BSc/MSci Mathematics for 23/24

All modules are worth 15 credits unless stated otherwise. 120 credits are taken each year. All modules are at level 4, 5, 6 or 7, corresponding roughly to years 1, 2, 3 and 4.

During all years of the degree, you must take a maximum of 150 credits at Level 4. To graduate with the BSc, you must take a minimum of 90 credits at or above during your degree. To graduate with the MSci, you must take a minimum of 120 credits at Level 7 during your degree.

Please note that the choice of optional modules available may vary slightly from year to year and is subject to approval by the Mathematics Departmental Tutor and, in the case of modules from other departments, also to approval from that department.

YEAR 1

All modules are compulsory and at Level 4

Term 1		*Term 2*	
MATH0003	Analysis 1	MATH0004	Analysis 2
MATH0005	Algebra 1	MATH0006	Algebra 2
MATH0008	Applied Mathematics 1	MATH0009	Newtonian Mechanics
MATH0010	Mathematical Methods 1	MATH0011	Mathematical Methods 2

YEAR 2

Term 1

The modules below are compulsory and are at Level 5

MATH0013 Analysis 3: Complex Analysis
MATH0014 Algebra 3: Further Linear Algebra
MATH0015 Fluid Mechanics
MATH0016 Mathematical Methods 3

Term 2

All students (BSc/MSci)

Choose four modules (60 credits) from the Year 2 options listed below. Your choice of options in the second year has a large impact on what can be chosen in the third year (and fourth year for MSci students): you should look at the third/fourth year options and the module pathways information to help you choose (https://www.ucl.ac.uk/maths/current-students/current-undergraduates/degree-structures-and-options). You may replace a maximum of one mathematics module (15 credits) by an outside option.

MSci students

In general MSci students are advised to take four mathematics options. To ensure a strong background for year 3 and year 4, it may also be helpful to take either at least 3 of the pure modules (MATH0051/52/53/34) or at least 3 of the applied modules (MATH0055/57/58).

Year 2 options (term 2)

MATH0034 Number Theory (Level 5)
MATH0051 Analysis 4: Real Analysis (Level 6)
MATH0052 Geometry and Groups (Level 5)
MATH0053 Algebra 4: Groups and Rings (Level 6)
MATH0055 Electromagnetism (Level 5)
MATH0056 Mathematical Methods 4 (Level 6)
MATH0057 Probability and Statistics (Level 5)
MATH0058 Computational Methods (Level 5)

Outside options (maximum 15 credits)

If you wish to choose an outside option, i.e. a module from another department, you should first check information with the relevant department, including pre-requisites and registration procedures. No adjustment can be made to timetables for outside options. Although outside options are normally taken in term 2, it is possible to take an outside option in term 1 or through terms 1 and 2 if the timetable works.

The list of modules which appear in the list here are likely to be reasonably suitable but **still require approval from the teaching department.** If you wish to take an outside option which does not appear on this list, then you should contact the Mathematics Departmental Tutor to discuss.

Standard Year 2 outside options

BASC0017	Interdisciplinary Game Theory	(Level 5: Term 2)
BASC0038	Algorithms: Logic and Structures	(Level 4: Term 2)
BASC0047	Machine Reasoning and Expert Systems	(Level 5: Term 2)
ECON0011	Basic Microeconomic Concepts	(Level 4: Term 2)
ECON0044	An Introduction to Applied Economic Analysis	(Level 4: Term 1)
INST0002	Programming 1	(Level 4: Term 2)
LC*:	Language Centre modules	(various levels: Term 1 **and** 2)
MSIN0004	Accounting for Business A4U	(Level 4: Term 1 **or** Term 2)
MSIN0048	Understanding Management	(Level 4: Term 1 **or** Term 2)
MSIN0059	Managerial Accounting for Decision Making	(Level 5: Term 1 **or** Term 2)
MSIN0061	Global Marketing Strategy	(Level 5: Term 2)
PHAS0022	Quantum Physics	(Level 5: Term 1)

These modules are expected to be offered in these terms in 2023-24 but this is not guaranteed and there is no guarantee you will be able to get a place. You should check term and timetable.

YEAR 3

All students (BSc/MSci)

You select 120 credits (normally 8 modules) from the list of modules below which include all standard year 3 Mathematics options, some year 4 Mathematics options, year 2 Mathematics options not previously taken, three standard Statistics options and the Maths Education module. [From the point of view of BSc students, which modules are in groups 1A, 1B and 2 is irrelevant, although if you wish to keep open the possibility of switching to the MSci, you should follow the MSci rules.] You may substitute up to 30 credits of these with outside option(s), subject to approval. You should ensure that you take enough units at Level 6 or 7: in order to graduate with the BSc degree, a minimum of 90 credits, from all years, must be taken at Level 6 or 7.

There is no strict rule on how many options you take in each term, but you are advised to choose either a 4:4 or a 5:3 distribution.

MSci students

In addition to the rules above, you must choose one of the three groups 1A, 1B and 2 and choose at least four modules from that group. To give you some flexibility in year 4, it is also probably a good idea to include at least one module at level 7 this year: to graduate with the MSci you must take at least 120 credits at level 7 during your degree. You should also choose your modules carefully in the light of which modules you will take in year 4, and which project you will pursue. Please take advice and look at the module pathways.

LIST OF MODULES

All modules are at Level 6 unless otherwise specified. Level 7 modules are likely to be harder and have a 50% pass mark.

Term 1		*Term 2*	
Main Year 3 Mathematics options			
MATH0017	Measure Theory	MATH0018	Functional Analysis
MATH0019	Multivariable Analysis	MATH0020	Differential Geometry
MATH0022	Galois Theory	MATH0021	Homological Algebra
MATH0023	Algebraic Topology	MATH0024	Geophysical Fluid Dynamics
MATH0025	Mathematics for General Relativity	MATH0027	Mathematical Methods 5
MATH0026	Biomathematics	MATH0028	Combinatorial Optimisation
MATH0029	Graph Theory and Combinatorics	MATH0031	Financial Mathematics
MATH0030	Mathematical Ecology	MATH0035	Algebraic Number Theory
MATH0032	Introduction to Mathematica	MATH0036	Elliptic Curves
MATH0033	Numerical Methods	MATH0037	Logic
MATH0070	Linear Partial Differential Equations (L7)	MATH0038	History of Mathematics
MATH0074	Topology and Groups (L7)	MATH0054	Analytical Dynamics
MATH0075	Lie Groups and Lie Algebras (L7)	MATH0069	Probability (L7)
MATH0077	Real Fluids (L7)	MATH0073	Representation Theory (L7)
MATH0083	Prime Numbers and their Distribution (L7)	MATH0079	Cosmology (L7)

MATH0106	Industrial and Geological Fluids (L7)	MATH0080	Waves and Wave Scattering (L7)
MATH0104	Modular Forms (L7) (term change)	MATH0090	Elliptic PDEs (L7)
		MATH0092	Variational Methods for PDEs (L7)
		MATH0102	Applied Stochastic Methods (L7)
		MATH0108	Commutative Rings and Algebras (new)
		MATH0109	Theorem proving in LEAN (new)
Stats modules and Maths Education [Note: Although these are counted as Mathematics options, you will need to register with Statistics/IoE and acceptance is not guaranteed]			
STAT0005	Probability and Statistics II	STAT0007	Introduction to Applied Probability
CPAS0012	Mathematical Education for Physical and Mathematical Sciences	STAT0011	Decision and Risk
Mathematics options from Year 2			
		MATH0034	Number Theory (L5)
		MATH0051	Analysis 4: Real Analysis
		MATH0052	Geometry and Groups (L5)
		MATH0053	Algebra 4: Groups and Rings
		MATH0055	Mathematics of EM and Special Relativity (L5)
		MATH0056	Mathematical Methods 4
		MATH0057	Probability and Statistics (L5)
		MATH0058	Computational Methods (L5)

Groups of modules for MSci students

Group 1A Analysis/PDEs

MATH0017	Measure Theory	MATH0018	Functional Analysis
MATH0019	Multivariable Analysis	MATH0020	Differential Geometry
MATH0029	Graph Theory and Combinatorics	MATH0069	Probability (L7)
MATH0070	Linear Partial Differential Equations (L7)	MATH0090	Elliptic PDEs

MATH0083	Prime Numbers and their Distribution (L7)	MATH0092	Variational Methods for PDEs (L7)

Group 1B Algebra/Number Theory

MATH0022	Galois Theory	MATH0021	Homological Algebra
MATH0023	Algebraic Topology	MATH0035	Algebraic Number Theory
MATH0029	Graph Theory and Combinatorics	MATH0036	Elliptic Curves
MATH0083	Prime Numbers and their Distribution (L7)	MATH0073	Representation Theory (L7)
MATH0104	Modular Forms (L7) (term change)	MATH0108	Commutative Rings and Algebras (new)

Group 2 Applied/Applicable Mathematics/Methods

MATH0025	Mathematics for General Relativity	MATH0024	Geophysical Fluid Dynamics
MATH0026	Biomathematics	MATH0027	Mathematical Methods 5
MATH0030	Mathematical Ecology	MATH0028	Combinatorial Optimisation
MATH0033	Numerical Methods	MATH0056	Mathematical Methods 4
MATH0077	Real Fluids (L7)	MATH0092	Variational Methods for PDEs (L7)
		MATH0102	Applied Stochastic Methods (L7)

Year 3 Outside options (at most 30 credits)

If you wish you can choose up to 30 credits of outside options, i.e. modules from other departments, you should first check information with the relevant department, including pre-requisites and registration procedures. No adjustment can be made to timetables for outside options.

The modules which appear here have been taken by Maths students in the past and most are likely to be reasonably suitable. However, there is no guarantee you can take them and they still require approval from the teaching department. Please note that if you are in year 4, you can only take outside options at Level 6 or 7. In year 3, if you choose a module at level 4 or 5 you need to make sure that you are still following the degree rules on number of credits at a given level. If you wish to take an outside option which does not appear on this list, then you should contact the Mathematics Departmental Tutor to discuss.

Year 3 Standard outside options

BENG0019	Engineering Mathematics in Finance	(Term 2: level 5)
COMP0015	Introduction to Programming	(Term 1 or 2: Level 5)
COMP0142	Machine Learning for Domain Specialists	(Term 2: Level 6)
ECON0008	History of Economic Thought	(Term 1: Level 4)

ECON0011	Basic Microeconomic Concepts	(Term 2: Level 4)
ECON0027	Game Theory	(Term 1: Level 6)
ECON0044	An Introduction to Applied Economic Analysis	(Term 1: Level 4)
INST0002	Programming 1	(Term 2: Level 4)
INST0060	Foundations of Machine Learning	(Term 1: Level 7)
LC*	Language Centre modules	(Term 1 **and** 2: various levels)
MSIN0004	Accounting for Business	(Term 1 or 2: Level 4)
MSIN0048	Understanding Management	(Term 1 or 2: Level 4)
MSIN0059	Managerial Accounting for Decision Making	(Term 1 or 2: Level 5)
MSIN0146	Financial Management	(Term 1: Level 6)
PHAS0022	Quantum Physics	(Term 1: Level 5)
STAT0025	Optimisation Algorithms in Operational Research	(Term 1: level 6)

These modules are expected to be offered in 2023-24 but this is not guaranteed and there is no guarantee you will be able to get a place. Please check term.

YEAR 4 (MSci)

The following module is compulsory and is worth 30 credits

MATH0084 Project (level 7)

As well as the 30-credit project, you should choose 90 credits from the list of Standard Year 4 Mathematics options below. It is possible to substitute up to 30 credits of these by suitable outside options or third year mathematics options, but all modules taken must be at Level 6 or 7, and you should be aware that you need to take 120 credits at level 7 (during your entire degree) to graduate with the MSci.

Standard Year 4 Mathematics options (level 7)

Term 1		Term 2	
MATH0065	Advanced Modelling Mathematical Techniques	MATH0061	Further Topics in Algebraic Number Theory
MATH0070	Linear Partial Differential Equations	MATH0069	Probability
MATH0071	Spectral Theory	MATH0073	Representation Theory
MATH0072	Riemannian Geometry	MATH0078	Asymptotic Approximation Methods
MATH0074	Topology and Groups	MATH0079	Cosmology
MATH0075	Lie Groups and Lie Algebras	MATH0080	Waves and Wave Scattering
MATH0076	Algebraic Geometry	MATH0082	Evolutionary Games and Population Genetics
MATH0077	Real Fluids	MATH0088	Quantitative and Computational Finance
MATH0083	Prime Numbers and their Distribution	MATH0090	Elliptic PDEs

MATH0086	Computational and Simulation Methods	MATH0092	Variational Methods for PDEs
MATH0104	Modular Forms	MATH0102	Applied Stochastic Methods
[MATH0106]	[Industrial and Geological Fluids] Not running 2023/24	MATH0107	Probabilistic Method in Combinatorics

Year 4 Outside options or 3rd year Mathematics modules (at most 30 credits)

If you wish you can choose up to 30 credits of outside options, i.e. modules from other departments, or 3rd year Mathematics modules. If taking a module from another department, you should first check information, including pre-requisites and registration procedures. No adjustment can be made to timetables for outside options.

The modules which appear here have been taken by Maths students in the past and most are likely to be reasonably suitable. However, there is no guarantee you can take them and they still require approval from the teaching department. Please note that you can only take outside options at Level 6 or 7 and you should make sure that you have a total of at least 120 credits at level 7 from this and previous years. If you wish to take an outside option which does not appear on this list, then you should contact the Mathematics Departmental Tutor to discuss.

Year 4 Standard outside options

COMP0142	Machine Learning for Domain Specialists	(Term 2: Level 6)
ECON0027	Game Theory	(Term 1: Level 6)
INST0060	Foundations of Machine Learning	(Term 1: Level 7)
LC*	Language Centre modules	(Term 1 **and** 2: level 7)
MSIN0146	Financial Management	(Term 1: Level 6)
STAT0025	Optimisation Algorithms in Operational Research	(Term 1: level 6)

These modules are expected to be offered in 2023-24 but this is not guaranteed and there is no guarantee you will be able to get a place. Please check term.

Year 3 Mathematics modules

Term 1		*Term 2*	
MATH0017	Measure Theory	MATH0018	Functional Analysis
MATH0019	Multivariable Analysis	MATH0020	Differential Geometry
MATH0022	Galois Theory	MATH0021	Homological Algebra
MATH0023	Algebraic Topology	MATH0024	Geophysical Fluid Dynamics
MATH0025	Mathematics for General Relativity	MATH0027	Mathematical Methods 5
MATH0026	Biomathematics	MATH0028	Combinatorial Optimisation
MATH0029	Graph Theory and Combinatorics	MATH0031	Financial Mathematics
MATH0030	Mathematical Ecology	MATH0035	Algebraic Number Theory
MATH0032	Introduction to Mathematica	MATH0036	Elliptic Curves
MATH0033	Numerical Methods	MATH0037	Logic

		MATH0038	History of Mathematics
		MATH0054	Analytical Dynamics
		MATH0108	Commutative Rings and Algebras (new)
		MATH0109	Theorem proving in LEAN (new)