



UNIVERSITY OF
BIRMINGHAM



MATHEMATICS

This leaflet outlines the modules available to undergraduate students in the School of Mathematics in the 2021–22 academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School.

WWW.BIRMINGHAM.AC.UK/MATHEMATICS

BSC/MSCI MATHEMATICS SINGLE HONOURS PROGRAMMES

Studying our most popular degree, you can follow your interests by choosing from a wide range of optional modules in later years.

MODULE STRUCTURE

- BSc Mathematics (G100)
- BSc Mathematics with a Year in Industry (G102)
- MSci Mathematics (G103)
- BSc Mathematics with an International Year (G104)
- BSc Mathematics with Study in Continental Europe (G141)

	Semester 1	Semester 2
Year 1	Real Analysis	Vectors, Geometry and Linear Algebra
	Algebra and Combinatorics	Probability and Statistics (10 credits)
	Sequences and Series (10 credits)	Mechanics (10 credits)
	Mathematical Workshops – Autumn (10 credits)	Mathematical Workshops – Spring (10 credits)
		Mathematical Modelling and Problem Solving (10 credits)
G141: you will study a language in place of Sequences and Series and Mathematical Modelling and Problem Solving		
Year 2	Multivariable and Vector Analysis	Real and Complex Analysis
	Linear Algebra and Linear Programming	(*) Algebra and Combinatorics 2
	Maths in Industry (10 credits)	(*) Differential Equations
	Numerical Methods and Programming (10 credits)	(*) Statistics
G100/102/103/104: you may choose any two of the three optional modules marked with an asterisk.		
G141: you may choose one of the three optional modules and will also study a language.		

All modules are worth 20 credits except where stated otherwise. Modules in **bold font** are compulsory, whilst others are elective according to the conditions described at the end of the section.

Please note that not all modules are offered every year. Also, because our research is constantly exploring new areas and directions of study, some courses may be discontinued and new ones offered in their place. Prerequisites and timetabling restrictions can mean not all options will be open to you. All details are correct at the time of printing (July 2020). For the most up-to-date information, please visit www.birmingham.ac.uk/mathematics.

		Semester 1	Semester 2
Year 3		Number Theory	Research Skills in Mathematics
		Graph Theory	Group Theory
		Metric Spaces and Topology	Functional and Fourier Analysis
		Randomness and Computation	Combinatorics and Communication Theory
		Applied Statistics	Algebraic and Differential Topology
		Integer Programming and Combinatorial Optimisation	Applied Mathematical Analysis
		Nonlinear Programming and Heuristic Optimisation	Medical Statistics
		Methods in Partial Differential Equations	Statistical Methods in Economics
		Continuum Mechanics	Electromagnetism (10 credits)
		Advanced Mathematical Modelling	Numerical Methods and Numerical Linear Algebra
		Mathematical Finance	Differential Equations
		Quantum Mechanics (10 credits)	Algebra and Combinatorics 2
		Statistics	

You must take Research Skills in Mathematics. You may then choose three optional modules in **Semester 1** and two optional modules in **Semester 2** subject to timetabling restrictions and necessary pre-requisites.

		Project in Mathematics (40 credits)	
Year 4 (G103 only)		Advanced Topics in Combinatorics	Advanced Topics in Analysis
		Topics in Applied Mathematics	Advanced Mathematical Finance
		Advanced Topics in Algebra	Advanced Management Mathematics
		Reaction-Diffusion Theory	Advanced Mathematical Biology
		Number Theory	Nonlinear Waves
		Graph Theory	Group Theory
		Applied Statistics	Combinatorics and Communication Theory
		Integer Programming and Combinatorial Optimisation	Algebraic and Differential Topology
		Nonlinear Programming and Heuristic Optimisation	Applied Mathematical Analysis
		Methods in Partial Differential Equations	Medical Statistics
		Continuum Mechanics	Statistical Methods in Finance and Economics
		Advanced Mathematical Modelling	Game Theory and Multicriteria Decision Making
			Numerical Methods and Numerical Linear Algebra
		Quantum Computing	

You must take Project in Mathematics. You may then choose two optional modules in each semester subject to timetabling restrictions and necessary pre-requisites.

BSC/MSCI MATHEMATICS WITH BUSINESS MANAGEMENT

Designed to prepare graduates for high-level management positions, one-third of your degree will be spent studying business-related subjects such as economics, marketing and finance.

MODULE STRUCTURE

■ BSc Mathematics with Business Management (G1N2)

■ MSci Mathematics with Business Management (G1NF)

	Semester 1	Semester 2
Year 1	Real Analysis	Vectors, Geometry and Linear Algebra
	Algebra and Combinatorics	Probability and Statistics (10 credits)
	Sequences and Series (10 credits)	Introduction to Economics and Finance
	Introduction to Management and Marketing	
Year 2	Multivariable and Vector Analysis	Real and Complex Analysis
	Linear Algebra and Linear Programming	(*) Algebra and Combinatorics 2
	International Economics and Financial Decision Making	(*) Differential Equations
		(*) Statistics
		(**) Human Resource Management
	(**) Marketing and New Technology	
You may choose one of the three modules marked (*) and one of the two modules marked (**).		

All modules are worth 20 credits except where stated otherwise. Modules in **bold font** are compulsory, whilst others are elective according to the conditions described at the end of the section.

Please note that not all modules are offered every year. Also, because our research is constantly exploring new areas and directions of study, some courses may be discontinued and new ones offered in their place. Prerequisites and timetabling restrictions can mean not all options will be open to you. All details are correct at the time of printing (July 2020). For the most up-to-date information, please visit www.birmingham.ac.uk/mathematics.

	Semester 1	Semester 2
Year 3	Integer Programming and Combinatorial Optimisation	Research Skills in Mathematics
	Strategic and Innovation Management	Game Theory and Multicriteria Decision Making
	Nonlinear Programming and Heuristic Optimisation	Corporate Finance and Supply Chain Management
	Graph Theory	Combinatorics and Communication Theory
	Number Theory	Medical Statistics
	Applied Statistics	Statistical Methods in Economics
	Mathematical Finance	Differential Equations
		Algebra and Combinatorics 2
	Statistics	

You may choose one optional module subject to timetabling restrictions and necessary pre-requisites

	Project in Mathematics with Business Management (40 credits)	
Year 4 (G1NF only)	Advanced Business Economics	Small Business and Entrepreneurship
	Advanced Topics in Combinatorics	Advanced Management Mathematics
	Number Theory	Advanced Mathematical Finance
	Graph Theory	Group Theory
	Applied Statistics	Combinatorics and Communication Theory
	Methods in Partial Differential Equations	Numerical Methods and Numerical Linear Algebra
	Continuum Mechanics	Medical Statistics
	Advanced Mathematical Modelling	Statistical Methods in Finance and Economics
	Mathematical Finance	

You may choose one of the optional modules listed in each semester, subject to timetabling restrictions and necessary pre-requisites.



BSC/MSCI MATHEMATICS AND COMPUTER SCIENCE

Through this degree you will witness the close interconnections between the disciplines of Mathematics and Computer Science at an advanced level, as well as their vital applications in the world. A wide range of optional modules allow you to follow your interests, including the option to pursue an extended project in either subject, and to weight the final year(s) of your degree towards your preferred area.

MODULE STRUCTURE

- BSc Mathematics and Computer Science (GG14)
 - MSci Mathematics and Computer Science (GI11)
- BSc Mathematics and Computer Science with Industrial Year (GGD4)
 - MSci Mathematics and Computer Science with Industrial Year (GG41)

Semester 1		Semester 2	
Year 1	Real Analysis	Vectors, Geometry and Linear Algebra	
	Data Structures and Algorithms	Mechanics (10 credits)	
	Object Oriented Programming	Probability and Statistics (10 credits)	
		Theories of Computation	
Year 2	Algebra and Combinatorics	Real and Complex Analysis	
	Functional Programming	Differential Equations (*)	
	Systems Programming in C/C++	Statistics (*)	
		Security and Networks	
You may choose one of the two optional modules marked with (*).			

All modules are worth 20 credits except where stated otherwise. Modules in **bold font** are compulsory, whilst others are elective according to the conditions described at the end of the section.

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Semester 1		Semester 2	
Year 3	Project in Computer Science (40 credits)		
	Linear Algebra and Linear Programming	Research Skills in Mathematics	
	Graph Theory	Algebra and Combinatorics 2	
	Mathematical Finance	Combinatorics and Communication Theory	
	Number Theory	Differential Equations	
	Advanced Networking	Real and Complex Analysis	
	Computer Graphics	Statistics	
	Human-Computer Interaction	Advanced Functional Programming	
	Security of Real-World Systems	Algorithms and Complexity	
	Theoretical Foundations for Security	Computer-Aided Verification	
	Distributed and Parallel Computing	Computer Vision and Imaging	
Programming Language Principles, Design and Implementation	Quantum Computing		
<p>You must choose either Project in Computer Science or Research Skills in Mathematics and may then choose further modules in each semester (satisfying timetabling requirements and necessary pre-requisites), with a minimum of 40 credits in total from each of Mathematics and Computer Science. Linear Algebra and Linear Programming is compulsory for MSci students.</p>			

Year 4 (GI11 and GG41 only)	Project in Mathematics (40 credits)		
	Project in Computer Science (40 credits)		
	Applied Statistics	Combinatorics and Communication Theory	
	Continuum Mechanics	Group Theory	
	Graph Theory	Medical Statistics	
	Mathematical Finance	Numerical Methods and Numerical Linear Algebra	
	Methods in Partial Differential Equations	Statistical Methods in Finance and Economics	
	Number Theory	Advanced Functional Programming	
	Advanced Networking	Algorithms and Complexity	
	Distributed and Parallel Computing	Computer-Aided Verification	
	Human-Computer Interaction	Quantum Computing	
	Neural Computation	Teaching Computer Science in Schools	
Security of Real-World Systems			
Theoretical Foundations for Security			
<p>You must choose either Project in Mathematics or Project in Computer Science, and may then choose further modules in each semester (satisfying timetabling requirements and necessary pre-requisites) with a minimum of 40 credits in total from each of Mathematics and Computer Science.</p>			

FIND OUT MORE ABOUT THE SCHOOL OF MATHEMATICS AT BIRMINGHAM NOW: WWW.BIRMINGHAM.AC.UK/MATHEMATICS

OUR PROGRAMMES

UCAS CODE

Single Honours

BSc Mathematics	G100
BSc Mathematics with a Year in Industry	G102
BSc Mathematics with Study in Continental Europe	G141
BSc Mathematics with an International Year	G104
MSci Mathematics	G103

Major/Minor

BSc Mathematics with Business Management	G1N2
MSci Mathematics with Business Management	G1NF

Joint Honours

BSc Mathematics and Computer Science	GG14
MSci Mathematics and Computer Science	G111
BSc Mathematics and Computer Science with Industrial Year	GGD4
MSci Mathematics and Computer Science with Industrial Year	GG41

For information on our other Joint Honours programmes, visit our website at: www.birmingham.ac.uk/courses

BSc Theoretical Physics and Applied Mathematics	FG31
MSci Theoretical Physics and Applied Mathematics	F3DG
BA Mathematics and Music	GW13
BA Mathematics and Philosophy	GV15

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CONTACT US

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This leaflet was produced in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be discontinued and new ones offered in their place. Before you apply, please visit our website to view essential information for all applicants: www.birmingham.ac.uk/applicantinformation

Please note the information in this brochure is correct at time of publication but may be subject to change (July 2020)

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BIRMINGHAM

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