

The Mathematics Department at Royal Holloway is a lively and friendly place with an international reputation for the quality of its teaching and research.

Academic staff are active in pioneering research which is making an impressive impact on the world stage. This strong research culture influences our curriculum, helping students to keep in touch with the latest developments in the field.

Our staff's passion and enthusiasm for the subject transmits through their teaching and they are on hand if you need advice or support.

Study Mathematics with us and open up a wealth of opportunities.

## Contents

<b>2</b> Why Study Mathematics?	<b>4</b> Admissions & Entry Requirements	<b>10</b> Teaching & Assessment
<b>3</b> Why Choose Mathematics at Royal Holloway?	<b>5</b> Degree Structure	<b>12</b> Other Information
	<b>7</b> Degree Options	<b>14</b> Academic Staff

This brochure is designed to complement Royal Holloway's Undergraduate Prospectus and information on the Department's website at: [www.rhul.ac.uk/Mathematics/](http://www.rhul.ac.uk/Mathematics/)

It is also available as a PDF at: [www.rhul.ac.uk/Studying/](http://www.rhul.ac.uk/Studying/)

**Head of Department**  
Professor Simon Blackburn  
[s.blackburn@rhul.ac.uk](mailto:s.blackburn@rhul.ac.uk)

**Admissions Tutor**  
Dr Christine Davies  
[c.m.davies@rhul.ac.uk](mailto:c.m.davies@rhul.ac.uk)

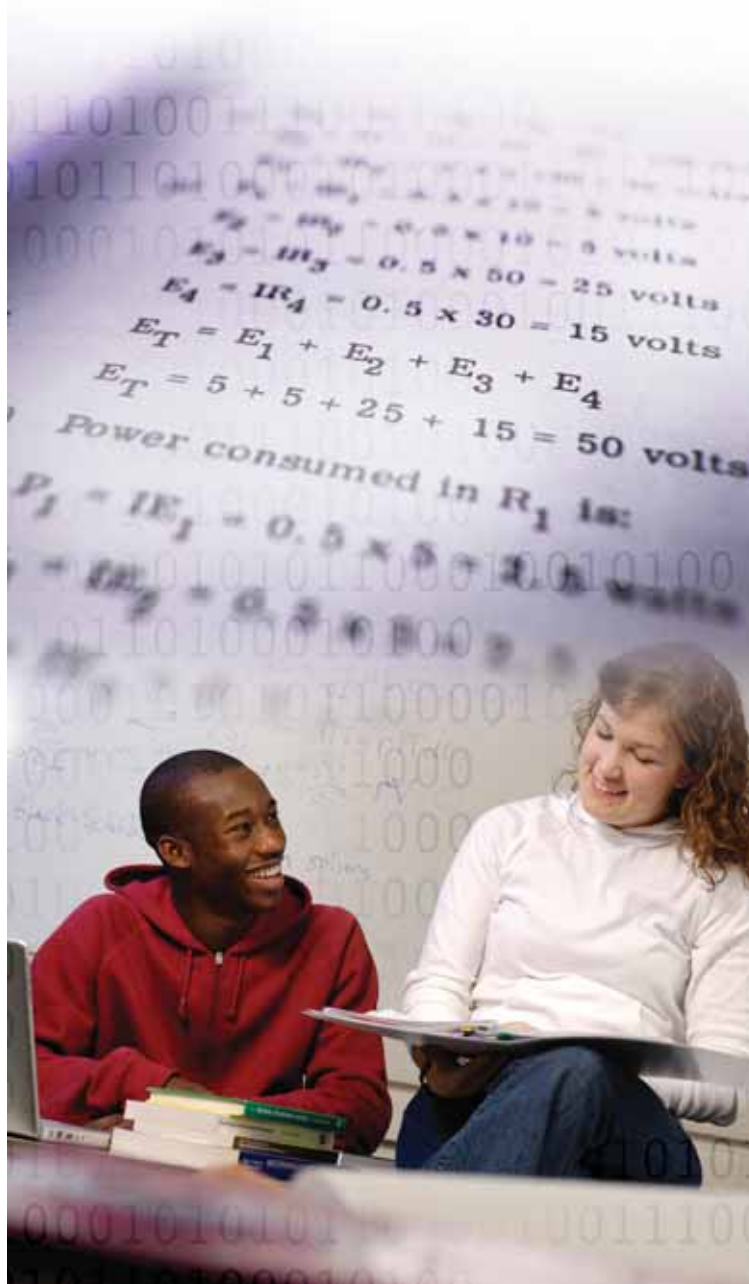
**Department of Mathematics**  
Royal Holloway, University of London  
Egham, Surrey, TW20 0EX, UK  
[maths@rhul.ac.uk](mailto:maths@rhul.ac.uk)

T: +44 (0)1784 443085  
F: +44 (0)1784 430766  
[www.rhul.ac.uk/Mathematics/](http://www.rhul.ac.uk/Mathematics/)

# Why Study Mathematics?

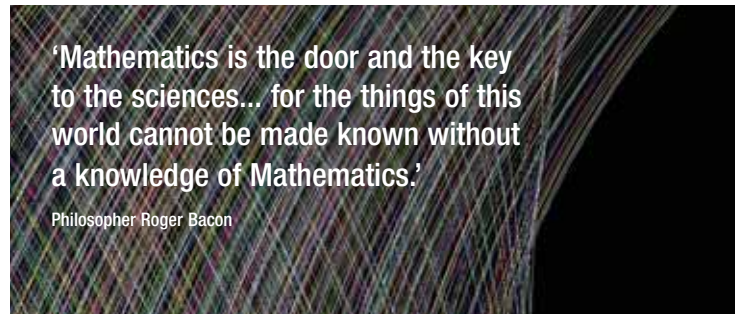
**M**athematics is intrinsically beautiful and can be studied for its own sake: you can gain pleasure from the subtleties of sets, numbers, patterns and algebraic structures, and develop logical and analytical skills. Mathematics is also the central tool in the physical and natural sciences as well as in other disciplines such as finance, economics, management and IT. Whatever your taste in Mathematics, Royal Holloway's varied curriculum will have something to suit you.

By studying Mathematics you gain a diverse range of transferable skills, including how to apply a universal language in a multiplicity of situations and see connections between them. Mathematics also provides an excellent foundation for a variety of fulfilling career paths or opportunities for further study.



# Why Choose Mathematics at Royal Holloway?

- Internationally recognised for the quality of our teaching and research — we received the top grade of 5 in the most recent Research Assessment Exercise and were rated ‘excellent’ by the Quality Assessment Agency
- Our graduates voted the Mathematics Department top for ‘Overall Student Satisfaction’ among all UK university Mathematics departments in the most recent National Student Survey, an independent exercise carried out by the Teaching Quality Information initiative
- A strong focus on small group teaching led by inspirational staff who are acknowledged experts in their fields
- Flexible degree programmes enabling you to mix Mathematics with other subjects and explore broader interests
- Challenging courses covering a varied curriculum, including pure mathematics, mathematical modelling, discrete mathematics, statistics, cryptography, operational research and financial mathematics
- Dedicated support network, including a personal Academic Adviser to guide you in your studies
- A track record of high-achieving graduates well-prepared for future employment
- Extensive postgraduate opportunities within our thriving research portfolio, including the internationally renowned Information Security Group
- Friendly campus environment, with an impressive range of modern facilities and a vibrant social scene
- Set in a prime location with excellent national and international communication links, making it easy to reach us and to travel home or see friends



## Tom Pierpoint



My plans have always been either to pursue a career in the financial world, or become an entrepreneur and build my own business empire. Wherever my future takes me, a degree in Mathematics from the University of London will hold me in good stead for the future.

The Mathematics Department at Royal Holloway is really friendly. All the lecturers know everybody’s name within a couple of weeks of the first term, and go out of their way to make themselves available to you if you have difficulties with the work set or other problems.

I have played for the men’s football club for the duration of my time here, winning the league last season and reaching the final of the ULU Shield. I have been a presenter on the student radio station, 1287am Insanity, for around eight months now. This has proved to be a very enjoyable experience and an opportunity I never thought I’d have.

My time at Royal Holloway has been thoroughly rewarding and enjoyable — so much so that I’m currently trying to change my course to the 4-year MSci so I can stay an extra year!

# Admissions & Entry Requirements



The Department admits about 95 new students each year. Applicants to the College come from a diverse range of backgrounds and students are admitted on the basis of attainment at A-level or equivalent qualifications.

We believe in meeting with all candidates and therefore like to interview where possible. Offers without interview may be made to candidates who are unable to attend.

Prospective students are encouraged to visit the Department, talk to members of staff and students and find out more about studying at Royal Holloway at one of our open days (see page 13). Parents are welcome to visit the Department at the same time.

**Typical Offers:** We make a standard offer to nearly all candidates, unless there are special circumstances. For three-year degrees we are looking for students with **at least 300 or 320 UCAS tariff points**, including a grade A in A-level Mathematics. For joint degree courses the other department concerned will have its own requirement — see the College's *Undergraduate Prospectus* for details.

**Mature Students & Alternative Qualifications:** Applications from mature students are very welcome: people of any age can study Mathematics with enjoyment and success.

Although two Mathematics A-levels are a help, especially in the first year, we do not assume that our students will have more than one and so the starting point of our first year courses is based on the A-level 'common core'. More than half of those awarded first class degrees in recent years entered with only one Mathematics A-level.

We try to assess each applicant individually, taking into account personal circumstances, and do not necessarily take a hard-and-fast line, especially when looking at the A-level grades achieved. If you have any queries please contact the Departmental Admissions Tutor.

**Deferred Entry:** Applications from those who wish to take a year's break between school and university are welcomed.

# Degree Structure

At the centre of our teaching programme are two specialist degrees: the **MSci in Mathematics** (a four-year degree, called an MMath in some universities), and the **BSc in Mathematics** (a three-year degree). We also offer a **BSc in Mathematics & Statistics**, enabling students to concentrate on theory and applications of statistics. Alternatively, students can choose from a variety of degree programmes that are shared between Mathematics and another subject: the large number of available combinations provides the opportunity for you to pursue your other interests.

All undergraduate degree programmes at Royal Holloway are based on the course unit system. This system provides an effective

and flexible approach to study, while ensuring that our degrees have a coherent and developmental structure. This is particularly essential in Mathematics, which is both logical and wide-ranging. In the case of combined degree programmes, it also makes it possible to change the balance of your subjects during your time at Royal Holloway.

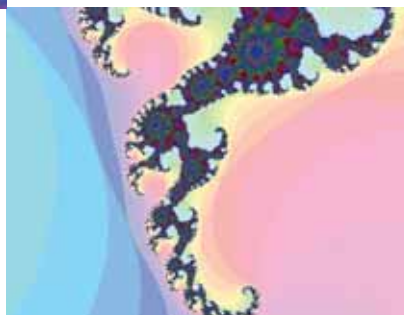
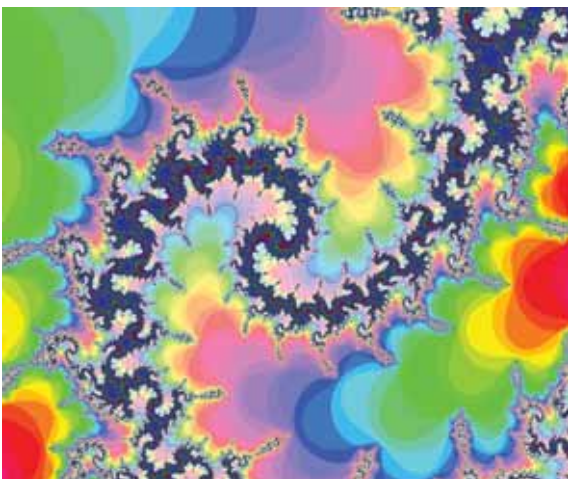
The Mathematics Department's website gives detailed lists of the units taken for each different degree programme. Those following one of the single honours Mathematics degree programmes also have the opportunity to take courses given by other departments (for example in languages).

## Illana Shah



During my six years at Royal Holloway, as an undergraduate and postgraduate student, I found that I gained in confidence through meeting new people and experiencing new situations. My love of Mathematics grew as I learnt a greater variety and depth of subject material. My time as a PhD student had both highs and lows but thankfully the former outweighed the latter, especially as I met my fiancé!

Dr Farmer and the Careers Centre were extremely helpful in supporting and guiding me along the path towards my new job. I am currently training to become a Chartered Accountant at Deloitte, working in the Corporate Tax division. The challenging environment and the friendly people make me feel glad that Royal Holloway provided me with the grounding for a rewarding career ahead.



## Degree Structure

### Year 1 (G100/G103)

- Calculus
- Functions of Several Variables
- Number Systems
- Matrix Algebra
- Numbers and Functions
- From Bernoulli to Mandelbrot: Chance, Information and Chaos

#### Plus two from:

- Introduction to Applied Mathematics
- Principles of Statistics
- Computational Mathematics

### Year 2 (G100/G103)

- Linear and Abstract Algebra and a Group Project (the project may be in any area of Mathematics)
- Real Analysis
- Complex Variable

#### Plus five from:

- Vector Analysis and Fluids
- Ordinary Differential Equations and Fourier Analysis
- Linear Statistical Methods
- Probability
- Discrete Mathematics
- Mathematical Programming
- Primes and Factorisation

### Year 3 (G100/G103)

#### Eight from:

- History and Development of Mathematics
- Mathematics in the Classroom
- Number Theory
- Matrices and Modules
- Metric Spaces
- Quantum Theory I
- Dynamics of Real Fluids
- Magnetohydrodynamics
- Electromagnetic Theory
- Non-Linear Dynamical Systems
- Control Systems
- Quantum Information and Coding
- Experimental Design
- Inference
- Statistical Systems
- Applied Probability
- Mathematics of Financial Markets
- Applications of Operational Research Techniques
- Numerical Analysis
- Error-Correcting Codes
- Cipher Systems
- Algorithmic Graph Theory
- Game Theory
- A Supervised Project

It is also possible to take some fourth-year courses. The precise selection of courses is liable to vary from year to year, but the above gives some indication of the available range.

### Year 4 (G103)

- A Supervised Project

#### Plus six from:

- Computational Number Theory
- Applications of Field Theory
- Symmetry
- Combinatorics
- Integration and Function Spaces
- Quantum Theory II
- Aerodynamics and Geophysical Fluid Dynamics
- Advanced Electromagnetism and Special Relativity
- Advanced Financial Mathematics
- Network Algorithms
- Channels
- Public Key Cryptography

It is possible to include one or two from the Year 3 list.

## Structure for Combined Degree Programmes

The choices of students following combined degree programmes will be influenced, to some extent, by the needs of their programme, so that for example Economics and Mathematics students will take courses in statistics, mathematical programming and financial mathematics. The precise structure for these programmes can be found in the *Departmental Undergraduate Handbook*, in the section 'Programmes of Study', available online at: [www.ma.rhul.ac.uk/current/bluebook/](http://www.ma.rhul.ac.uk/current/bluebook/)

The *Departmental Handbook* also contains complete details of each course, in the section 'Course Unit Descriptions'.

# Degree Options

## Single Honours

**G103** Mathematics MSci (four-year)

**G100** Mathematics BSc (three-year)

## Specialist Degree

**G1G3** Mathematics with Statistics

## Mathematics as a Major Subject (75%)

**G1L1** Mathematics with Economics

**G1R1** Mathematics with French

**G1R2** Mathematics with German

**G1R3** Mathematics with Italian

**G1N2** Mathematics with Management

**G1V5** Mathematics with Philosophy\* (\*Subject to validation)

**G1R4** Mathematics with Spanish

## Joint Degrees (50%)

**GG41** Computer Science & Mathematics

**LG11** Economics & Mathematics

**FG61** Geology & Mathematics

**GN12** Mathematics & Management

**GW13** Mathematics & Music

**GF1H** Mathematics & Physics\* MSci (four-year) (\*Subject to validation)

**GF13** Mathematics & Physics BSc (three-year)

**GC18** Mathematics & Psychology

## Mathematics as a Minor Subject (25%)

**L1G1** Economics with Mathematics

**R1G1** French with Mathematics

**R2G1** German with Mathematics

**R3G1** Italian with Mathematics

**N2G1** Management with Mathematics

Full descriptions are listed on pages 8–9



## Degree Options

### **G103 Mathematics MSci (four-year)**

### **G100 Mathematics BSc (three-year)**

About 1260 the philosopher Roger Bacon wrote 'Mathematics is the door and the key to the sciences... for the things of this world cannot be made known without a knowledge of Mathematics'. Centuries later this is as true as ever. Mathematics is unique — at the same time it is both a beautiful and fascinating world of abstract structures and ideas and a down-to-earth, practical subject at the heart of modern science and technology. Much of its attraction comes from studying the relations between these aspects; for example an elegant theorem on complex functions also governs the lift on an aircraft wing, and apparently highly abstract algebraic results have important consequences in data security. Our degree courses aim to convey the power, beauty and excitement of the subject.

The MSci degree is primarily aimed at those who will continue to use Mathematics at a high level after graduation — for example in commerce, industry or research — while the BSc is aimed at those who will use mathematical skills in areas such as administration, management, accountancy and teaching. We realize that on entry most students will not have decided on a career, so the BSc and the MSci programmes have a common first year, and the choice between them is made at the start of the second year. Therefore it does not matter which degree you register for initially.

### **G1G3 Mathematics with Statistics**

It was said of Florence Nightingale that 'the study of statistics was for her a religious duty'. She realized that to create and run an organization efficiently, data on its operation must be collected and made use of when making decisions. Today this view is universally agreed, although the approach to decision-making is much more sophisticated. In fact statistics is based on Mathematics, not only because the data used are usually numerical, but because the fundamental concepts of probability theory are closely linked to pure mathematics. Therefore there is a great need for graduates with a good understanding of Mathematics who can use statistical methods correctly, and this course aims to produce such graduates.

### **G1L1 Mathematics with Economics**

There is one area of life where everyone needs and uses Mathematics at an elementary level — in personal finance. To understand and try to control the affairs of a firm or organization it is necessary to apply more sophisticated mathematical techniques, to measure the relevant quantities, make predictions, investigate the question 'what if we do this?', and to test the results. This course is designed for those who enjoy studying and using Mathematics, and also want to learn enough economics to understand the contribution that their mathematical skills can make to the solution of real world problems.

### **G1N2 Mathematics with Management**

All business organizations face problems which are basically quantitative, and managers must make decisions on, for example, the allocation or acquisition of resources. Over the last 50 years mathematical techniques have been applied with great success to routine problems, leaving more time for managers to tackle the more difficult situations. Now year by year more powerful and sophisticated techniques are being introduced, so that messy, complicated, ill-posed managerial problems can be handled. Most managers do not have the mathematical background to understand these techniques, while the consultants used too often do not understand the background to the problems. The aim of these degree courses is to fill the gap and provide graduates with some understanding of business as well as a thorough grasp of the appropriate branches of Mathematics.

### **G1R1 Mathematics with French**

### **G1R2 Mathematics with German**

### **G1R3 Mathematics with Italian**

### **G1R4 Mathematics with Spanish**

Galileo described the universe as a book written in the mathematical language, and the concept of Mathematics as a universal language is a powerful one. Like other languages it can be studied for its own sake, and also as a vehicle for transmitting ideas. So it is logical to study Mathematics with a foreign language — and it also opens up a wide range of careers. These programmes combine most of the specialist Mathematics BSc degree with a study of the spoken and written appropriate language. Note that these are three-year degrees.

### **G1V5 Mathematics with Philosophy\* (\*Subject to validation)**

Philosophy addresses fundamental questions about knowledge, reasoning, our view of the universe, and their impact on people's lives. Many questions such as 'what is a number?' or 'is Mathematics discovered or invented?' are basically philosophical, and Greek philosophers introduced the idea of applying Mathematics to describing the universe. The philosophy courses in this programme include Greek and Roman Philosophy, Modern European Philosophy, and the Philosophy of Politics.

### **GG41 Computer Science & Mathematics**

There is an obvious connection between Computer Science and Mathematics — many of the subjects studied by computer scientists are basically mathematical, and there is no branch of Mathematics which has not been radically altered by computer techniques. A degree course in Computer Science & Mathematics will show that Computer Science is a serious intellectual discipline and Mathematics is a relevant and useful subject, and the combination opens up a very wide range of career opportunities.

### **LG11 Economics & Mathematics**

Economic analysis relies more and more on mathematical foundations. Optimal individual behaviour is found through the use of calculus, the dynamic properties of economies are studied with difference and differential equations, and important results in welfare economics are established from topological properties. In areas of management consulting and in financial institutions, advanced mathematics and computing are vital in determining the best strategy for the firm and for investing in different assets. The Economics courses consider the analysis of individual behaviour and markets, with options in financial and industrial economics and numerous other fields; econometric analysis shows how to analyse data. The Mathematics courses consider the fundamental properties of the Mathematics used, from calculus to probability and statistics, mathematical programming and game theory.

### **FG61 Geology & Mathematics**

The words 'geometry' and 'geology' include the same Greek root, and interest in measurement and understanding of the earth has fuelled study of both subjects for millennia. This degree programme trains students for the increasing numbers of geological research and industrial posts that require a high level of mathematical understanding. Geology courses cover crystallography, mineralogy, petrology, sedimentology and structural geology, while Mathematics courses cover mathematical methods, modelling, mechanics, statistics and fluid dynamics.

### **GN12 Mathematics & Management**

Managers in any business are faced with varied and usually complex situations. There are always issues of finance, logistics, inventory control, scheduling and so on — and the skills developed in a Mathematics degree are just the ones needed. Combine these with a study of Management and Accounting, and you will be well equipped when you graduate.

### **GW13 Mathematics & Music**

Both Mathematics and Music are concerned with the creation, understanding and analysis of abstract patterns. In the 6th-century BC Pythagoras and his followers developed a unified theory of arithmetic, geometry and music, based on ideas of proportion and harmony. This was the  $\mu\alpha\theta\eta\mu\alpha$ , or 'what should be learnt', from which the name Mathematics comes. Though the link between Mathematics and Music is not so close now, it is still well worth combining these two subjects.

### **GF1H Mathematics & Physics\* – MSci (\*Subject to validation)**

### **GF13 Mathematics & Physics – BSc**

Mathematics and Physics are two branches of knowledge which have formed a fruitful partnership for centuries, enabling us to explain and predict the behaviour of the universe. They form a natural combination for a degree course. The compulsory core of the course contains the fundamental ideas of Physics and useful ideas and techniques of Mathematics, and the wide range of options available allows you to follow your own interests.

### **GC18 Mathematics & Psychology**

Mathematics and Psychology are in some ways contrasting subjects: Psychology is strongly based in the real world and Mathematics is much more abstract. But Leopold Kronecker (1823–1891) wrote: 'God made the integers; all the rest [of Mathematics] is the work of man'. So Mathematics is one of the greatest products of human thinking, and a study of Psychology together with Mathematics sheds light on both. This degree programme is particularly appropriate for those who need a teaching subject in preparation for training as an educational psychologist, and also for potential managers in areas such as marketing.

# Teaching & Assessment

Studying Mathematics at Royal Holloway is not just about collecting skills and information for a future career (though of course that is important). It is about developing a feel for the subject in many different, often small, ways, and becoming a community of people who care about the subject.

We aim to provide an environment in which it is a pleasure for you to study and which will encourage you to follow your strengths and interests in order to achieve the best possible degree. Our compact size helps to promote a friendly and inspiring atmosphere where students are known as individuals. Staff are always ready to give help and advice and a member of staff is also assigned to you as a Personal Adviser. Your Personal Adviser will help you with any queries or difficulties (academic or otherwise) and guide you in your choice of courses. Typically, your Adviser will be the person who writes your job references in the final year.

Our teaching was rated 'excellent' during our recent quality assessment, reflecting the care we take in the design and delivery of our courses. Our research interests such as cryptography, information theory, and operational research, influence our curriculum, particularly in the final year, and these subject areas are extremely useful — they give students the tools to apply their Mathematics in real-life situations.

A variety of teaching methods is used. Our approach is to start in the first year with plenty of academic support, and gradually reduce the level as students gain in confidence. Generally the first year courses are taught by a combination of lectures, problem-solving workshops and tutorials in groups of four or five; in the second year we use lectures and workshops; and in the third and fourth years mostly lectures. As Mathematics is only learnt by practice, we support every course with weekly worksheets: the students' work is

collected, corrected where necessary, and returned with comments. This feedback is a vital part of the teaching and learning process.

Computers are used as an aid in many courses, especially in statistics. Simple use of the *Mathematica* package ('A System for Doing Mathematics by Computer') is taught to all students; it can be used to check any routine calculation (numerical or algebraic) and in a variety of ways. For students who want to extend their knowledge, we offer an optional strand in Computational Mathematics.

Learning to prepare and present the results of your work is something we (and employers) see as important. Therefore we provide several opportunities to do so. In the second year all students work in small groups to prepare a report and an oral presentation on a mathematical topic of their choice. Most of the statistics courses include a project component, and in the third year, two courses (Mathematics in the Classroom and one Operational Research course) are assessed entirely by project work. A supervised project forms a quarter of the work in the final year of the MSci, and third year students may opt to undertake a project if they wish.

In a typical week students will attend 12–14 hours of formal teaching: lectures, tutorials, workshops and computer classes. Outside these times they are expected to work on worksheets, revision, and preparation of projects.

Apart from projects (mentioned above) all courses are examined by written papers in the Summer Term.

There is more to learn in a Mathematics course than the material presented in lectures. You must be able to convince yourself of the validity of a piece of Mathematics and to present results to others in an intelligible fashion — to explain something you have just learnt (or, even better, just discovered) can be a pleasure.





# Other Information

## Facilities

The Mathematics Department is housed in the McCrea Building (named after the remarkable Professor William McCrea, FRS, former Head of Mathematics and one of the leading cosmologists and relativists of his generation). There is a dedicated computer laboratory for students and a range of specialist Mathematics software available. Further computer facilities (some with 24-hour access) are conveniently located around the campus. Data Cabling has also been installed in many of the residences to provide you with intranet access and enable you to use your computer laptop for your studies. The Bedford Library holds an extensive stock of Mathematics textbooks, monographs and journals, and is next to the McCrea Building.

## Career Prospects

University of London degrees enjoy international recognition, and are especially valued by employers. The strong links which the Department has with various companies and organizations help us to stay in tune with the very latest needs of employers. Certain exemptions may be given by the Institute of Actuaries and other professional bodies to students who have taken appropriate course units.

Mathematics graduates are in high demand and have a wide range of employment prospects. Mathematicians are logical, numerate, have careful analytical skills, and are confident in handling formulae or large data sets. These skills are in short supply in many key areas of industry, finance and government. There is also a need for graduates as Mathematics teachers. Recent Royal Holloway graduates have started lucrative careers in finance, actuarial work, accountancy, and management.

In industrial research, mathematicians are members of teams dealing with all types of problems; in information technology mathematicians are needed in software development, to advise on methods of handling data, and so on; in financial services, stockbrokers, banks and investment companies employ large numbers of mathematicians to improve portfolio management, money control methods and forecasting; pharmaceutical companies, social research organizations and others employ many statisticians; operational research teams in industry and consultancy firms need Mathematics graduates. Professional mathematicians can also be found in research teams working on problems as diverse as aircraft design, operational research or cryptography.

For most of the employment areas described, a BSc involving Mathematics is an excellent background. If, however, you are interested in using Mathematics professionally, in academic work or elsewhere, then you may wish to apply for an MSci degree (called an MMath in many universities), or to change it after arrival.

## Careers Centre

The staff of the College Careers Centre will work with you to enhance your employability and prepare you for the choices ahead. They have a comprehensive information service, and run seminars on the preparation of CVs and interview technique, as well as organizing careers fairs and recruitment visits by companies.

The team also hold regular sessions specifically for Mathematics students on vacation employment and the careers available to them on graduation.

## Postgraduate Opportunities

Many students see a Mathematics first degree as a useful platform from which to move to further study and the Department offers exciting opportunities for postgraduate study.

We have earned an international reputation for our research, reflected in our strong performance in the most recent Research Assessment Exercise where we scored a top grade of 5. Our cutting edge research covers a diverse range of interests, including Quantum Chaos. We are also a national leader in Information Security and one of our research groups is the internationally renowned Information Security Group. Through all our research we aim to extend the boundaries of the subject and make a difference in the real world.

Quite a few graduates proceed to MSc degrees which deal with applications of Mathematics and equip them for more specialized types of employment. The Department offers MSc courses in Mathematics for Applications, Mathematics of Cryptography and Communications, and Information Security. Students have also gone onto study at other prestigious universities for higher degrees in all branches of Mathematics and in related fields such as business administration and specialised areas of engineering.



## Maths Careers Website

The Institute of Mathematics and its Applications, together with the London Mathematical Society and the Royal Statistical Society, have recently launched a new Maths Careers website. This site includes useful advice on finding the right career. For more information, visit: [www.mathscareers.org.uk](http://www.mathscareers.org.uk)

## Mathematics in the Classroom (The Undergraduate Ambassadors Scheme)

Endorsed by the DTI and DfES, the Undergraduate Ambassadors Scheme provides an opportunity for third year undergraduates to gain valuable transferable skills and experience of science education. Each student spends half a day each week for one term in a local school. You will work under the supervision of a specific teacher who will act as a trainer and mentor, and determine your tasks and responsibilities. This course counts towards the final degree result in the same way as other third year Mathematics courses. For more information, visit: [www.uas.ac.uk](http://www.uas.ac.uk)

## Study Abroad

The Department has strong international links and it is possible to spend one year abroad at another university. The College also has a series of exchange links set up with universities across the world, including in Australia, Hong Kong, Russia and the USA. For more information, please see the College's *Study Abroad* brochure.

## College Open Days

An Open Day at Royal Holloway offers a unique opportunity to come and see the College for yourself. You will have the chance to meet our students and teaching staff, and get a taste of what university life is really like. Parents and friends are very welcome to come with you.

Dates of Open Days can be obtained from the Department, the Educational and International Liaison Office or from our website: [www.rhul.ac.uk](http://www.rhul.ac.uk)

**For further information please contact:**  
[liaison-office@rhul.ac.uk](mailto:liaison-office@rhul.ac.uk)



## Lan-Anh Bui



The Mathematics Department at Royal Holloway is extremely supportive which makes it a brilliant learning environment. The staff are approachable and helpful no matter how minor the problem — they are always on hand to help. These qualities, along with the College's reputation, are what attracted me to Royal Holloway when deciding on my choice of university.

The Mathematics and Economics programme gave me the opportunity to pursue my interest in Maths as well as introduce me to Economics which I hadn't studied previously. Flexibility in the final year allowed me to pursue the areas that interested me but at the same time it was structured enough to ensure that I had a broad range of knowledge. The skills and knowledge I have gained have been invaluable, especially in my current position where they are being put into practice daily.

# Academic Staff

**Mr John Austen** is a Consultant in Information Security. His main area of interest is computer crime.

**Dr Yiftach Barnea** is a Lecturer in Pure Mathematics. His research interests include profinite groups and Lie algebras.

**Professor Simon Blackburn** is Head of Department and a Professor of Pure Mathematics, with interests in algebra, combinatorics, and cryptography.

**Professor Ken Bowen** is a Visiting Professor. His research interests include the methodology of operational research, conflict situations, and 'messes'.

**Dr Carlos Cid** is an Academic Fellow in Information Security. His research interests include cryptography, information security and computer algebra.

**Dr Chez Ciechanowicz** is a Reader in Information Security, with interests in risk analysis, risk management, and security management.

**Dr Jason Crampton** is a Lecturer in Information Security. His research interests include role-based access control and the application of partial order theory (and Sperner theory in particular) to access control.

**Dr Mark Damerell** is a Lecturer in Pure Mathematics, with interests in algebraic combinatorics and computing applications.

**Dr Christine Davies** is Admissions Tutor and Senior Lecturer in Applied Mathematics. Her area of interest includes magnetohydrodynamics and applications to astrophysics.

**Dr Gar de Barra** is a former Senior Lecturer in Pure Mathematics. His area of interest includes differentiability in Banach spaces.

**Dr Alex Dent** is a Lecturer in Information Security. His research is primarily focused on the design of provably secure cryptographic algorithms.

**Dr Christian Elsholtz** is a Senior Lecturer in Pure Mathematics. His research interests include additive and multiplicative number theory, and combinatorics.

**Professor John Essam** is an Emeritus Professor of Applied Mathematics. His research interests are percolation theory, polymer networks, Potts models, and combinatorics.

**Dr Christine Farmer** is a Senior Lecturer in Applied Mathematics. Her area of interest includes the mathematics of quantum mechanics.

**Mr Andreas Fuchsberger** is a Lecturer in Information Security. His research interests are in network and software security.

**Dr Steven Galbraith** is a Reader in Mathematics. His research interests include number theory and mathematical aspects of cryptography.

**Mrs Hilary Ganley** is the Distance Learning Co-ordinator for Information Security and lectures in Information Security.

**Mr Ed Godolphin** is a Reader in Statistics. His research interests include time series analysis, design and experimental methods in statistics.

**Professor Glyn Harman** is a Professor of Mathematics. His research interests are in most areas of analytic number theory and in particular the application of sieve methods, Diophantine approximation, and metric number theory.

**Dr Kostas Markantonakis** is a Lecturer in the Smart Card Centre. His interests are in security and applications of smart cards.

**Dr Keith Martin** is a Reader in Information Security, with interests in authentication codes and secret sharing schemes.

**Dr Keith Mayes** is Director of the Smart Card Centre. His interests are in the development of smart cards and communications.

**Dr James McKee** is a Senior Lecturer in Pure Mathematics. His research interests include elliptic curves, Pisot numbers, and algorithms for the factorisation of integers.

**Professor Chris Mitchell** is a Professor of Computer Science and Director of Graduate Studies. His main research interests are in Information Security and combinatorial mathematics.

**Dr Francisca Mota-Furtado** is a Reader in Applied Mathematics. Her research interests include classical and quantum chaos in atomic systems.

**Professor Sean Murphy** is a Professor of Mathematics, with interests in cryptography and data security.

**Dr Siaw-Lynn Ng** is a Lecturer in Information Security, with interests in combinatorics and finite geometry, and their applications in information security.

**Dr Chris Norman** is a former Senior Lecturer in Pure Mathematics. His research interests include the Jordan decomposition of matrices.

**Professor Pat O'Mahony** is a Professor of Applied Mathematics, with interests in quantum dynamics, chaos, and atomic theory.

**Dr Tobias Osborne** is a Lecturer in Applied Mathematics. His research interests are quantum information science and applications to the study and simulation of condensed matter systems.

**Professor Kenny Paterson** is a Professor in Information Security. His research interests are cryptography, security, coding theory, and sequences.

**Professor Fred Piper** is External Director of the Information Security Group and Professor of Mathematics. His interests include algebraic combinatorics, cryptography, and data security.

**Dr Geraint Price** is a Lecturer in Information Security. His research interests include secure protocols, Public Key Infrastructures, Denial of Service attacks and resilient security.

**Professor Rüdiger Schack** is a Professor in Applied Mathematics. He is interested in open quantum systems and the physics of information, including quantum information theory and quantum cryptography.

**Dr Scarlet Schwiderski-Grosche** is a Lecturer in Information Security. Her special interests are security in mobile telecommunications systems, e-payment in m-commerce and e-commerce systems, and biometrics.

**Dr Eira Scourfield** is an Honorary Research Associate in Pure Mathematics. Her research interest is analytic number theory.

**Dr Teo Sharia** is a Lecturer in Statistics. Her research interests include asymptotic theory of parametric estimation, iterative methods and stochastic approximation.

**Dr Andrew Sheer** is Assistant Head of Department, Academic Co-ordinator, and Senior Lecturer in Applied Mathematics. His area of interest includes applications of operational research to transport and finance.

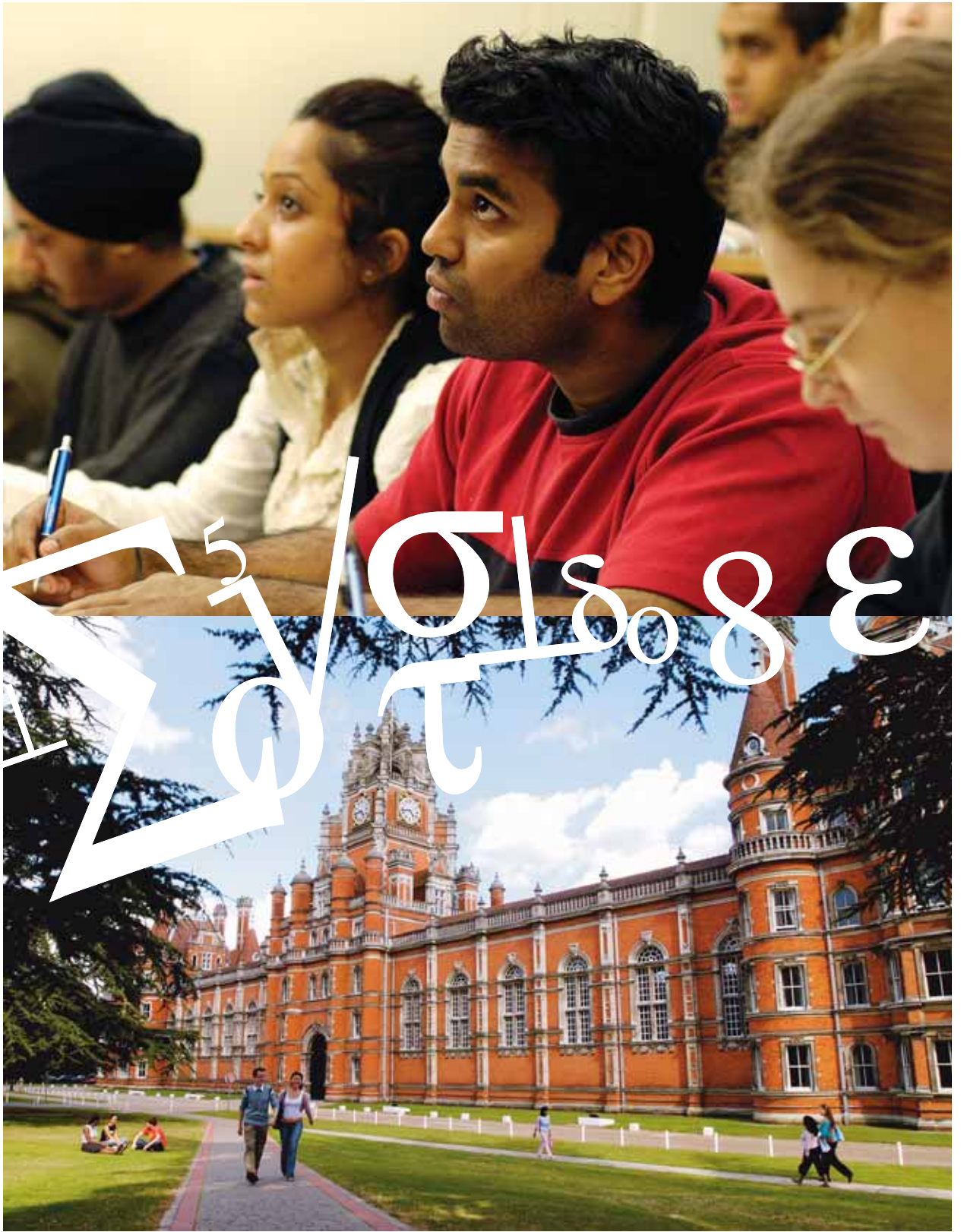
**Dr Allan Tomlinson** is a Lecturer in Information Security. His research interests include mobile communications security, trusted computing, and content protection.

**Professor Michael Walker** is a Visiting Professor of Information Security, with interests in cryptography and data security.

**Professor Peter Wild** is a Professor of Pure Mathematics and Director of the Information Security Group. His interests include design and difference sets, and applications to data communications.

**Dr Stephen Wolthusen** is a Lecturer in Information Security. His research interests include the modelling of trust and security aspects using uncertainty and belief models such as non-standard logics.

**Dr David Yates** is a Lecturer in Pure Mathematics. His area of interest includes the theory of numbers.



The terms and conditions on which Royal Holloway, University of London makes offers of admission to its programmes of study, including those covered in this booklet, may be found in the Undergraduate and Postgraduate Prospectuses; copies of which are available from the Educational and International Liaison Office.

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