

School of Mathematics Undergraduate Degree Programmes

Entry 2017

www.cardiff.ac.uk/mathematics

Cardiff University School of Mathematics

**WORLD
LEADING
research**

**ACADEMIC
excellence**

**HIGH
EMPLOYABILITY**

**Transferable
SKILLS**





Friendly **Supportive** environment
Modern IT Facilities

96% of our graduates
were in employment and/or further
study six months after graduating

Insider Information – Find out more...

Want to know what life at Cardiff is really like?

Our insiders are real students studying a range of subjects. You can read their blogs, post comments and message them on Facebook and Twitter.

To find out more go to: **www.cardiff.ac.uk/insiders**

Discover the **Cardiff Experience**

A leading university . . .

- ▶ You'll be part of a Russell Group university - one of the UK's world-class universities.
- ▶ You can choose from more than 350 degree programmes. The Cardiff University degree is known and respected worldwide with a substantial number accredited by the professions and other external bodies.
- ▶ You'll benefit from outstanding teaching in a research-led environment - Cardiff is ranked in the UK's top 5 universities for research quality.
- ▶ Staff include a Nobel Laureate and numerous Fellows of the Royal Society and other prestigious institutions.

in an outstanding city . . .

- ▶ You'll live in a friendly, compact and safe city with all your study, living and leisure needs within walking distance.
- ▶ Your money will go further at Cardiff with capital city attractions at provincial prices - including one of the lowest average costs of living for university cities.¹

with able and motivated students . . .

- ▶ You'll be at a first choice university where demand for places is strong.
- ▶ You'll be studying in an environment with able and motivated students who have high grades at A-level or equivalent.
- ▶ You'll be at an international university with students from more than 100 countries.

who have excellent career prospects.

- ▶ You can be confident of your future prospects - typically, 96% of our students were employed or had entered further study within six months of completing their studies.²
- ▶ You'll be in demand - Cardiff is among the top 25 universities targeted by employers seeking high calibre graduates.³

Notes

1. Moneysupermarket.com
Quality of Living Index 2015 /
Complete University Guide 2015
2. HESA Destination of Leavers
Survey 2014
3. High Fliers Research
The Graduate Market 2016



Welcome

Mathematics is an exciting, enjoyable, interesting and highly rewarding subject to study at University. Not only does it offer you intellectual challenges, introducing you to new theories, new applications, and new horizons, but it also equips you with skills that are highly valued by employers.

In addition to subject-specific knowledge, a maths degree will also equip you with analytical, writing, problem-solving, presentation, communication, team-working and computing skills that are sought after by key employers in market sectors such as science, industry, commerce, engineering and finance.

We are an internationally recognised centre of excellence for research in the mathematical sciences as shown in the Research Excellence Framework (REF) 2014. All of the research submitted to REF 2014 was rated at least 'internationally recognised' with 90% rated as either 'world leading' or 'internationally excellent'. A distinctive feature of our submission was that 100% of our research was rated as 'outstanding' or 'very considerable' for its economic and health impact in terms of its reach and significance. This means that undergraduates in the School have access to some of the best mathematicians in the country. New research and the needs of modern technology feed directly into our undergraduate teaching.

At Cardiff you will find that we have a carefully planned range of Honours Degrees which are designed to challenge and to stimulate academic curiosity and to enable you to fulfil your potential. Our courses cover traditional subject areas which provide you with the core mathematical knowledge and techniques you need to undertake advanced study, and we also offer the opportunity to study new application areas which will prepare and empower you for satisfying careers. In particular, we are one of only a few UK mathematics schools teaching Operational Research at undergraduate level. We have also introduced a new programme in Financial Mathematics.

The School offers one of the strongest professional development programmes for mathematics undergraduates in the

UK in which undergraduate students at the end of their second academic year can opt to take a 12-month period of training in a mathematics environment in industry, commerce or government. These programmes play a significant role in bringing high quality undergraduates to Cardiff and preparing our graduates for fulfilling careers. There are also opportunities to spend a year studying abroad.

There is a high demand for places studying maths at Cardiff. Students are attracted by our reputation for excellent teaching quality standards, the friendly atmosphere that pervades the School, and the care and support students receive from the staff. We strive to ensure that our students react enthusiastically to their courses and thoroughly enjoy their learning experience.

I hope you decide to study at the School of Mathematics and become part of a thriving mathematical community where you can enjoy excellent facilities, tuition of the highest quality, and a friendly supportive environment.



Professor Tim Phillips
Head of School

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This brochure will provide you with more details of our programmes. We hope that they will give you more than just a flavour of what we have to offer you. However, we are always ready to answer any questions you may have, by post, telephone or email, or when you come to Cardiff for a visit. You will find the appropriate contacts at the end of this brochure.

Important Legal Information

The contents of this brochure relate to the Entry 2017 admissions cycle and are correct at the time of going to press in August 2016. However, there is a lengthy period of time between printing this brochure and applications being made to, and processed by us, so please check our website [www.cardiff.ac.uk] before making an application in case there are any changes to the course you are interested in or to other facilities and services described here. Where there is a difference between the contents of this brochure and our website, the contents of the website take precedence and represent the basis on which we intend to deliver our services to you.

Any offer of a place to study at Cardiff University is subject to terms and conditions, which can be found on our website [www.cardiff.ac.uk/offerterms] and which you are advised to read before making an application. The terms and conditions set out, for example, when we might make changes to your chosen course or to student regulations. It is therefore important you read them, and understand them.

If you are not able to access information online please contact us:

Email: enquiry@cardiff.ac.uk

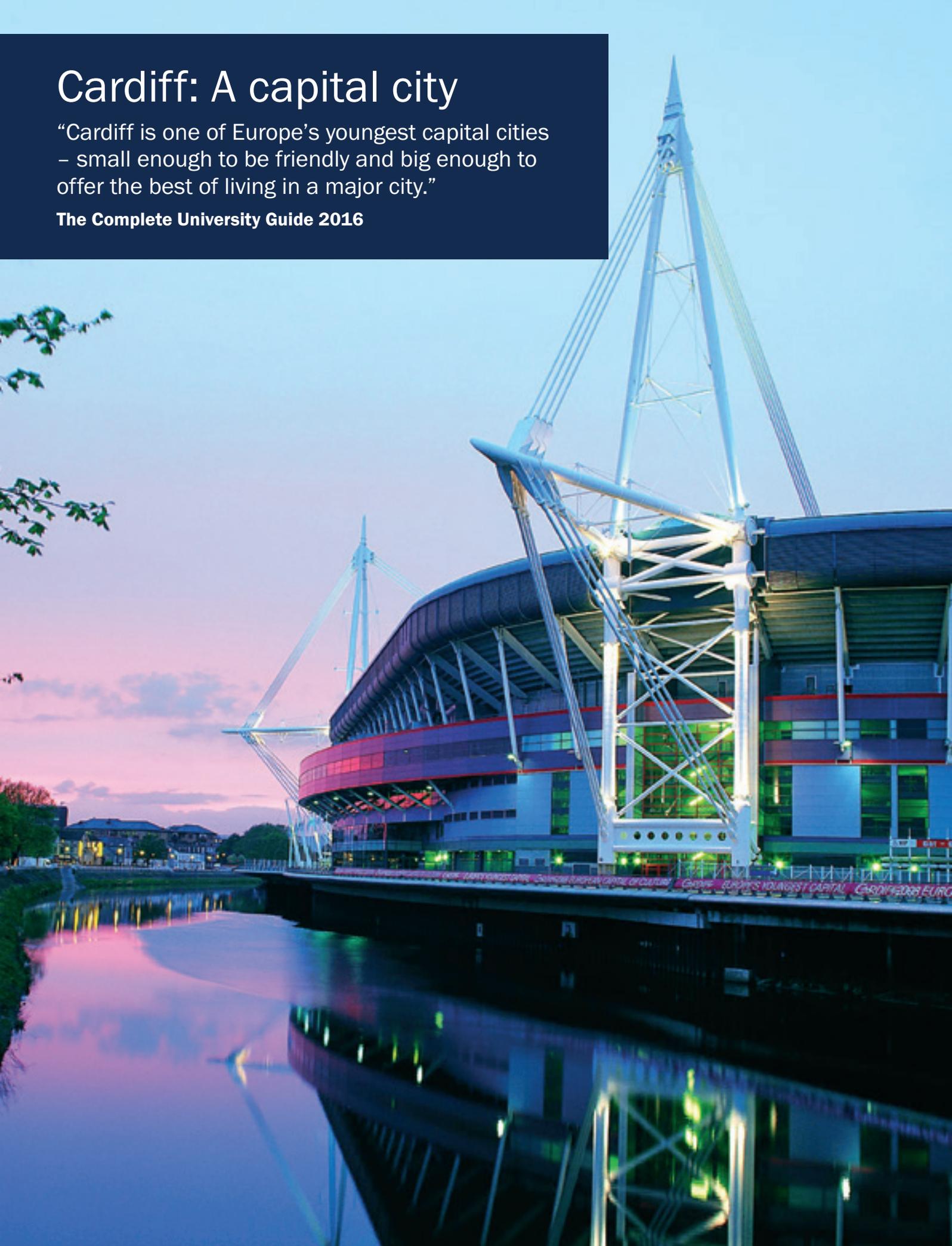
Tel: 029 2087 4455

Your degree: Students admitted to Cardiff University study for a Cardiff University degree.

Cardiff: A capital city

“Cardiff is one of Europe’s youngest capital cities – small enough to be friendly and big enough to offer the best of living in a major city.”

The Complete University Guide 2016



The Principality (Millennium) Stadium nestles in the heart of the city, and is home to numerous sporting events and concerts throughout the year

Cardiff is a thriving and attractive city, which is widely recognised as an outstanding place in which to live and study. It combines all the advantages of a compact, friendly and inexpensive location, with the cultural and recreational facilities of a modern capital city.

Cardiff offers everything from the excitement of the city to the peace and tranquillity of the nearby coast and countryside. With its distinctive character, good quality of life, and growing national and international reputation, it hosts many high-profile cultural and sporting events, including international rugby, soccer, cricket and motor sport.

When it comes to entertainment, Cardiff is well-equipped to satisfy student needs. There is a multitude of cafés, pubs and nightclubs. The city is home to the world-renowned Welsh National Opera, it boasts prestigious concert venues such as the Wales Millennium Centre, St David's Hall and the Motorpoint Arena, as well as the iconic Principality (Millennium) Stadium, the National Museum Wales, several theatres and the historic Cardiff Castle.

Cardiff is the location for award-winning television productions, including Doctor Who, Sherlock, Torchwood and Casualty, and the Doctor Who Experience in Cardiff Bay is a popular attraction.

The city is one of the UK's best shopping destinations, with St David's Dewi Sant retail centre standing alongside pedestrianised shopping streets, indoor and outdoor markets, and a fascinating network of glass-canopied Victorian and Edwardian arcades.

Cardiff also has more urban green space than any other UK city, and offers easy access to the countryside, coast and mountains.

Lively, elegant, confident, cosmopolitan and ambitious are all words readily used to describe modern-day Cardiff. Together, the city and the University provide students with the 'Cardiff Experience', a lifestyle our students remember long after graduation.

Don't just take our word for it . . .

"Cardiff is a popular student city, relatively inexpensive and with a good range of nightlife and cultural venues"

The Times/Sunday Times Good University Guide 2015



The surrounding countryside and coast offer superb opportunities for outdoor pursuits



Cardiff is one of the UK's best shopping destinations

Come and see for yourself . . .

Cardiff benefits from excellent road and rail links with Britain's other major towns and cities. London, for example, is two hours by train, and the M4 links both the West and South of England, as well as West Wales. Travel to the Midlands and to the North is equally convenient. The journey by road from Birmingham, for example, takes only two hours. The main coach and railway stations are both centrally placed, and Cardiff also benefits from an international airport.



"Cardiff seems to have it all: grand civic architecture in a breezy waterside location, super-smart city bars and venues just a short hop from lovely countryside."

Guardian University Guide 2016

The Wales Millennium Centre is a world-class venue for the arts

Cardiff: A leading university

“Cardiff University is one of Britain’s leading teaching and research universities.”





Cardiff University has an international reputation for excellence in teaching and research, built on a history of service and achievement since 1883, and recognised by our membership of the Russell Group of leading research-led universities.

With attractive and compact campuses, excellent student accommodation, and a hugely popular Students' Union, all within easy walking distance of each other in a thriving city, it is not surprising that Cardiff is a university of first choice among well-prepared applicants.

We admit approximately 5,000 undergraduate entrants each year, the majority of whom are school and college leavers, and have high grades at A-level or equivalent. While competition for entry is strong, Cardiff is an inclusive university with a good record on widening participation and fair access, and we welcome applications, irrespective of background, from everyone with the potential to succeed at Cardiff University.

The University's Cathays Park Campus is located in and around the impressive Portland stone buildings, parks and wide tree-lined avenues that form Cardiff's attractive civic centre. The majority of academic schools are located here - just a few minutes' walk from the city centre. The three academic schools

offering healthcare courses (excluding Optometry and Pharmacy) are based at the Heath Park Campus, approximately one mile away, which is also home to the University Hospital of Wales.

Although dating from 1883, Cardiff is focused on the 21st century, and has modern state-of-the-art buildings and facilities. The University has invested substantially in its estate in recent years and continues to do so today. Most academic schools have benefited from major refurbishment, including new and well-equipped laboratories, lecture theatres, libraries and computing facilities.

International opportunities are available via our Global Opportunity Centre. These include study, work and volunteering placements in 27 EU countries as well as international exchange opportunities. All students also have the opportunity to study a language, in addition to their degree, through the University's Languages For All programme.

The University takes its environmental, safety and security responsibilities very seriously. It has comprehensive policies in place which are making great savings in energy consumption and, to support the safety and security of all members of the University community and their property, there is 24-hour security cover throughout the campus.

What the Guides say ...

"The University is as confident and forward-looking as the city it's located in, and has an excellent reputation for the quality of its teaching and research."

Guardian University Guide 2016

"Cardiff is the perennial choice as the Sunday Times best Welsh University. It is the Principality's only member of the Russell Group of research-led universities and its sole representative in the top 200 of the world rankings."

The Times/Sunday Times Good University Guide 2015-2016



Living in Cardiff

As a fast developing capital city, Cardiff is a great place to be a student. It's large enough to offer you an exciting variety of activities and entertainment, but small enough for you to feel comfortable in.





Accommodation

Cardiff offers guaranteed University accommodation, good quality and value, and a range of residences to suit individual preferences and budgets.

All undergraduates who accept their offer of a place from Cardiff, on a firm basis, are guaranteed a single occupancy place in University residences during their first year of study.

Please see our website for full details of our accommodation guarantee and associated deadlines:

www.cardiff.ac.uk/residences

The University is continually investing in its student residences, and the views of students are taken into account at the design stage. Unusually for a civic university, most of our residences are within easy walking distance of lecture theatres, libraries, laboratories, the Students' Union and city centre.

There are 15 different residences, providing more than 5,500 study

bedrooms and students can apply for the residences which best suit their preferences, interests and budgets. Some 70% have en-suite shower and toilet facilities and all halls of residence have computer network connection points and access to Wi-Fi.

Fees depend on the facilities included and whether catered, part-catered or self-catered, but prices compare very favourably with those of other UK universities. Besides managing University property, the Residences Office maintains close links with the private sector and provides assistance to students seeking to rent or share houses or flats.

Student Life

The Students' Union

Cardiff Students' Union is one of the biggest, best and most active in Britain. A multi-million pound investment has been made in Union facilities in recent years, which has included a new venue called Y Plas, which at night becomes a nightclub.

Hosting live music, club nights, stand-up comedy, fashion shows and awards ceremonies, there's lots to keep you entertained from your first day to your last.

Other facilities include a new food court, a bank, a print shop, a hair salon and a bookshop. The Lounge offers IT and Skyping facilities, meeting rooms and a "chillout" area, as well as snooker tables and multi-faith prayer room. The Union also has its own letting agency and an Advice and Representation centre. In addition, it is home to CU TV and Xpress Radio (the students' own TV and radio stations) and more than 200 cultural, political, religious, social, sporting societies and clubs.

Jobshop

Jobshop is the Union's own student employment service and provides casual, clerical and catering jobs around the University to hundreds of students.



What the Guides say . . .

Cardiff is ranked 3rd amongst the UK's top cities for quality of life. Research by moneysupermarket examined factors such as cost of living, average disposable income and life satisfaction in the UK's twelve biggest cities.

Moneysupermarket.com – Quality of Living Index 2015

"The cost of living for a student in Cardiff is generally lower than elsewhere in the UK."

The Independent A-Z University Guide 2015

"Cardiff has one of the biggest, best and most active students' unions in the UK and is currently benefiting from a multi-million investment."

The Complete University Guide 2016

Our School



We are proud of our reputation as a small, friendly and inclusive School with a strong student community and good relationships with staff.

Our School is situated on the Cathays Park Campus (see the map on page 33) in the centre of Cardiff. The building houses lecture theatres, computer suites, a library and a cybercafé. Access to the library and computer facilities is available throughout the day and early evening during term times.



Teaching, Learning and Assessment

The year is divided into two semesters, the first running from early October to January (Autumn semester) and the second from February until June (Spring semester). Each semester, you will normally study six modules.

In a typical week, you will normally attend 12 hours of lectures, where new material is presented to you. There are an additional three hours of examples classes, where understanding is reinforced by working through example questions. In the first year you will also attend three small group tutorials where you have the chance to work in small groups and ask individual questions.

Assessment is mostly by examination, although formative (informal) assessment is used to provide constant feedback to students of their progress. Examinations take place at the end of each semester. The comments and feedback you receive from the formative assessment will help you to maximise your performance in the examinations.

Student Support

At the start of your course you will be allocated a Personal Tutor. Your Personal Tutor is a member of academic staff within the School. If you apply for a Joint Honours programme you will receive a Personal Tutor in both Schools. Your tutor is able to offer advice, in confidence, on both academic and non-academic matters. You will normally retain the same tutor throughout your degree. However if, for whatever reason, you request a new Personal Tutor then an alternate would be offered without question.

The Student Staff Panel consists of elected School students and members of School staff who usually meet twice each

semester to discuss academic issues. We encourage students to speak with the elected Student Panel members to bring matters to the School's attention. Student representatives sit on the School's Board of Studies, influencing the direction of future degree programme developments.

The Maths Support Service

We offer a drop-in service where students with any mathematical question can get help either one-to-one or in a small group. The service is available to all Cardiff University students. It is used by Mathematics students and students from other disciplines with mathematical queries.

Computing Facilities

The School has two undergraduate computing labs containing the latest mathematical software on networked stations. A separate project lab is available for year three students enrolled on a Project module. Additional computing facilities are available in both Senghennydd Library, which is based within the School and also provides information services for the School, and the building's Cybercafé.

We deliver a range of materials and learning resources via Learning Central, an internet based e-learning system which can be accessed by students anywhere, anytime. Wi-Fi is available throughout the whole School.

Degree Programmes

The School of Mathematics offers a variety of undergraduate degree programmes, many of which are available with the opportunity to take a year of paid professional placement in industry, or to spend a year abroad at an overseas university.

Our courses cover a wide range of topics designed to be stimulating and flexible, allowing you to make choices that suit your mathematical interests as you develop your mathematical skills.

You will take 12 modules each year, usually six in each semester. There is a choice of modules in each year, especially in the final year. The modules studied in the first year of the Single Honours courses are mostly common, so transfer between programmes is possible up to the start of the second

year. It is also normally possible to transfer from Joint Honours to Single Honours programmes, although because some second and final year modules are dependent on first year ones there may be limitations on the module choices available.

It is possible to spend a year overseas at one of our partner universities on each of our Single Honours degree programmes – please see page 29 for further information.

The majority of our Single Honours degrees also come with the option of

taking a year of professional placement between Years Two and Three. These are usually salaried positions. The School will support you in finding a suitable placement – please see page 28 for full details.

A mathematics degree at Cardiff provides a good foundation for further study after graduation or for a career in many industries. The problem solving and logical reasoning skills that are learned in these degrees are sought after by many employers.

Title	UCAS code	Duration	Summary
BSc Mathematics	G100	3 years	Allows you to choose from a wide range of mathematical topics, with a core of pure mathematics.
BSc Mathematics with Year Abroad	G103	4 years	Can also be taken with a Year Abroad.
BSc Financial Mathematics	GN13	3 years	Specially designed to prepare you with the mathematical and financial skills to work in the finance and investment industries.
BSc Financial Mathematics with Professional Placement	GN14	4 years	Can also be taken with a year Professional Placement.
BSc Financial Mathematics with Year Abroad	GN15	4 years	Can also be taken with a Year Abroad.
MMath Mathematics	G101	4 years	You will delve more deeply into areas of pure and applied mathematics.
MMath Mathematics with Year Abroad	G104	5 years	Can also be taken with a Year Abroad.
BSc Mathematics and its Applications	G120	3 years	You may choose topics in mathematics that are applied to solve problems in science, business and commerce.
BSc Mathematics and its Applications with Professional Placement	G111	4 years	Can also be taken with a year Professional Placement.
BSc Mathematics and its Applications with Year Abroad	G900	4 years	Can also be taken with a Year Abroad.
BSc Mathematics, Operational Research and Statistics	G991	3 years	For those with an interest in operational research and statistics subjects that are applied to the solution of problems in areas such as medical and pharmaceutical research, planning and management.
BSc Mathematics, Operational Research and Statistics with Professional Placement	G990	4 years	Can also be taken with a year Professional Placement.
BSc Mathematics, Operational Research and Statistics with Year Abroad	GG23	4 years	Can also be taken with a Year Abroad.
BSc Music and Mathematics	GW13	3 years	A study of musical theory and performance is combined with pure mathematics and either further pure mathematics, applied mathematics or statistics.
BSc Music and Mathematics with Year Abroad	GW31	4 years	Can also be taken with a Year Abroad.
BSc Mathematics with Computer Science Options	G111	3 years	Essentially the same as our general BSc Mathematics degree but with the option of learning Java programming in year one and more computing modules in later years.
BSc Physics and Mathematics	FG31	3 years	You will combine a study of pure and applied mathematics with theoretical and experimental physics.

Mathematics BSc

- ▶ UCAS Code G100 (Three-year course)
- ▶ UCAS Code G103 (Four-year course including a Year Abroad)



The BSc Mathematics at Cardiff is flexible, allowing you to specialise as you progress through the course or to maintain a broad range of modules from the major branches of mathematics.

This course has an essential core of pure mathematics linked with modules from applied mathematics, statistics, computing and operational research and you will sample all of these branches in your first year.

There is the option of taking a year studying at a university abroad between your second and third years. This would extend the BSc degree to four years – see page 29 for full details.

Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in years one and two will inform the choices available to you later.

Year One

Most of the first year modules are compulsory, but you can choose to study one other mathematics module or one from another subject.

Year Two

There is a greater choice of optional modules in year two including pure and applied mathematics, statistics and operational research. The modules you select will inform the choices available to you in the final year.

Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

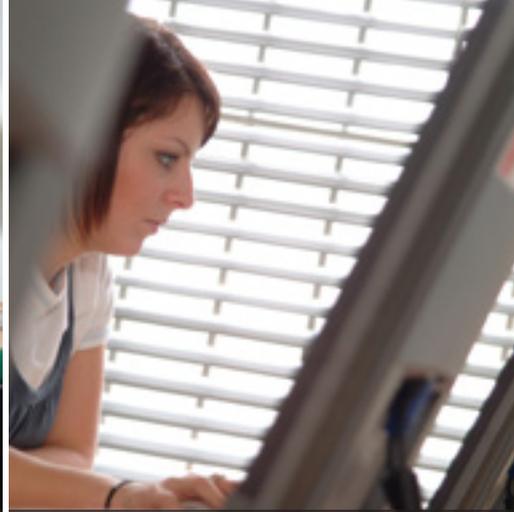
Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1003	Computing for Mathematics	AS	20	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1004	Geometry	A	10	■
MA1500	Introduction to Probability Theory	A	10	■
MA1300	Mechanics I	S	10	●
MA1501	Statistical Inference	S	10	●
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	●

Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2006	Real Analysis	A	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0212	Linear Algebra	S	10	■
MA0216	Elementary Number Theory II	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA0235	Elementary Fluid Dynamics	S	10	●
MA0261	Operational Research	S	20	●
MA0276	Visual Basic Programming For OR	S	10	●
MA2300	Mechanics II	A	10	●
MA2301	Vector Calculus	S	10	●
MA0291	Accountancy	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2500	Foundations of Probability and Statistics	A	20	●
CM2203	Informatics	S	10	●
MA2501	Programming and Statistics	A	10	●
MA0213	Groups	A	10	●
CM2207	Introduction to the Theory of Computation	S	10	●
MA2701	Numerical Analysis	A	10	●
MA2900	Problem Solving	A	10	●



A Mathematics lecture underway



A student using our computer facilities



Students at an Open Day

Final Year (Year Three for G100 or Year Four for G103)

The modules available in your final year are closely aligned to the research interests of the School. There are no compulsory modules and your options are wide-ranging. As well as taught modules you may choose a 10-credit or 20-credit project, giving you the opportunity to develop communication and presentational skills and to learn how to apply your mathematical skills to an investigation of your choice.



Ben Craft

Ben graduated from Cardiff with a first class honours degree in Mathematics and its Applications. During his degree he spent an industrial training year at the Higher Education Funding Council for Wales. He is now working for Smartodds, a company providing statistical research and football modelling services in the betting sector.

Year Three Modules				
Module code	Module title	Semester	Credits	
MA0332	Fluid Dynamics	S	10	●
MA0391	Project	AS	20	●
MA0392	Project (Half)	A	10	●
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3003	Groups, Rings, and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods For Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3005	Introduction to Functional and Fourier Analysis	S	20	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3900	Cyflwyniad i addysgu Mathemateg mewn ysgol uwchradd	A	20	●
MA3505	Multivariate Statistics	A	10	●
MA3504	Official Statistics	A	10	●
MA3602	Algorithms and Heuristics	S	10	●
MA3901	Introduction to secondary school Mathematics teaching	A	20	●
CM3201	Project and Change Management	S	20	●
CM3111	Forensics	A	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●
MA3902	Communication and Research Skills	A	10	●

Financial Mathematics BSc

- ▶ UCAS Code GN13 (Three-year course)
- ▶ UCAS Code GN14 (Four-year course including a Professional Placement)
- ▶ UCAS Code GN15 (Four-year course including a Year Abroad)

This degree aims to provide you with fundamental mathematical and statistical knowledge, whilst also developing important transferable skills and an understanding of modern finance studies regarding financial markets, institutions, investments and policies.

All graduates will gain a solid foundation of utilising theories and tools in mathematics, statistics and finance to focus on issues and topics relevant to the computational and market design side of contemporary finance.

The degree will focus on topics including:

- complex systems
- trading (in particular high frequency trading)
- fund management
- analytics

The BSc Financial Mathematics also offers a good grounding in general mathematical theory and techniques.

There is the option of taking a year studying at a university abroad or a year working in industry in the UK or Europe between your second and third years. This would extend the BSc degree to four years – see pages 28-29 for details.

Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in year two will inform the choices available to you in year three.

Year One

All of our courses have a core of pure mathematics in Year One but you will also take modules in financial mathematics, statistics, computing and operational research. The finance modules will introduce you to techniques and tools of corporate financial management at firm level.



Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1003	Computing for Mathematics	AS	20	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1500	Introduction to Probability Theory	A	10	■
MA1501	Statistical Inference	S	10	■
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	■
MA1800	Economics for Financial Mathematics	A	10	■

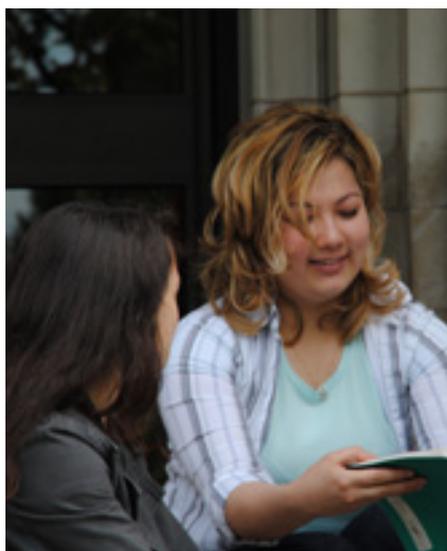
Year Two

There is a choice of optional modules in year two and the modules you select will inform the choices available to you in year three. Alongside specialist financial mathematics modules you will continue to broaden your knowledge of areas such as statistics and operational research.

Final Year (Year Three for GN13 or Year Four for GN14 and GN15)

The modules available in your final year are closely aligned to the research interests of the School. There are no compulsory modules and your options are wide-ranging. As well as taught modules you may choose a 10-credit or 20-credit project, giving you the opportunity to develop communication and presentational skills and to learn how to apply your mathematical skills to an investigation of your choice.

Year Two Modules				
Module code	Module title	Semester	Credits	
MA2800	Finance II: Investment Management	S	10	■
MA2004	Series and Transforms	S	10	■
MA2801	Econometrics for Financial Mathematics	S	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0261	Operational Research	S	20	■
MA2500	Foundations of Probability and Statistics	A	20	■
MA2501	Programming and Statistics	A	10	■
MA0212	Linear Algebra	S	10	●
MA2003	Complex Analysis	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA2006	Real Analysis	A	10	●
MA0276	Visual Basic Programming for OR	S	10	●
MA2301	Vector Calculus	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2701	Numerical Analysis	A	10	●



Year Three Modules				
Module code	Module title	Semester	Credits	
MA0391	Project	AS	20	●
MA0392	Project (Half)	A	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3700	Mathematical Methods For Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3505	Multivariate Statistics	A	10	●
MA3504	Official Statistics	A	10	●
MA3602	Algorithms and Heuristics	S	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3800	Behavioural Finance	A	10	●
MA3801	Market Microstructure and Trading Theory	A	10	●
MA3802	Continuous Financial Modelling and Stochastic Calculus for PDEs	S	10	●
MA3803	Financial Mathematics and Modern Actuarial Risk Theory	S	10	●
MA3804	Trading, Market design and Applications	S	10	●

Mathematics MMath

- ▶ UCAS Code G101 (Four-year course)
- ▶ UCAS Code G104 (Five-year course including a Year Abroad)

The four-year MMath Mathematics course offers you the opportunity to delve more deeply into pure and applied mathematics than is possible on a BSc course.

The MMath course is an ideal preparation if you want to go on to work in research or for a technological company or simply want to gain a deeper understanding of mathematics and develop skills in demand by a range of would-be employers.

This course has an essential core of pure mathematics linked with modules from applied mathematics, statistics, computing and operational research and you will sample all of these branches in your first year.

There is the option of taking a year studying at a university abroad between your second and third years. This would extend the MMath degree to five years – see page 29 for full details.

Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Most modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in years one, two and three will inform the choices available to you later.

Year One

Most of the first year modules are compulsory, but you can choose to study up to 10 credits in another subject.

Year Two

There is a greater choice of optional modules in year two. The modules you select will inform the choices available to you later.

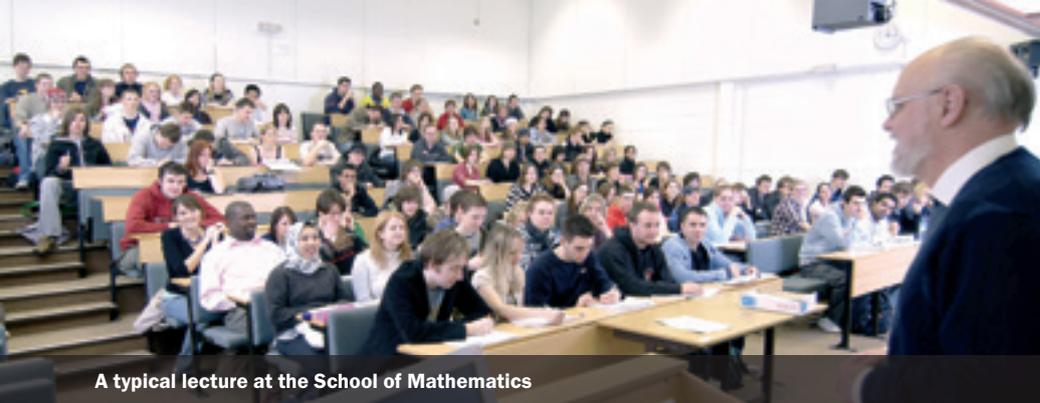
Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1003	Computing for Mathematics	AS	20	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1004	Geometry	A	10	■
MA1500	Introduction to Probability Theory	A	10	■
MA1300	Mechanics I	S	10	●
MA1501	Statistical Inference	S	10	●
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	●

Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2006	Real Analysis	A	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0212	Linear Algebra	S	10	■
MA0216	Elementary Number Theory II	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA0235	Elementary Fluid Dynamics	S	10	●
MA0261	Operational Research	S	20	●
MA2300	Mechanics II	A	10	●
MA2301	Vector Calculus	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2500	Foundations of Probability and Statistics	A	20	●
MA0213	Groups	A	10	●
MA2701	Numerical Analysis	A	10	●



A typical lecture at the School of Mathematics



Cardiff University Maths Support Service

Year Three

The modules available in year three are closely aligned to the research interests of the School. In year three you will take a selection of advanced modules, allowing you to focus on topics of particular interest.

Final Year (Year Four for G101 or Year Five for G104)

The final year develops research training and enhanced mathematical skills, especially in mathematical analysis, mathematical physics and fluid dynamics. There is also a major piece of project work, in which you will undertake novel research.

This gives you the opportunity to develop presentation and communication skills, in addition to applying your mathematical skills to a research topic of your choice.

Year Three Modules				
Module code	Module title	Semester	Credits	
MA0332	Fluid Dynamics	S	10	●
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3003	Groups, Rings, and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3005	Introduction to Functional and Fourier Analysis	S	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3505	Multivariate Statistics	A	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●



Year Four Modules				
Module code	Module title	Semester	Credits	
MA4900	MMath Project	AS	40	■
MA4007	Measure Theory	A	20	●
MA4009	Mathematical Principles of Image Processing	S	20	●
MA4901	Reading Module	A	20	●
MA4012	Finite Elasticity	S	20	●
MA4011	Combinatorial and Analytic Number Theory	S	20	●
MA4000	Operator Algebras & Non Commutative Geometry	A	20	●
MA4003	Theoretical Fluid Dynamics	A	20	●
MA4015	Advanced topics in Analysis: Sobolev spaces and viscosity solutions	S	20	●
MA4014	Mathematical Foundations of Quantum Physics	A	20	●

Mathematics and its Applications BSc

- ▶ UCAS Code G120 (Three-year course)
- ▶ UCAS Code G111 (Four-year course including a Professional Placement)
- ▶ UCAS Code G900 (Four-year course including a Year Abroad)

Mathematics is the language of science, technology and engineering, and its various branches are used throughout commerce and the business world. The BSc Mathematics and its Applications offers you the skills and tools used extensively in these fields.

This course provides a good grounding in general mathematical techniques as a foundation for understanding more specialised branches such as computing, numerical analysis, applied probability, statistics, operational research and applied mathematics.

There is the option of taking a year studying at a university abroad or a year working in industry in the UK or Europe between your second and third years. This would extend the BSc degree to four years – see pages 28-29 for details.

Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in years one and two will inform the choices available to you later.

Year One

Most of the first year modules are compulsory, but you can choose to study one other mathematics module or one from another subject.

Year Two

There is a greater choice of optional modules in year two, including pure and applied mathematics, statistics and operational research. The modules you select will inform the choices available to you in year three.

Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1003	Computing for Mathematics	AS	20	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1004	Geometry	A	10	■
MA1500	Introduction to Probability Theory	A	10	■
MA1300	Mechanics I	S	10	●
MA1501	Statistical Inference	S	10	●
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	●

Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0232	Modelling with Differential Equations	A	10	■
MA2301	Vector Calculus	S	10	■
MA2006	Real Analysis	A	10	●
MA0212	Linear Algebra	S	10	●
MA0216	Elementary Number Theory II	S	10	●
MA0235	Elementary Fluid Dynamics	S	10	●
MA0261	Operational Research	S	20	●
MA0276	Visual Basic Programming For OR	S	10	●
MA2300	Mechanics II	A	10	●
MA0291	Accountancy	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2500	Foundations of Probability and Statistics	A	20	●
CM2203	Informatics	S	10	●
MA2501	Programming and Statistics	A	10	●
MA0213	Groups	A	10	●
CM2207	Introduction to the Theory of Computation	S	10	●
MA2701	Numerical Analysis	A	10	●
MA2900	Problem Solving	A	10	●
CM2303	Algorithms and Data Structures	AS	20	●

Final Year (Year Three for G120 or Year Four for G111 and G900)

The modules available in your final year are closely aligned to the research interests of the School. There are no compulsory modules and your options are wide-ranging. As well as taught modules, you may choose a 10-credit or 20-credit project, giving you the opportunity to develop communication and presentational skills and to learn how to apply your mathematical skills to an investigation of your choice.



Ketan

Ketan graduated from Cardiff University with a first class honours degree in Mathematics and its Applications. He started work for the Ministry of Defence as an Operational Research Analyst primarily working for front line support. Having spent a year with the MOD he decided that he wanted to experience a more business-oriented role and accepted a job as an analyst with Royal Bank of Scotland Insurance.

Year Three Modules				
Module code	Module title	Semester	Credits	
MA0332	Fluid Dynamics	S	10	●
MA0391	Project	AS	20	●
MA0392	Project (Half)	A	10	●
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3003	Groups, Rings, and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods For Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3005	Introduction to Functional and Fourier Analysis	S	20	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3900	Cyflwyniad i addysgu Mathemateg mewn ysgol uwchradd	A	20	●
MA3505	Multivariate Statistics	A	10	●
MA3504	Official Statistics	A	10	●
MA3602	Algorithms and Heuristics	S	10	●
MA3901	Introduction to secondary school Mathematics teaching	A	20	●
CM3201	Project and Change Management	S	20	●
CM3111	Forensics	A	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●
MA3902	Communication and Research Skills	A	10	●



Mathematics, Operational Research and Statistics BSc

- ▶ UCAS Code G991 (Three-year course)
- ▶ UCAS Code G990 (Four-year course including a Professional Placement)
- ▶ UCAS Code GG23 (Four-year course including a Year Abroad)

To many people statistics means numbers – collecting them and organising them. The field of modern statistics involves much more. It is the source of techniques developed to help managers and researchers to draw reliable conclusions from observations that contain variation.

Operational research techniques, sometimes called management science, provide quantitative decision-making methods complementary to statistical analysis, such as the control of queues and of stock, and quality control.

The BSc in Mathematics, Operational Research and Statistics also offers a good grounding in general mathematical theory and techniques.

There is the option of taking a year studying at a university abroad or a year working in industry in the UK or Europe between your second and third years. This would extend the BSc degree to four years – see pages 28-29 for details.

Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in years one and two will inform the choices available to you later.

Year One

Most of the first year modules are compulsory, but you can choose to study one other mathematics module or one from another subject.

Year Two

There is a greater choice of optional modules in year two and the modules you select will inform the choices available to you in year three.

Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1003	Computing for Mathematics	AS	20	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1004	Geometry	A	10	■
MA1500	Introduction to Probability Theory	A	10	■
MA1501	Statistical Inference	S	10	■
MA1300	Mechanics I	S	10	●
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	●

Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0261	Operational Research	S	20	■
MA2500	Foundations of Probability and Statistics	A	20	■
MA2006	Real Analysis	A	10	●
MA0212	Linear Algebra	S	10	●
MA0216	Elementary Number Theory II	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA0276	Visual Basic Programming For OR	S	10	●
MA0291	Accountancy	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2501	Programming and Statistics	A	10	●
MA0213	Groups	A	10	●
MA2701	Numerical Analysis	A	10	●
MA2900	Problem Solving	A	10	●
MA2501	Programming and Statistics	A	10	●
MA0213	Groups	A	10	●
CM2207	Introduction to the Theory of Computation	S	10	●
MA2701	Numerical Analysis	A	10	●
MA2900	Problem Solving	A	10	●



Maths lecturer and student



There is a good staff-student relationship within the School



There will often be someone you know in and around the campus

Final Year (Year Three for G991 or Year Four for G990 and GG23)

The modules available in your final year are closely aligned to the research interests of the School. There are no compulsory modules and your options are wide-ranging. As well as taught modules you may choose a 10-credit or 20-credit project, giving you the opportunity to develop communication and presentational skills and to learn how to apply your mathematical skills to an investigation of your choice.



Krupa

Krupa studied for the BSc Mathematics, Operational Research and Statistics degree course and spent her placement year working with GlaxoSmithKline, a large pharmaceutical company, based at their site in Greenford, Middlesex.

After graduation Krupa decided that she would embark on a career in the financial industry. She is now working as a trainee accountant for a large firm of chartered accountants who are sponsoring her while she studies for her professional qualifications.

Year Three Modules				
Module code	Module title	Semester	Credits	
MA0391	Project	AS	20	●
MA0392	Project (Half)	A	10	●
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3003	Groups, Rings, and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods For Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3900	Cyflwyniad i addysgu Mathemateg mewn ysgol uwchradd	A	20	●
MA3505	Multivariate Statistics	A	10	●
MA3504	Official Statistics	A	10	●
MA3602	Algorithms and Heuristics	S	10	●
MA3901	Introduction to secondary school Mathematics teaching	A	20	●
CM3201	Project and Change Management	S	20	●
CM3111	Forensics	A	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●
MA3902	Communication and Research Skills	A	10	●
MA3009	Differential Geometry	A	10	●
MA3902	Communication and Research Skills	A	10	●

Mathematics with Computer Science Options BSc

► UCAS Code G111

The BSc in Mathematics with Computer Science Options is for you if you are keen to study some additional computing modules as part of a mathematics degree.

The course is essentially the same as our general BSc Mathematics degree but with the option of learning Java programming in year one and more computing modules in later years.

The course has an essential core of pure mathematics linked with a wide range of modules from applied mathematics, statistics and computing and you will study a range of these branches in your first year. Much of year one is common to our courses, so if you wish to change to another course within the School this may be possible.

The course includes a carefully chosen balance of core modules and optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year. The modules you choose in year two will inform the choices available to you later.

Year One

Most of the first year modules are compulsory, but you can choose to study one other mathematics module or one from another subject. Java programming is among the core modules.

Year Two

There is a greater choice of optional modules in year two. The modules you select will inform the choices available to you in year three.

Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

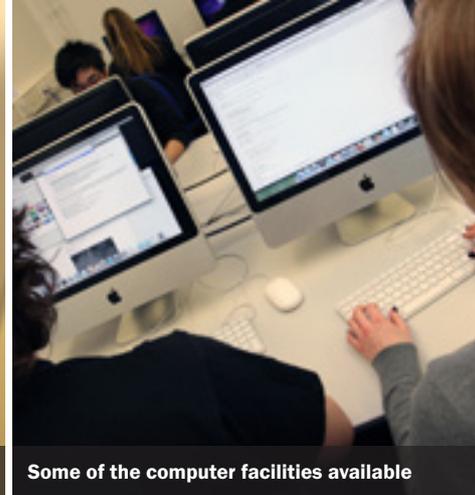
Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■
MA1004	Geometry	A	10	■
MA1500	Introduction to Probability Theory	A	10	■
CM1209	Object Oriented Java Programming	S	10	■
MA1300	Mechanics I	S	10	●
MA1501	Statistical Inference	S	10	●
MA1003	Computing for Mathematics	AS	20	●
MA1801	Finance I: Financial Markets and Corporate Financial Management	S	10	●

Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2006	Real Analysis	A	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA0212	Linear Algebra	S	10	■
MA0216	Elementary Number Theory II	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA0235	Elementary Fluid Dynamics	S	10	●
MA0261	Operational Research	S	20	●
MA0276	Visual Basic Programming for OR	S	10	●
MA2300	Mechanics II	A	10	●
MA2301	Vector Calculus	S	10	●
MA0291	Accountancy	S	10	●
MA2005	Ordinary Differential Equations	S	10	●
MA2500	Foundations of Probability and Statistics	A	20	●
CM2203	Informatics	S	10	●
MA2501	Programming and Statistics	A	10	●
MA0213	Groups	A	10	●
CM2207	Introduction to the Theory of Computation	S	10	●
MA2701	Numerical Analysis	A	10	●
MA2900	Problem Solving	A	10	●
CM2303	Algorithms and Data Structures	AS	20	●



Student with an iPad



Some of the computer facilities available

Year Three

The modules available in year three are closely aligned to the research interests of the School. There are no compulsory modules and your options are wide-ranging, including a number from the School of Computer Science and Informatics. You may choose a 10-credit or 20-credit project instead of one of the taught modules, giving you the opportunity to develop communication and presentational skills and to learn how to apply your mathematical skills to an investigation of your choice.



Year Three Modules				
Module code	Module title	Semester	Credits	
MA0332	Fluid Dynamics	S	10	●
MA0391	Project	AS	20	●
MA0392	Project (Half)	A	10	●
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis & Forecasting	S	10	●
MA3003	Groups, Rings, and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods For Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3005	Introduction to Functional and Fourier Analysis	S	20	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes For Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3900	Cyflwyniad i addysgu Mathemateg mewn ysgol uwchradd	A	20	●
MA3505	Multivariate Statistics	A	10	●
MA3504	Official Statistics	A	10	●
MA3602	Algorithms and Heuristics	S	10	●
MA3901	Introduction to secondary school Mathematics teaching	A	20	●
CM3201	Project and Change Management	S	20	●
CM3111	Forensics	A	10	●
MA3603	Optimisation	A	20	●
MA3604	Game Theory	S	10	●
MA3605	Queueing Theory and Inventory Control	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●
MA3902	Communication and Research Skills	A	10	●
CM3112	Artificial Intelligence	A	10	●
CM3109	Combinatorial Optimisation	A	10	●

Joint Honours

BA Music and Mathematics

▶ UCAS Code: GW13

BA Music and Mathematics with a Year Abroad

▶ UCAS Code: GW31

As a Joint Honours student of Music and Mathematics, you will find there are often complementary issues and perspectives as well as skills that link subjects, be they critical analysis, historical contexts or recent research. You will spend a similar amount of time on each subject, developing your musical understanding and skills while studying the fascinating and challenging subject of Mathematics.

This course will provide you with a sound basis of knowledge, understanding and skills in the main areas of mathematics, alongside experience of a range of musical disciplines, including performance, composition, historical and critical musicology, ethnomusicology and acoustics.

You will develop an ease with abstract mathematical concepts, logical argument and deductive reasoning, as well as a portfolio of skills associated with literate musicianship.

There is the option of taking a year studying at a university abroad between your second and third years. This would extend the BSc degree to four years – see page 29 for details.

This degree consists of 120 credits a year, split equally between the two Schools.

Year One

In Music, this is essentially a foundation year preparing you to take advantage of the creative and intellectual benefits of higher education. You will receive core instruction in analysis, harmony and counterpoint, history of music, composition and practical musicianship. In Mathematics, year one consists of four compulsory modules. Note that in both subjects some modules provide essential preparation ('prerequisites') for more advanced modules if you wish to pursue them in later years.

Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■

In addition to these core modules from Mathematics, you will choose 60 credits worth of modules from the School of Music



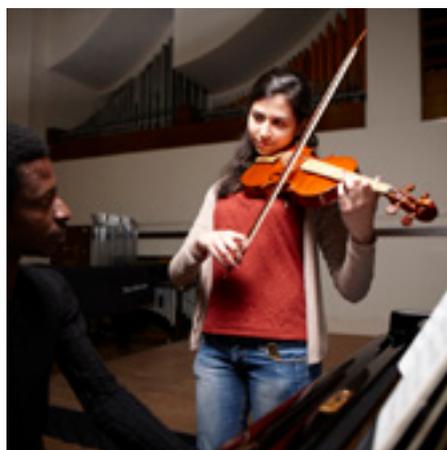


Year Two

In Music, courses are more advanced and you will focus on more specialist topics. In Mathematics, year two consists of four compulsory modules and two optional modules.

Final Year (Year Three for GW13 or Year Four for GW31)

In Music, you choose again from the four subject groups, and pursue at least one (but no more than two) of the three major academic projects: Dissertation, Project in Ethnomusicology, or Project in Music Analysis. There are no core modules for Mathematics in the final year.



Year Two Modules

Module code	Module title	Semester	Credits	
MA2003	Complex Analysis	S	10	■
MA2004	Series and Transforms	S	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2002	Matrix Algebra	A	10	■
MA2006	Real Analysis	A	10	●
MA0212	Linear Algebra	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA2301	Vector Calculus	S	10	●

In addition to the core modules plus two optional modules from Mathematics, you will choose 60 credits worth of modules from the School of Music

Year Three Modules

Module code	Module title	Semester	Credits	
MA3000	Complex Function Theory	S	10	●
MA0367	Time Series Analysis and Forecasting	S	10	●
MA3003	Groups, Rings and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods for Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3005	Introduction to Functional and Fourier Analysis	S	20	●
MA3502	Regression Analysis and Experimental Design	A	20	●
MA3503	Stochastic Processes for Finance and Insurance	S	20	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3900	Cyflwyniad i addysgu Mathemateg mewn ysgol uwchradd	A	20	●
MA3504	Official Statistics	A	10	●
MA3901	Introduction to secondary school Mathematics teaching	A	20	●
MA3604	Game Theory	S	10	●
MA3008	Algebraic Topology	S	10	●
MA3009	Differential Geometry	A	10	●

In addition to choosing 60 credits worth of optional modules from Mathematics, you will choose 60 credits worth of modules from the School of Music

Joint Honours

BSc Physics and Mathematics

▶ UCAS Code: FG31

The dividing line between mathematics and physics is becoming less clear and if you are looking for broader study than a single honours degree can offer, this joint honours BSc Physics and Mathematics is designed with you in mind.

Throughout your course you will devote half your time to physics and half to mathematics. You can choose between a theoretical project and laboratory work in your final year, depending on your interests.

Physics may be the subject for you if you take a real interest in the world around you, have an inquiring mind and want to understand why things are the way they are. In this course the physics is supported by mathematics modules designed to challenge and stimulate your academic curiosity.

Mathematics and physics are subjects which naturally overlap in fields such as applied mathematics and theoretical physics. This joint course offers preparation for careers including industrial or academic research and development, computing, education and areas needing a pragmatic, numerate and analytical approach to problem solving.

This course includes a carefully chosen balance of core modules, along with some optional modules. Modules are worth 10 or 20 credits and you need to earn 120 credits a year.

Year One

In year one all modules are core (compulsory) and areas of study include essential mathematical topics, along with modules on the theory and practical side of physics.

Year Two

Year two of the course continues to build on the core material and some choice is allowed among the optional mathematics modules.



Key: A – Autumn S – Spring AS – Both semesters ■ Core module ● Optional module

Year One Modules

Module code	Module title	Semester	Credits	
MA1007	Vectors and Matrices	A	10	■
MA1001	Elementary Differential Equations	S	10	■
MA1005	Foundations of Mathematics I	A	20	■
MA1006	Foundations of Mathematics II	S	20	■

In addition to these core modules from Mathematics, you will take 60 credits worth of modules from the School of Physics & Astronomy

Year Two Modules

Module code	Module title	Semester	Credits	
MA2004	Series and Transforms	S	10	■
MA2001	Calculus of Several Variables	A	10	■
MA2003	Complex Analysis	S	10	●
MA2006	Real Analysis	A	10	●
MA2002	Matrix Algebra	A	10	●
MA0212	Linear Algebra	S	10	●
MA0232	Modelling with Differential Equations	A	10	●
MA0235	Elementary Fluid Dynamics	S	10	●

In addition to the core modules plus four optional modules from Mathematics, you will choose 60 credits worth of modules from the School of Physics & Astronomy

Year Three

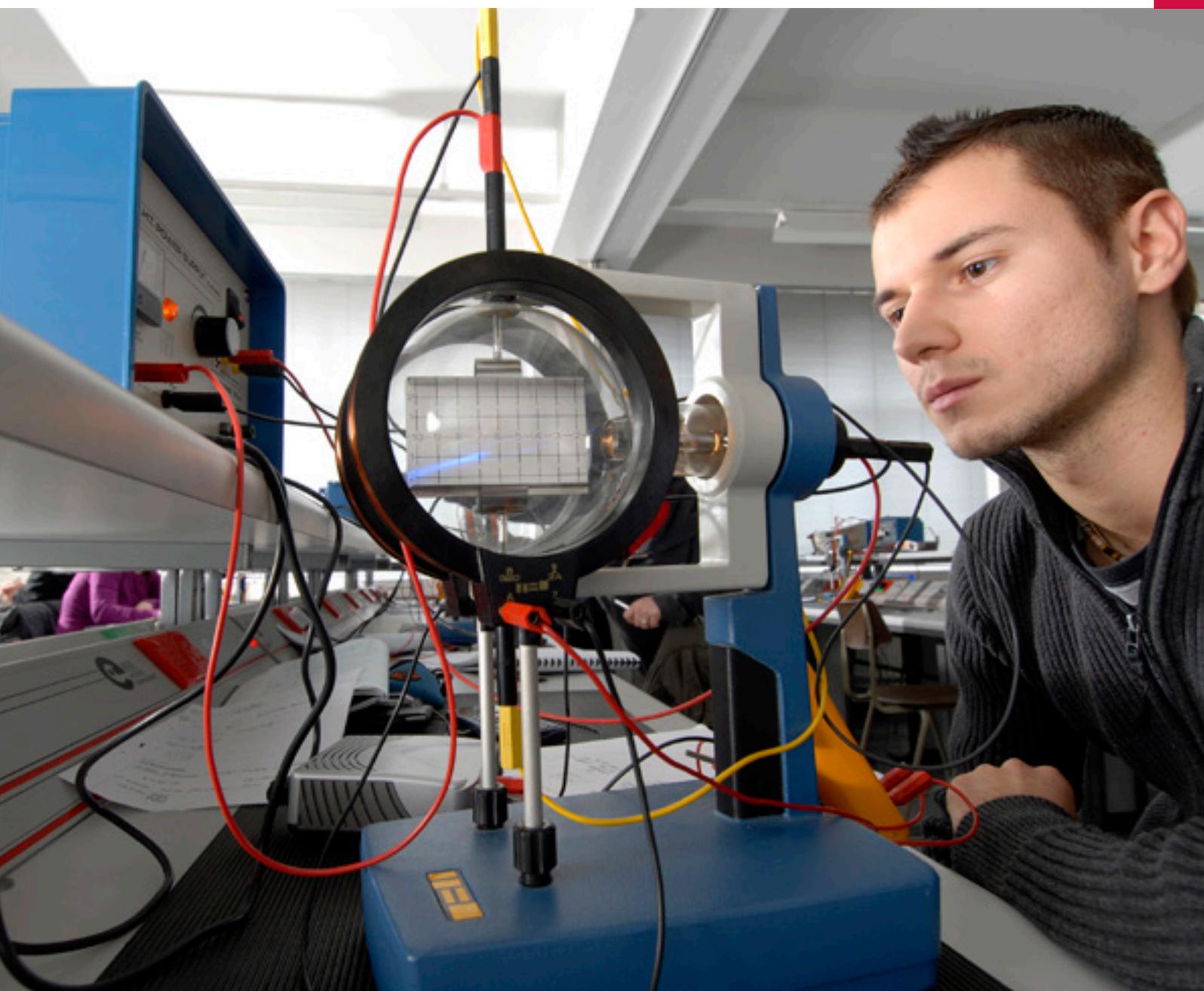
The modules in year three are more closely aligned to the research interests of the Schools, and some further choice is permitted among the mathematical modules.

You will also undertake a physics-related project under the supervision of a member of the academic staff. This may be experimental or theoretical in nature (or a mixture of both) and might involve substantial computing, numerical modelling or analysis.

Year Three Modules

Module code	Module title	Semester	Credits	
MA0332	Fluid Dynamics	S	10	●
MA3000	Complex Function Theory	S	10	●
MA3003	Groups, Rings and Fields	A	10	●
MA3004	Combinatorics	S	10	●
MA0322	Knots	A	10	●
MA3700	Mathematical Methods for Data Mining	S	10	●
MA3006	Introduction to Coding Theory and Data Compression	A	20	●
MA3301	Applied Nonlinear Systems	S	10	●
MA3303	Theoretical and Computational Partial Differential Equations	A	20	●
MA3304	Methods of Applied Mathematics	S	20	●
MA3009	Differential Geometry	A	10	●

In addition to choosing 60 credits worth of modules from Mathematics, you will study 60 credits worth of core modules from the School of Physics & Astronomy



Work Placements

You can choose to develop your employability skills by spending a year working in industry between the second and final years of your degree*.

*see page 11 for list of applicable courses

Work placements involve working in salaried employment for a period of one year at an approved organisation, in a post related to mathematics, statistics or operational research.

Our placements team will help you find and apply for suitable placement opportunities, and prepare you for the workplace through a series of personal development workshops during your second year. You will be encouraged to reflect on your experiences by posting weekly entries to an online journal, which will be used to monitor your progress. Your progress will also be monitored by visits to the workplace by members of staff, and also by regular progress reports from your workplace supervisor. The learning outcomes of the placement year are based on professional standards set by the City & Guilds Institute of London. These will be assessed by a series of reflective reports, and contribute 10% to the overall assessment of your degree programme.

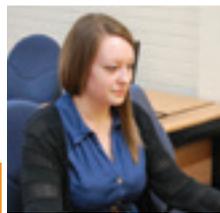
Our work placement programme is very popular, and has been running successfully for many years. We have well-established links with a number of organisations, and the programme is designed so that both students and employers will benefit from the experience. Work placements can be the first step in a successful graduate career, and placement students are often offered graduate employment by their placement provider. Even for those students who wish to seek graduate careers elsewhere, placement years are attractive to many employers, who hold such extended periods of work experience in high regard.



We have helped students find placements within various branches of government, the business and finance sector and the industrial sector, at organisations such as:

- HM Revenue and Customs (London)
- Ministry of Defence (Warminster)
- Office for National Statistics (Newport)
- Welsh Government (Cardiff)
- Barclaycard (Northampton)
- Lloyds Banking Group (Cardiff, Bristol and London)
- PwC (various locations)
- BAE Systems (Bristol)
- Corus (Newport)
- GSK (Greenford and Harlow)
- National Air Traffic Services Ltd (Southampton)
- Roche Pharmaceuticals (Welwyn Garden City)
- Rolls Royce (Derby)
- Rutherford Appleton Research Laboratories (Didcot)

If you are interested in work placement but do not wish to commit yourself at this stage, you can easily transfer to a programme that includes work placement at the end of your first year.



Emily

I spent my placement year working at Roche as a Biostatistician which has been an amazing experience allowing me to link my university studies to their application within the Pharmaceutical industry.

As a Biostatistician, my position was in the Product Development department. I was a member of a smaller subgroup of statisticians working on the statistical analysis of data from clinical trials. This placement

has provided both knowledge and a strong interest in the Pharmaceutical industry, which I hope to pursue further at university, and enabled me to develop invaluable professional skills crucial for employment. Most importantly it has converted previous studies and skills into invaluable practical experience. I better understand how I work to be most productive and I have gained a lot of confidence in my abilities.

I have loved my placement year and cannot wait to come back!



Nathan

My placement was in the Investment Management and Private Equity department within the audit sector at Deloitte.

My role involved being part of numerous audit teams, obtaining evidence and testing the amounts and disclosures in the financial statements of clients, sufficient to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or error. Deloitte offer great opportunities to develop, providing excellent support and encouragement. One unique opportunity during my placement was the level of client interaction and the opportunities to work with a variety of different management levels within different organisations. This was not a 9-5 office based job, but one where I was able to travel and work within and outside of central London, at the offices of some of the company's biggest clients.

Overall, I thoroughly enjoyed and benefited from my placement year, and have accepted a graduate position with the company upon completing my degree.

Year Abroad

You may wish to gain valuable experience by spending the third year of your degree* studying at a university abroad.

*see page 11 for list of applicable courses



Degrees offering the option to spend a year studying abroad offer a unique opportunity to experience a different culture in a new environment. You will gain valuable life experience which employers view favourably, and you are more likely to achieve getting a job abroad after graduating.

Students choosing this option will go abroad after the second year has been completed, and a grade of 50% in Year 1 needs to have been achieved. You will not have to make a final commitment in your decision to take the year abroad until the January of your second year. A number of universities abroad start slightly earlier in the academic year so most students will depart in August ready to begin their studies, which will then finish around April or May of the following year. Many students choose to extend their stay and plan some travelling or holiday time on successful completion of their year studying. Some visas may also allow you to incorporate some part-time work alongside your studies, or as part of any plans you make to travel.

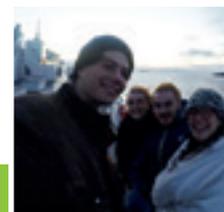
We have numerous contacts with universities around the world and have recently helped students gain places for their year of studying abroad in the USA, Canada, Australia, Germany, Sweden and Italy. We will provide you with information on the universities with which we have contact and you will submit your top three choices of where you would like to go. You will then be allocated one of your choices; the better the grades you achieve up to this point will have an influence on your chance of being allocated your top choice.

We will also help you choose a suitable curriculum and you may not be restricted to mathematics only; you may have access to a variety of subjects with which you may like to combine your maths studies. Or you may choose to continue to focus on just mathematics and experience new areas of the subject which are not covered at Cardiff.

You will also receive support from the university's Global Opportunities Centre, who will provide you with a full briefing before you go abroad, with useful information such as ensuring you have taken out appropriate health insurance.

Other useful things to know about the year abroad option include:

- We will provide funding of £500 - £700 towards flights
- The student fee is 15% of the usual fee
- You will still be eligible for your student loan
- You will always be allocated a place in Halls of Residence at the university you go to
- Your year abroad will contribute 10% towards your final degree



Matt

BSc Mathematics and its Applications with a Year Abroad

Deciding to go abroad as part of my undergraduate studies was possibly the best decision I've ever made. I signed up to the exchange program because it offered the chance to travel, meet new people and study at a wide range of universities across the world.

I chose to study at the University of British Columbia in Vancouver, and while I was there I got the chance to pick classes from almost any faculty. I was therefore able to take physics and astronomy classes for the first time, alongside mathematics.

In my spare time I took advantage of the student season pass for Whistler Blackcomb, and so spent my days off skiing and hiking the mountains and lakes north of the city.

With a huge student union and hundreds of clubs and societies to join, there was no shortage of people to meet, places to discover and things to do. I really loved exploring around the city, and visiting the surrounding towns and islands. I was able to go whale watching in Victoria and bear watching on Vancouver Island to name a few.

Overall my year abroad was absolutely unforgettable, and after returning I feel more confident, self-sufficient, and determined to travel more of the world. Studying in an American style education system also helped me to develop new learning techniques and the experience will definitely help with my final year.

I would definitely recommend a year abroad to anyone, it added so much to my university experience and gave me memories and friends I'll have for years to come.

Careers & Employability

A study of mathematics gives you an insight into problem solving and logical thought, the organisation of ideas and argument and an appreciation of structure.



Mathematicians also possess computation skills, and in Cardiff we incorporate practical computing in several of our modules. All these skills are valued by employers in a wide range of organisations, so our students are equipped to embark on a stimulating and rewarding career after graduation.

The pie chart right, shows the most recent destinations of our Cardiff graduates in 2013/14.

This is a selection of first time employers of recent Cardiff mathematics graduates:

- Professions/Commerce
- Barclays Bank
- Deloitte
- First Actuarial
- Clerical Medical
- FIRSTPLUS
- HBOS
- Legal and General
- Nationwide Building Society
- Price Waterhouse Coopers
- Industry
- BAE Systems
- British Energy
- Corus Europe
- General Dynamics UK
- EMI
- GlaxoSmithKline
- Mowlem Group
- PA Consulting
- Roche Pharmaceuticals
- Public Service
- HM Revenue and Customs
- DEFRA
- Ministry of Defence
- Monmouthshire County Council
- National Air Traffic Services
- National Assembly for Wales
- National Health Service
- Office for National Statistics

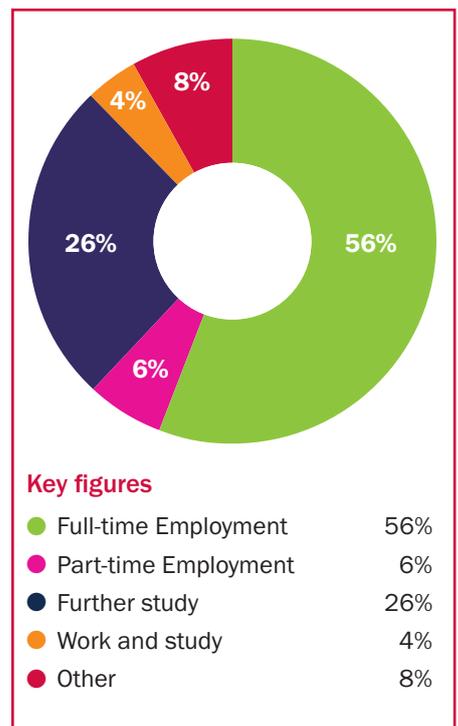
Skills developed during your degree and in demand from employers may include:

- analysing and interpreting data, finding patterns and drawing conclusions
- skills in designing and conducting experimental studies
- high level IT skills developed through the use of computer applications
- the ability to approach problems in an analytical and rigorous way and to formulate and apply theories
- the facility to deal with abstract concepts
- an ability to present mathematical arguments with accuracy and clarity
- advanced numeracy skills and the ability to handle and analyse large quantities of data
- clear logical thinking

Careers and Employability Service

The University offers a careers and employability service for students, graduates and postgraduates. You can access careers information, explore your options and speak to a consultant who can advise you of opportunities relating to your degree or preferred field, including advice on postgraduate degrees. The service offers guidance on preparing a CV and job applications and gives you the chance to meet and network with top graduate recruiters at Careers Fairs and events. If you are looking for work experience, the careers service can assist with planning and organising your placement.

www.cardiff.ac.uk/studentsupport



Research

The research work undertaken by academic staff is an essential component of the life of the School, and Cardiff has been highly rated in recent national assessments. Current interests encompass a very wide range, from highly theoretical investigations in various branches of Pure Mathematics to practical problem solving in the fields of Applied Mathematics, Operational Research and Statistics.

Pure Mathematics

The main areas of research in Pure Mathematics: are in Algebra, Analysis and Differential Equations, Geometry and Algebraic Geometry, Number Theory, Operator Algebras and Noncommutative Geometry and Topology. Many aspects of these subjects are studied, from the most abstract and theoretical to problems arising in mathematical physics. Topics include function spaces, inverse spectral problems (can one hear the shape of a drum?), sieve methods and their applications, enumerative combinatorics, algebraic methods in geometry, functional analysis, statistical mechanics and quantum field theory.

Applied and Computational Mathematics

The research interests of the group are in theoretical and computational fluid mechanics, structural and solid mechanics, numerical analysis, inverse problems and applied analysis. Our research in the area of applied and computational mathematics is informed by problems at the interface with physical sciences, biological sciences and engineering and benefits from interdisciplinary collaborations within Cardiff University and further afield. Interdisciplinary research is performed in a diverse range of application areas including wetting phenomena; dynamics of liquid films, jets and bubbles; analysis of damage in structural and solid mechanics; Earth mantle dynamics; fuel injection in diesel engines; materials characterization; composite materials; lubrication of bearings; aerodynamics; groundwater flow and the extrusion of polymeric materials. The group is interested in the modelling, analysis and numerical simulation of these problems.

Statistics

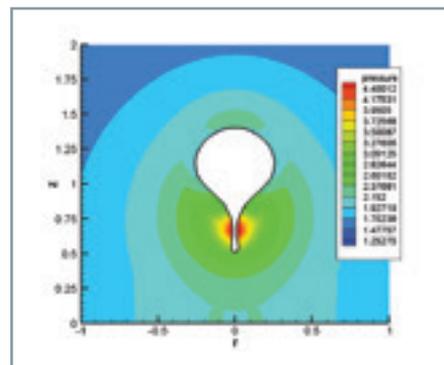
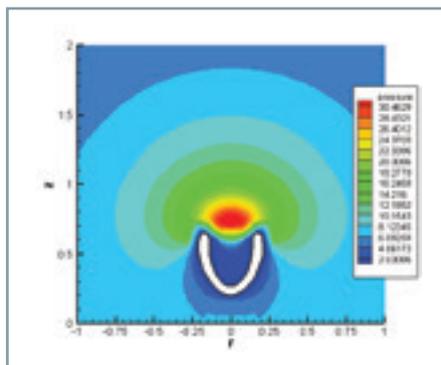
The Statistics group is active in advancing the theory of statistics in multivariate analysis, probabilistic number theory, stochastic processes, stochastic optimisation and time series analysis. Statisticians within the School have been prominent in collaborating with researchers in other disciplines. Locally there are strong links with the School of Medicine working on applications of multivariate statistics and time series analysis in bioinformatics; with the School of Engineering in the areas of image processing and stochastic global optimisation of complex systems; and with Cardiff Business School in the analysis of economics time series. The group also forms a key part of the Centre for Optimisation and its Applications based at Cardiff University. This is an interdisciplinary centre which encourages joint research and applied projects among members of the Schools of Mathematics, Computer Science and Business and the Manufacturing Engineering Centre. The group is active in various areas of applied research and frequently engages in consultancy and contract work.

Operational Research

The Operational Research group has interests in both the theoretical and practical aspects of the subject area; with particular expertise in queueing theory, simulation, healthcare modelling, epidemiology, scheduling, heuristics and timetabling. The prominence of Operational Research at Cardiff is reflected by the success of being awarded the largest ever research grant in the UK for Operational Research as part of the LANCS consortium (with three other universities). This has enabled the Operational Research group to more than double in size and is now the largest subject group of academic staff within the School of Mathematics. In addition to offering a range of Operational Research modules at undergraduate level, the group runs two MSc programmes in Operational Research, Applied Statistics and Risk as well as supervising a number of PhD students.

The research groups are regular hosts to visiting scholars from many parts of the world.

Computer predictions of a bubble as it undergoes collapse in a Newtonian (left) and viscoelastic fluid (right). The red and blue regions show areas of high and low pressure, respectively.



Admissions

Application Process and Entry Requirements

Applications must be made through the UCAS scheme, details of which can be found at: www.ucas.com Applications can be made either in the English or the Welsh language. The UCAS code and number for Cardiff University is **CARDF C15**.

Once we receive your application, you will normally be invited to visit the School on one of our Open Days. The visit includes a guided tour of the School and the University campus, allowing you to see facilities such as the library and Students' Union. You also have the opportunity to talk to present students and find out what life as a mathematics student is really like. There is the opportunity to talk to staff and to raise any questions that you may have. If you are unable to visit we will consider making an offer based only on the details on the UCAS application form.

Within a few days of your visit, you will be informed of the details of your offer. Most of our offers are conditional on A-level results. The standard A-level offer for all single honours Mathematics degree programmes is **AAB / A*BB / A*AC**, with an A in Mathematics, other than the MMath for which the offer is **AAA / A*AB**. A-levels in General Studies are not counted towards this offer. You are not required to have studied Further Mathematics, nor does it matter which version of Mathematics A-level you have taken, as long as it contains the core material in Pure Mathematics. A minimum C grade in GCSE English or equivalent is normally required. The Welsh Baccalaureate is accepted as one of the three A level grades.

The offer for Joint Honours Mathematics degree programmes varies but in all cases, an A grade in Mathematics is required. Please contact one of the Admissions tutors for more information.

The corresponding IB offer is 34 points overall, with at least 6 in Higher Level Mathematics. An English qualification of minimum grade C at GCSE or equivalent is normally required. Applications from mature students and students who have equivalent qualifications, such as BTEC, GNVQ, ACCESS, etc are also welcomed. Overseas students are also welcome and we would consider your qualifications on a case by case basis.

Open Days

University-wide Open Days are held each year and provide the opportunity to visit all schools in addition to residences, the Students' Union and sports facilities. The Admissions tutors are also very willing to discuss queries, by telephone, letter or email. For further information, please see our website: www.cardiff.ac.uk/opendays

Applicants with Disabilities/Equal Opportunities

Every application is considered on an individual basis. We welcome applications from students with disabilities. Applicants with special requirements that relate to a disability or medical condition are encouraged to contact the Disability Advisor, who can discuss individual needs.

Where appropriate, informal visits can be arranged in which applicants can view accommodation and meet academic staff in addition to staff from the Disability Service.

The Disability Advisor can be contacted at:

Disability & Dyslexia Service

Student Support Centre
50 Park Place
Cardiff CF10 3AT

Tel: **029 2087 4528**

Email: studentsupport@cardiff.ac.uk

All applicants are afforded equal opportunity, irrespective of their age, colour, race, ethnic or national origins, sex, sexual orientation, marital status, family responsibilities, physical or sensory disabilities, or their political or religious beliefs. Diversity of background among Cardiff's mathematics students is encouraged and all selection decisions are made strictly on the basis of merit.

Notes for Welsh Language Applicants

We recognise that if you are a Welsh speaker you may feel more comfortable speaking to a Welsh speaking personal tutor. Provided there are Welsh speaking members of staff in your subject area, every effort will be made to allocate a Welsh speaker to you. We offer Welsh speakers the opportunity to attend some tutorials conducted in Welsh. If you wish, you can also submit your assessed work and take your examinations through

the medium of Welsh, regardless of the language of tuition of the course you are following. Some of the accommodation at Senghennydd Court and Talybont student residences has been allocated for Welsh speakers and learners who would like to be grouped together. If you would like to take advantage of this please make a note of this on your accommodation form.

Admissions Contact

For information on applying and enrolling on any of our programmes please contact:

Dr Jonathan Gillard

School of Mathematics,
Cardiff University, Senghennydd Road
Cardiff CF24 4AG

Tel: **029 2087 0619**

Email: gillardjw@cardiff.ac.uk

Caroline Frame

Admissions and Clerical Assistant

School of Mathematics,
Cardiff University, Senghennydd Road,
Cardiff CF24 4AG

Tel: **+44 (0)29 2087 4811**

Email: FrameC@Cardiff.ac.uk

Tuition Fees and Financial Assistance

The University charges an annual fee which covers all tuition fees, registration and examinations other than the re-taking of examinations by students not currently registered. Please note charges for accommodation in University Residences are additional.

Please see the following website for more information: www.cardiff.ac.uk/fees

Scholarships and Bursaries

For more information please visit the following website:

www.cardiff.ac.uk/scholarships

Useful websites for information about tuition fees and financial assistance:

Cardiff University website:

www.cardiff.ac.uk/fees

Student Support Centre website:

www.cardiff.ac.uk/financialsupport/index.html

Student Finance Wales

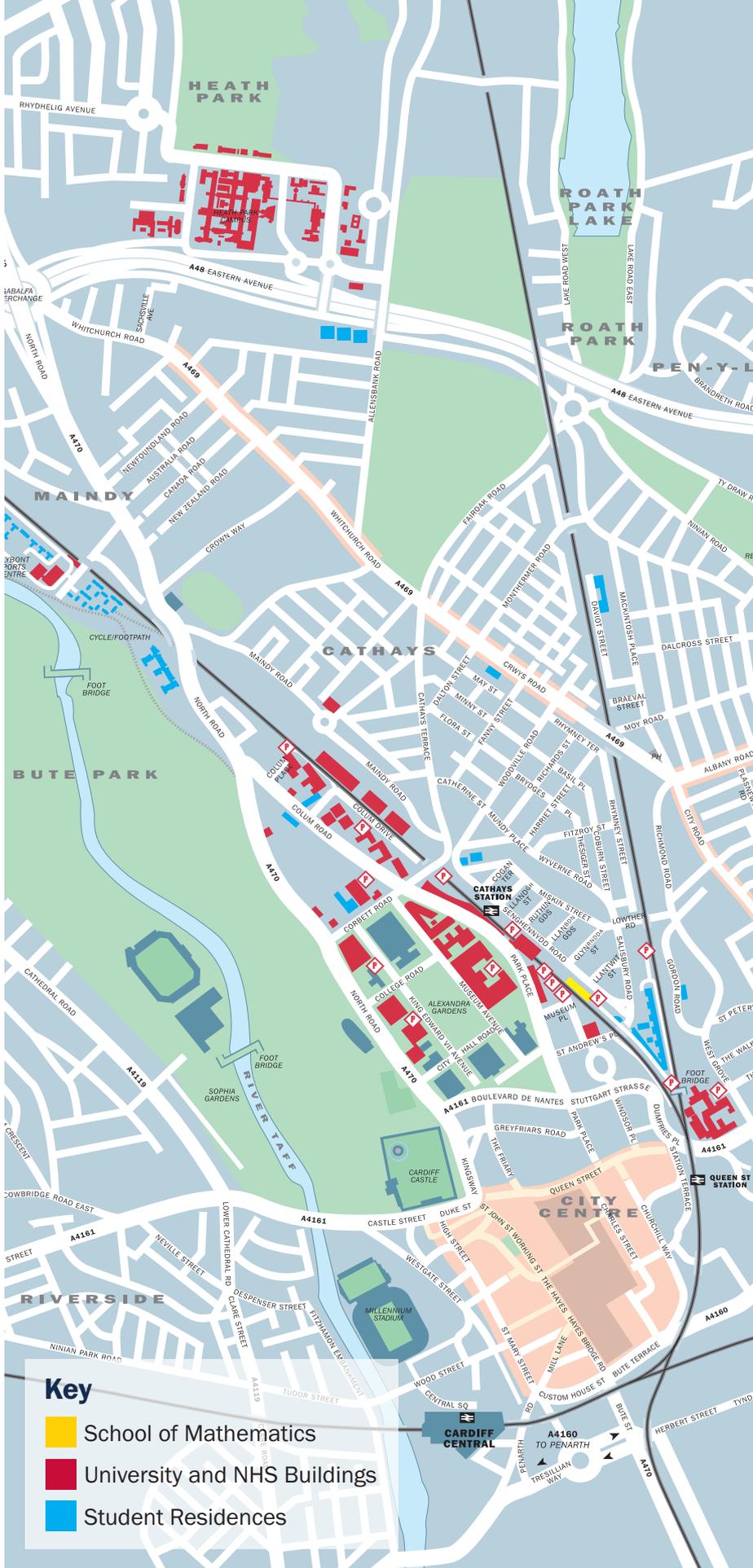
www.studentfinancewales.co.uk

Student Finance England:

www.studentfinanceengland.co.uk

Student Loans Company

www.slc.co.uk



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Tel: 029 2087 4455

Email: RobertsL9@cardiff.ac.uk

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How to find the School

The School of Mathematics is situated in a building, known as the Mathematics Institute, located in a central position within the University campus, yet within five minutes walking time of the main city shopping complex and Cardiff's magnificent Civic Centre.



To find out more about the School of Mathematics please visit our website: www.cardiff.ac.uk/mathematics



Got questions about student life?
Get them answered at:
www.cardiff.ac.uk/insiders

Some of our current students are sharing their experiences online through their Facebook pages, so if you want to know what life as a student at Cardiff is really like, then you can find out now. There is also lots of information about what is happening in Cardiff, including articles written by our students, videos, and much more.

Enquiries

Tel: 029 2087 4811
Email: mathematics@cardiff.ac.uk

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