As a discipline mathematics is unique. The theory and methods we study in pure and applied mathematics and statistics are relied upon and used by subjects from architecture to zoology. If you have a mathematical mind there are countless problems to solve, collaborations to enter into, and wide-ranging employment opportunities to take advantage of.

Through our degree courses we aim to motivate, enthuse and support students in developing not only knowledge of mathematical and statistical techniques but also the skills required to tackle unfamiliar problems and to understand when others may be using these techniques incorrectly. I want our degree courses to provide the ideal preparation for whatever future challenges lie ahead.

I am proud to lead a department which celebrates its diversity: the diversity of the mathematics which we learn, teach and research; the diversity of how we teach; and the diversity of the individuals – both staff and students – within it. This helps to create the supportive, dynamic and interactive environment from which we all benefit, helping us to maximise our potential and reach our personal and academic goals. It is this department that we would like you to become a part of.

Dr Marcus Tindall
Head of the Department of Mathematics and Statistics

www.reading.ac.uk/maths

“The most rewarding part is the "Aha" moment, the excitement of discovery and enjoyment of understanding something new – the feeling of being on top of a hill and having a clear view.”

Maryam Mirzakhani
First woman to win the Fields Medal
You can choose to study mathematics as a single honours degree or combine it with other subjects.
You can also include a summer placement, a year placement, and/or a year studying abroad into your degree and even study a language from beginner level.
All our courses are also offered as four-year degrees with a year of professional experience*.

BSc Mathematics †
MMath Mathematics †
BSc Mathematics with Computer Science †
BSc Mathematics and Economics
BSc Mathematics with Finance and Investment Banking †
BSc Mathematics and Meteorology †
MMath Mathematics and Meteorology †
BSc Mathematics and Statistics †

* Subject to availability, see inside back cover.
† This course will meet the educational requirements of the Chartered Mathematician designation, awarded by the Institute of Mathematics and its Applications, when followed by subsequent training and experience in employment to obtain equivalent competencies to those specified by the Quality Assurance Agency (QAA) for taught master's degrees.
‡ Accredited by the Institute of Mathematics and its Applications to meet the educational requirements of the Chartered Mathematician designation.
**BSc MATHEMATICS**

This well-rounded degree can be personalised to meet your interests and is a stepping stone to a wide range of careers.

In the first year you will be taught pure and applied mathematics as well as statistics, giving you the opportunity to experience the breadth of mathematics. In later years if you are fascinated by pure maths you can tailor your degree to contain more complex analysis, or if you want variety you can mix up maths modules with something a little different such as working with our first years as part of Peer-Assisted Learning, or analysing data acting within a team of statistical consultants. Regardless of your choices, you will have the opportunity to develop a range of skills that are highly desired by employers, including mathematical computing, communication skills and teamwork.

If you love maths and studying at Reading, then subject to module selection and performance, you can choose to switch from the BSc Mathematics course to the MMath Mathematics course as late as the third year of study.

### Year one modules include:
- Foundations of mathematics
- Calculus
- Linear algebra
- Real analysis
- Probability and statistics
- Mathematical and statistical programming

### Year two modules include:
- Algebra
- Professional skills for mathematicians
- Real and complex analysis
- Differential equations
- Vector calculus

### Year three modules include:
- Applied stochastic processes
- Cryptography and error correcting codes
- Mathematical biology
- Measure theory and integration
- Number theory
- Statistical data science and machine learning
- Experimental design
- Multivariate data analysis

The final year also includes either a mathematics or statistics project, or Peer-Assisted Learning module.
MMath
MATHEMATICS

Gain a master’s-level understanding of applied and pure mathematics through a degree that can be tailored to match your interests.

Develop an in-depth understanding of a subject that touches on every aspect of society and the natural world, from the physics of the oceans to the modelling of financial markets. This course is perfect for budding mathematicians that want to learn as much maths as possible and it is particularly appropriate if you are considering a career as a research mathematician.

During the first two years, amongst other skills, you will develop the ability to construct rigorous mathematical arguments, and correctly express statements and proofs of mathematical theorems. You will learn the concepts of sets, functions and other familiar number systems, and you will build upon your current knowledge of calculus and extend it into two and more dimensions. In your study of analysis you will also learn a branch of mathematics not taught below degree level that can provide remarkable results that calculus cannot. The final two years are predominantly made up of optional modules, enabling you to tailor the course to suit your interests.

Year one modules include:
- Foundations of mathematics
- Calculus
- Linear algebra
- Real analysis
- Probability and statistics
- Mathematical and statistical programming

Year two modules include:
- Real and complex analysis
- Algebra
- Differential equations
- Vector calculus
- Professional skills for mathematicians

Year three modules include:
- Measure theory and integration
- Cryptography and error correcting codes
- Fluid mechanics
- Partial differential equations
- Number theory
- Modelling structured data
- The third year also includes either a mathematics project or Peer-Assisted Learning module.

Year four modules include:
- Analytic number theory
- Dynamical systems
- Numerical linear algebra
- Operator theory
- Advanced partial differential equations
- Stochastic processes

Several of these optional modules overlap with those offered in the third year. If the optional module is chosen at fourth year the material covered will be of a higher level than the third year option. The final year also includes a compulsory mathematics project.
BSc MATHEMATICS WITH COMPUTER SCIENCE

Develop your knowledge of mathematics alongside key computational skills such as programming. The split between the two subjects is roughly two-thirds mathematics and one-third computer science.

The modern world is increasingly rich in data, novel applications of technology and algorithmic processes. Many contemporary problems cannot be solved “by hand” and instead require a highly skilled blend of mathematical thought and computational expertise to solve. This degree will enable you to develop these highly sought after skills.

You will be given a thorough grounding in mathematics as well as developing key computational skills.

As part of your first year you will study the core topics of mathematics, extending your knowledge of differentiation and integration to more dimensions and then into first and second order ordinary differential equations. As part of the foundations of mathematics you will discuss the need for proofs in the rigorous study of mathematics, as well as exploring topics such as the famous ‘twin prime conjecture’. This will be balanced with your studies in computer science in which you will learn the structure of computer systems and the interaction between software and hardware, examine the role of computer networking in computer communication, as well as having the opportunity to get to grips with several programming languages including C++ and Java.

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<th>Year one modules include:</th>
<th>Year two modules include:</th>
<th>Year three modules include:</th>
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<tr>
<td>Foundations of mathematics</td>
<td>Differential equations</td>
<td>Applied stochastic processes</td>
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<tr>
<td>Calculus</td>
<td>Vector calculus</td>
<td>Calculus of variations</td>
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<td>Linear algebra</td>
<td>Numerical analysis</td>
<td>Dynamical systems</td>
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<tr>
<td>Fundamentals of computer science</td>
<td>Mathematical programming</td>
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<td>Programming in C/C++</td>
<td>Professional skills for mathematicians</td>
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<td>Algorithms and operating systems</td>
<td>Virtual reality</td>
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<td>Programming in Java</td>
<td>Image analysis</td>
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The final year also includes either a mathematics project or Peer-Assisted Learning module.
This course will enable you to develop your skills as a mathematician whilst gaining a strong grounding in the conceptual underpinnings of economics. You will spend equal amounts of time studying each subject.

In the first year the mathematics you will study will include the foundations of mathematics and calculus which build on your knowledge of differentiation and integration, and pose questions such as why the differential of $x^2$ equals $2x$. You will gain an understanding of both pure and applied mathematics which you can choose to build on through your project and module choices in later years.

Through the economics modules you will study microeconomics starting with how markets work and how consumers and firms make decisions, up to game theory and oligopoly models in your final year. As part of your macroeconomic study you will discuss the major concepts of growth, inflation, unemployment and interest rates and the relationships between these variables. You also have the opportunity to bring your interests together through econometrics, in which you study the empirical analysis of economic models.

**BSc MATHEMATICS AND ECONOMICS**

Year one modules include:
- Foundations of mathematics
- Calculus
- Linear algebra
- Introductory macroeconomics
- Introductory microeconomics
- Introductory quantitative methods in Economics and Business

Year two modules include:
- Differential equations
- Real analysis
- Intermediate macroeconomics
- Intermediate microeconomics

Year three modules include:
- Cryptography and error correcting codes
- Fluid mechanics
- Multivariate data analysis
- Behavioural economics
- Economics of banking
- Urban economics

The final year also includes either a mathematics project, economics dissertation, or Peer-Assisted Learning module.
BSc MATHEMATICS WITH FINANCE AND INVESTMENT BANKING

Prepare yourself for a career in the financial markets or investment banking studying at Henley Business School, the University of Reading’s hub of business expertise, whilst developing your knowledge of mathematics. The split between the two subjects is roughly two-thirds mathematics and one-third finance and investment banking.

From your first year you will be able to gain a real insight into the world of finance and investment banking, discussing the role the financial system plays in the economy as well as being immersed in the trading environment using the latest software in Henley Business School’s simulated dealing rooms.

You will also study core mathematics and build on your knowledge of differentiation, integration and differential equations. You will learn to write proofs, for example to establish the existence of infinitely many prime numbers, whilst discussing questions such as: do we discover or invent numbers? Studying probability and statistics will support your understanding of quantities such as risk, and the maths side of the course continues in later years with a mix of applied and pure mathematics.

Year one modules include:
- Foundations of mathematics
- Calculus
- Linear algebra
- Probability and statistics
- Introductory finance / trading simulation
- Introductory securities and markets

Year two modules include:
- Differential equations
- Vector calculus
- Probability theory
- Mathematical programming
- Financial modelling
- Portfolio management

Year three modules include:
- Dynamical systems
- Asymptotic methods
- Statistical data science and machine learning
- Derivatives securities / trading simulation
- Financial engineering
- Management of risk

The final year also includes either a mathematics project or Peer-Assisted Learning module.
BSc MATHEMATICS AND METEOROLOGY

Meteorology is a discipline that perfectly demonstrates the importance of, and application of, mathematics in a different subject area. You will spend roughly equal amounts of time studying each subject, though you will be using your mathematical knowledge in many of your meteorology modules.

In this course you will explore the physics of the Earth’s atmosphere and oceans in a mathematical context whilst learning how to build effective numerical models. Modern weather forecasting and climate prediction rely upon accurate numerical modelling of the atmosphere and oceans. This course will enable you to develop your skills in both pure and applied mathematics, whilst gaining a broad knowledge of meteorology and environmental physical science. In the first year you will extend your knowledge of differentiation and integration in calculus whilst studying topics such as global mean seasonal patterns of atmospheric variables in your meteorology modules. You will learn about the formation of cloud particles, the glacial process, and the origin of rainbows, as well as bringing together your knowledge from both disciplines to quantitatively describe the radiation field in the atmosphere.

This degree is ideal if you are considering a career applying mathematical techniques to environmental problems.

This course is also approved by the Royal Meteorological Society as appropriate academic training for meteorologists seeking the qualifications of Chartered Meteorologist (CMet).
MMath MATHEMATICS AND METEOROLOGY

This master’s-level course, an extension of BSc Mathematics and Meteorology, will enable you to develop your mathematics skills whilst gaining a broad knowledge of meteorology and environmental physical science. You will spend roughly equal amounts of time studying both subjects.

In mathematics you will study the theory and application of differential equations, underpinned with a knowledge of calculus, analysis and linear algebra. In meteorology you will explore the inner workings of weather systems from a physical and dynamic viewpoint. The course is theory-based and will cover subjects such as atmospheric physics, numerical methods, climate change, and weather and climate fundamentals.

The additional fourth year places a strong emphasis on developing independent research skills and is ideal if you are considering a career in the mathematical modelling of areas such as the atmosphere or fluid dynamic systems.

Subject to module selection and performance, you can choose to switch from the BSc Mathematics and Meteorology course to the MMath Mathematics and Meteorology course as late as the third year of study.

This course is approved by the Royal Meteorological Society as appropriate academic training for meteorologists seeking the qualifications of Chartered Meteorologist (CMet).

Year one modules include:
- Foundations of mathematics
- Calculus
- Linear algebra
- Introduction to meteorology
- Weather and climate fundamentals

Year two modules include:
- Differential equations
- Vector calculus
- Real analysis
- Atmosphere and ocean dynamics
- Atmospheric physics
- Numerical methods for environmental science

Year three modules include:
- Mathematical biology
- Fluid mechanics
- Calculus of variations
- Climate change
- The global circulation
- Numerical weather predictions
- The third year also includes either a mathematics project or Peer-Assisted Learning module.

Year four modules include:
- Asymptotic methods
- Dynamical systems
- Multivariate data analysis
- Dynamics of weather systems
- Oceanography
- Remote sensing methods and applications

Several of these optional modules overlap with those offered in the third year. If the optional module is chosen at fourth year the material covered will be of a higher level than the third year option. The final year also includes a compulsory meteorology project.
Mathematics and statistics are inextricably linked; for example in your first year you will be studying statistical distributions and to do this you need to be able to differentiate, integrate and understand limits. In the second and third years you will continue to build on your mathematical skills, with the freedom to focus on pure or applied mathematics or to continue studying both. Alongside this you will develop your understanding of probability and statistical theory, and learn how to build models to analyse increasingly complex data.

In the second year you have the opportunity to experience statistical consultancy, with an external member of industry outlining the objectives of a study and providing the associated real dataset. With your peers you will explore the data and open up a dialogue with your ‘client’ in order to identify specific research questions so you can conduct the appropriate analysis. This is a really useful exercise for students taking a placement year, particularly those considering a statistical analysis role, as well as those considering further more independent study in statistics.

The final year also includes either a mathematics or statistics project, or Peer-Assisted Learning module.
MODULE SPOTLIGHT: MATHEMATICAL BIOLOGY

In Mathematical Biology, we focus on using mathematics to understand biological systems. By their very nature biological systems are complex, meaning simple interactions within them can lead to unexpected behaviour. In this module students are provided with an introduction to a number of application areas, including ecology, the spread of infectious diseases, cellular genetics and pattern formation. Students practise analysing mathematical models in these areas and using the results to inform the system being studied. Taught by our Head of Department, this module will introduce you to the rapidly developing area of Mathematical Biology which is providing vital evidence, enabling us to plan and adapt to the current changes in our world.

I chose to take mathematical biology because I’ve always enjoyed being able to see the real world applications of maths rather than just the theory. I’d also never considered biology to be a field that relies heavily on math, so I was curious to see how it is used.

The module was challenging but also very interesting. It opened my eyes to how important maths can be, even in fields where you wouldn’t typically think that it would have much use. Marcus was a very engaging lecturer who taught the module with a good blend of maths and biology to make it understandable for people who don’t have prior biology knowledge. I would definitely recommend the module to other students. 

Elliott Sainsbury
MMath Mathematics and Meteorology

FLEXIBLE OPTIONS

Our degrees offer you variety, flexibility and choice. All of our courses contain numerous optional modules from pure and applied mathematics and statistics, so you can choose those which interest you most. Your final year will be comprised almost entirely of optional modules, which reflect the research strengths of the department.

The joint degrees also allow you to switch to the single subject BSc Mathematics degree at the end of the first year if you choose to shift your focus to studying more mathematics.

 STUDY ABROAD

Stand out from the crowd and see the world.

In an increasingly international and mobile world, studying abroad can help boost your future employability. It provides an exciting opportunity to acquire numerous transferable and desirable skills, and study specialisms additional to what’s offered at Reading. It’s also a fantastic life experience.

You have the option to apply to take our Study Abroad module, subject to meeting the eligibility criteria*, which is available across many of our courses. All courses offered by our partner universities are taught in English.

For more information on our latest partner institutions, costs and how to apply visit: www.reading.ac.uk/outgoing

* Subject to availability, see inside back cover.
Gain invaluable work experience and explore your career options by taking a placement or year of professional experience during your studies.

If you choose to apply for the opportunity to take part in a Professional Placement Year and/or Summer Placement*, our dedicated placements team can provide support and advice to enable you to find the ideal post. We will keep in regular contact with you whilst you are with your placement employer.

You will have the opportunity to take advantage of the preparation and support offered through the whole process: from help identifying industries suited to your individual career interests; having your CV and application forms reviewed; building your confidence for interviews, tests and assessment centres; and receiving feedback.

The RED Award (Reading Experience and Development Award) is a formal record of all your placements and volunteering which is included in your University transcript. This allows you to make the most of extra-curricular activities and experiences undertaken outside of your academic course and to share these with prospective employers on graduation.

The Students in Schools Scheme, particularly appealing for those with an interest in teaching, allows you to volunteer to work alongside teachers in local schools with the aim of raising the aspirations of school pupils and encouraging them to continue into Higher Education. You can also choose to take a summer placement working in a school to gain additional experience in this area.

www.reading.ac.uk/maths-and-stats/undergraduate/maths-placements.aspx

* Subject to availability, see inside back cover.
Gwen Perry took a placement with Thames Water as a data analyst.

"I’ve used a little bit of my knowledge from the statistics side of my studies (such as linear models), but the most important thing I brought from my studies was an analytical and inquisitive mind; most of the work that I’ve done has been taught on the job. The work I’ve completed has been really ‘mathsy’, but definitely business-based.

For example, one of the projects I worked on was looking into Low Pressure Incidents 2014–2018: events where areas of Thames have had difficulty with low pressure, affecting our customers. To do that project I used Excel and a statistical programme called R. I’ve carried out some simple statistics in R and produced really interactive plots that you can scale and mess around with. I’m a data analyst who does computer programming to carry out the analysis. I uploaded the report to a HTML document online which can be viewed by other members of Thames Water in the cloud.

Though I like lots of different areas in maths, statistics is by far my favourite. I hope to be a data analyst in the future, basically doing what I’m doing now at work."

Gwen Perry
BSc Mathematics with a Placement Year
Disclaimer
This brochure was issued in 2020 and is aimed at prospective undergraduate students wishing to apply for a place at the University of Reading (the University) and start a course in autumn 2021. The University makes every effort to ensure that the information provided in the brochure is accurate and up-to-date at the time of going to press (May 2020). However, it may be necessary for the University to make some changes to the information presented in the brochure following publication — for example, where it is necessary to reflect changes in practice or theory in an academic subject as a result of emerging research; or if an accrediting body requires certain course content to be added or removed. To make an informed and up-to-date decision, we recommend that you check www.reading.ac.uk/ready-to-study.

The University undertakes to take all reasonable steps to provide the services (including the courses) described in this brochure. It does not, however, guarantee the provision of such services. Should industrial action or circumstances beyond the control of the University interfere with its ability to provide the services, the University undertakes to use all reasonable steps to minimise any disruption to the services.

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Modules disclaimer
Sample modules are provided as a taster of some of the modules that may be available on each course. The sample modules listed may be compulsory (core) or optional modules. Information is correct at the time of going to press (May 2020) but the University cannot guarantee that a module appearing in this list will definitely run. Teaching staff on specific courses or modules mentioned in this brochure may be subject to change.

For optional modules, the University cannot guarantee that all optional modules will be available to students who may wish to take them, although the University will try to ensure that students are able to take optional modules in which they have expressed interest at the appropriate time during their course. Optional modules vary from year to year and entry to them will be at the discretion of the Course Director.

Joint courses disclaimer
Our joint courses may have extra requirements, including English language requirements. Please check the individual course pages on our website for further details.

Year abroad and placement fees
Some courses include an optional or compulsory year abroad or placement year. During this year you will only pay a partial fee which is currently set at 15% of the normal tuition fee. Check the website for the latest information: www.reading.ac.uk/fees-and-funding.

Placements disclaimer
Courses with a Professional Placement Year (also known as ‘Year in Industry’ or ‘Placement Year’) are fully dependent on students securing their own placement opportunity, normally through a competitive recruitment process. The University provides dedicated career and application support for placement year students. Students who do not secure a placement or who are unable to complete the placement year due to extenuating circumstances, have the option to transfer to a three year variant of their programme with agreement from their school/department.

Study abroad disclaimer
The partnerships listed are correct at the time of publication (May 2020). For up-to-date information on the University’s partnerships contact studyabroad@reading.ac.uk.

Where Study Abroad is not a compulsory part of the degree course, the University of Reading cannot guarantee that every applicant who applies for the scheme will be successful. Whilst efforts are made to secure sufficient places at partner institutions, the number of places available and the University’s partners can vary year on-year. In all cases, the University cannot guarantee that it will be possible for applicants to choose to study abroad at a particular institution. Further, certain courses and/or institutions may require you to satisfy specific eligibility criteria. It can be a competitive process. For further information on the University’s Study Abroad Scheme please contact studyabroad@reading.ac.uk.