.sansom@ed.ac.uk

Our visits to you
If you are unable to visit the University, we attend events throughout the year so you can meet and speak to us in person.

UK and Europe: www.ed.ac.uk/postgraduateuk-eu-events
International: www.ed.ac.uk/international/our-visits-overseas
Illustration by: Ailsa Johnson, MA Illustration

The front cover shows Eduardo Paolozzi’s plaster maquette Alan Turing II 2000, which was bequeathed to the University in 2007. It is a stylized depiction of Turing, the pioneering mathematician, computer scientist and codebreaker.

The item in this illustration is part of the University’s unique Centre for Research Collections, a rich resource for all our students, staff and the wider community.

#drawntoedinburgh

This publication is available online at www.ed.ac.uk/postgraduate and can be made available in alternative formats on request. Please contact communications.office@ed.ac.uk or call +44 (0)131 650 2252.