| **Programme Information** | | |
|---|---|---|
| Programme Title | Programme Code | HECoS Code |
| Mathematics | G103 | For Registry Use Only |

| Award | Length of Study | Mode of Study | Entry Point(s) | Total Credits | |
|---|---|---|---|---|---|
| | | | | ECTS | CATS |
| MSci* | 4 years | Full time | Annually in October | 240 | 480 |
| BSc (Hons)* | N/A | N/A | N/A | 180 | 360 |
| Dip. HE* - G100D | N/A | N/A | N/A | 120 | 240 |
| Cert. HE* - G100C | N/A | N/A | N/A | 60 | 120 |

* Students unable to complete the requirements for the MSci may be offered the following exit awards at the discretion of the Board of Examiners provided that you have met the minimum ECTS requirements for that award in line with Imperial Regulations: Certificate of Higher Education in Mathematics, Diploma of Higher Education in Mathematics, BSc Mathematics with Statistics for Finance, BSc Mathematics with Statistics, BSc Mathematics with Mathematical Computation, BSc Mathematics with Applied Mathematics/Mathematical Physics or BSc Mathematics (Pure Mathematics).

| **Ownership** | | | |
|---|---|---|---|
| Awarding Institution | Imperial College London | Faculty | Natural Sciences |
| Teaching Institution | Imperial College London | Department | Mathematics |
| Associateship | Royal College of Science | Main Location(s) of Study | South Kensington Campus |
| **External Reference** | | | |
| Relevant QAA Benchmark Statement(s) and/or other external reference points | | Mathematics, Statistics and Operations Research | |
| FHEQ Level | | Level 7 - Masters | |
| EHEA Level | | 2nd cycle | |
| **External Accreditor(s) (if applicable)** | | | |
| External Accreditor 1: | N/A | | |
| Accreditation received: | N/A | Accreditation renewal: | N/A |
| **Collaborative Provision** | | | |
| Collaborative partner | Collaboration type | Agreement effective date | Agreement expiry date |

| | | | |
|---|---|---|---|
| N/A | N/A | N/A | N/A |

| **Specification Details** | |
|---|---|
| Programme Lead | Dr. Christopher Hallsworth |
| Student cohorts covered by specification | 2025-26 entry |
| Date of introduction of programme | October 2019 |
| Date of programme specification/revision | October 2023 |

## Programme Overview

The MSci Mathematics Degree programme at Imperial College London aims to present a wide range of mathematical ideas in a way which enables you to develop your critical and intellectual abilities. It encourages enthusiasm for the subject as a living discipline that is of value both in its own right and in its applications. It aims to provide a good knowledge of a broad range of topics in mathematics and to allow you to acquire a more advanced knowledge of selected parts of the subject. You will have the opportunity to develop an appreciation of topics which lead into current research in Mathematics and applications of Mathematics. A key feature of the final year is an individual project which allows you to explore a research-level topic or area in Mathematics in considerable depth.

All of the modules in year 1 and around half of the modules in year 2 are core or compulsory. These provide a solid foundation in fundamental mathematical topics and their applications. In the second year, you will also take a number of elective modules and can either choose to specialise, or sample a broad range of topics. During the 3rd and 4th year of the programme you will choose from a large selection of modules across a very wide range of areas of Mathematics and its applications. In years 2 and 3 you may also take a limited number of modules delivered outside the department.

Teaching of Mathematics modules takes place at Imperial's South Kensington Campus. Studying at a research intensive institution, you will learn from specialists in their subject areas. Most teaching sessions are delivered by staff from the Department of Mathematics. These are predominantly permanent academic staff who are actively engaged in research, but also include teaching fellows and research associates. Problem classes are supported by Graduate Teaching Assistants and your first-year studies will be supported by small-group tutorials with a member of staff and with a higher-year student.

Our programme is designed to develop personal attributes that employers value, including effective time management and resilience, good interpersonal, leadership, computational, analytical and problem solving skills, as well as developing independent research skills and your verbal and written presentation skills. You will have the opportunity to develop mathematical and communication skills that will be useful in scientific or other jobs.

Mathematics graduates join various employment sectors, including financial, technology and consultancy. The programme also provides an excellent foundation for postgraduate study, enabling you to progress to specialised Master's and PhD programmes, and then to carry on to pursue a career in academic research, or high-skilled employment.

## Learning Outcomes

Students who have fulfilled all the requirements of the programme will be awarded an MSci **Mathematics (Honours)** degree. On successful completion of the programme, you will be able to:

- demonstrate an understanding of core material and more specialised areas by assimilating and applying a large body of complex, inter-related concepts;
- use logical mathematical argument and deductive reasoning, together with formal processes of mathematical proof and development of mathematical theories;

- take a structured mathematical-analytical approach to problem solving, recognising the importance of assumptions made and consequences of their violation;
- apply Mathematics as a language to describe and model a wide range of situations relevant to research or industry, choosing appropriate solution methods and interpreting results;
- solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identify key issues and try different approaches in order to make progress;
- develop programming skills and practices to further mathematical understanding and solve mathematical problems;
- manage and evaluate your learning, making appropriate choices for your self-development and use appropriate support and resources;
- work and plan effectively, both individually and as part of a team, making use of appropriate investigative methods;
- demonstrate in-depth understanding of an area of mathematics through advanced guided study as well as independent research;
- assimilate advanced knowledge to produce a clearly defined written project;
- communicate mathematical understanding of complex topics concisely and accurately to both specialist and non-specialist audiences;
- choose to take up opportunities to engage in teaching others and share their own mathematical ability and understanding;
- demonstrate strong self-efficacy and a deeper understanding of their own learning journey through the completion of advanced material.

Students not eligible for an MSci degree, may be awarded one of the following exit-awards.

**Certificate of Higher Education:** On completion of year 1 of the programme, you will be able to:

- demonstrate knowledge and understanding of core mathematical concepts and principles
- apply basic problem solving skills and mathematical techniques to solve well-defined problem sets
- construct a logical mathematical argument with understanding of the fundamentals, including identifying assumptions and making conclusions
- develop programming skills to solve mathematical problems
- communicate components of core material reasonably clearly to selected audiences
- demonstrate intellectual and personal development through the development of transferable, independent and group study and learning skills.

**Diploma of Higher Education:** On completion of years 1 and 2 of the programme, you will have achieved the above learning outcomes for the Certificate of Higher Education, and will be able to:

- demonstrate more in-depth knowledge and understanding of selected topics in mathematics and begin to develop a fuller appreciation of the subject and its many applications
- apply core concepts and principles both in well-defined contexts as well as more open ended questions and begin to develop understanding of some inter-relationships
- apply a further-developed understanding of deductive reasoning in the construction of logical mathematical arguments
- identify and use different mathematical approaches and techniques to solve and model problems, including understanding where some approaches will not work, and demonstrate skills in calculation and manipulation when solving these problems
- develop programming skills to model problems and further mathematical understanding
- communicate straightforward arguments and conclusions, both in core material and individual research, reasonably accurately and clearly, to varied audiences
- demonstrate personal development through taking ownership of own learning journey and making use of appropriate resources.

**BSc Mathematics (Honours)** degree. On successful completion of years 1,2,3 of the programme, you will be able to:

- appreciate the fundamentals of Mathematics as a living discipline in its own right;

- demonstrate an understanding of core material and more specialised areas by assimilating and applying a large body of complex, inter-related concepts;
- use logical mathematical argument and deductive reasoning, together with formal processes of mathematical proof and development of mathematical theories;
- take a structured mathematical-analytical approach to problem solving, recognising the importance of assumptions made and consequences of their violation;
- apply Mathematics as a language to describe and model a wide range of situations relevant to research or industry, choosing appropriate solution methods and interpreting results;
- solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identify key issues and try different approaches in order to make progress;
- develop programming skills and practices to further mathematical understanding and solve mathematical problems;
- communicate mathematical understanding concisely and appropriately in varied situations and to diverse audiences;
- manage and evaluate your learning, making appropriate choices for your self-development and use appropriate support and resources;
- work and plan effectively, both individually and as part of a team, making use of appropriate investigative methods.

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial degree programme. The Graduate Attributes are available at: https://www.imperial.ac.uk/about/education/our-graduates/

| **Entry Requirements** | |
|---|---|
| Academic Requirement | A-levels: Normally a minimum **A*A*A** overall<br>**A*** in Mathematics<br>**A*** in Further Mathematics<br>**A** in one other A-level (not General Studies or Critical Thinking)<br><br>IB minimum requirements:<br>**7** in Mathematics at higher level<br>**6** in another subject at higher level<br>Preferred Mathematics syllabus: Mathematics Analysis and Approaches or the Applications and Interpretation syllabi will be accepted at higher level, but Analysis and Approaches is preferred.<br><br>For further information on entry requirements, please go to www.imperial.ac.uk/study/apply/undergraduate/entry-requirements/ |
| Non-academic Requirements | N/A |
| English Language Requirement | Higher requirement<br>Please check for other Accepted English Qualifications |
| Admissions Test/Interview | All applicants should take the Test of Mathematics for University Admission (TMUA) as part of the application process for this course.<br>STEP may be asked for additionally.<br>No interview. |

The programme's competency standards documents can be found at: www.imperial.ac.uk/mathematics/undergraduate/course-structure-and-content/

**Learning & Teaching Approach**

**Learning and Teaching Delivery Methods**

You will learn though a combination of lectures, problem classes, tutorials, computing lab classes, group work and self-study. Support for learning, in the form of tutorials and problem classes, is tapered. It is greater in the early stages of the programme, allowing you to develop into a fully-independent learner by the end of the programme.

**Lectures**
Typically, a 5 ECTS module will have 20 lectures. In the core modules in years 1 and 2, you will be together with your whole cohort. In elective modules, particularly in year 3, the class size can be much smaller. Lecturers will take a variety of approaches. In some lectures, the lecturer will focus on presenting new material, often writing out arguments, examples and calculations by hand and adjusting the pace of the delivery to suit students' understanding. In other lectures, you may be expected to have studied material beforehand and the lecture will be an interactive session to develop your understanding.

**Tutorials**
In terms 1 and 2 of year 1, you will have a weekly tutorial with a staff member (usually your personal tutor) as part of a small group (around 5 or 6). You will also have a 'peer-tutorial' with a higher-year undergraduate or MSc student.

**Problem-solving and group learning classes**
In addition to lectures, most year 1 and 2 modules are supported by timetable classes delivered by at least one staff member, normally the lecturer, supported by a team of Graduate Teaching Assistants. The classes are usually delivered to all students on the module, divided into a number of rooms. You will be expected to prepare for these classes by working on problem sheets produced by the lecturers. Activities in the classes can include: working in small groups with the assistance of a GTA or the lecturer; engaging with presentations of solutions to the problems or working on challenging unseen problems individually or in groups.
In year 3, lecturers will include regular problem-solving sessions as part of their timetabled lectures.

**Independent learning**
You will be expected to spend a substantial amount of time on independent study. This will include preparation for and working on material from lectures; working through problem sheets and other formative assignments either individually or in groups; other preparation for tutorials and problem-solving/ group learning classes; producing coursework for submission and assessment; preparation for examinations.

**Group Learning**
You will have the opportunity to work in groups through tutorials, problem-solving classes, projects and assessments. These opportunities will give you the opportunity to deepen your mathematical understanding and develop improved communications and team work skills.

**Research Projects**
In term 3 of years 1 and 2, you will undertake a short research-oriented project. The year 1 project is an individual project and the year 2 project is a group project (in a group of around 5 students) directed by a member of staff. In year 4, you will complete a 15 ECTS Research Project under the guidance and supervision of a member of staff.

**Overall Workload**
Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the indicative total study time is 1500 hours per year. As these are indicative study times, you may need to make reasonable adjustments to these suggested times to account for your individual learning style.

During year 1 you will typically spend around 22 percent (330 hours) of your time in lectures, problem classes and tutorials. In year 2 it will be around 20 percent (300 hours), around 16 percent (240 hours) in year 3, and around 12 percent (180 hours) in year 4. The remaining time is for self-study (including project work).

**Assessment Strategy**

## Assessment Methods

A variety of assessment methods will be used to test your understanding. Assessments may be formative, summative or both.

**Formative assessments** do not contribute to the module mark but provide information on your progress as an individual and in the context of your peers. This allows you to learn by using your new skills to solve problems and receive feedback on your performance to guide your future learning. This supports you to achieve a better performance in the summative assessments which do count towards your module marks. Common types of formative assessment used include: regular question sheets, questions posed by a lecturer in lectures, and exercises set by your tutor or peer-tutor.

**Summative assessments** are used to assess your learning against the intended module learning outcomes and contribute towards your achievement of the programme learning outcomes, detailed above. All modules contain aspects of summative assessment and these assessments will contribute towards your mark for each year. Usually the grades for summative assessment are assigned by lecturers or graduate teaching assistant but occasionally your work will be peer assessed (i.e., your grade is provided by one or more of your fellow students). The choice of summative assessment method is largely determined by the nature of the module and its learning outcomes.
A variety of different summative assessment methods is used, including:

- Written examinations
- Short, individual tests
- Group assignments and projects
- Individual Projects
- Online tests and quizzes
- Oral presentations
- Poster presentations.

Lecture modules in all years typically involve an end-of-year examination and some element of coursework or short tests during the module. In year 1 the end-of-year examination is usually worth 70 percent of the module; this typically increases to 80 percent in year 2 and 90 percent in years 3 and 4. Some modules, notably ones with a high computational or data analysis element, may have a higher proportion of coursework or may be assessed entirely a number of projects (which may also involve presentations).

## Academic Feedback Policy

Feedback will be provided in a number of formats, including:

- Oral (i.e. face-to-face) during problem classes and tutorials
- Personal (discussion with staff)
- Written (e.g. model answers, group feedback, individual comments written on coursework)
- Interactive (online quizzes).

Oral feedback on formative work is available in problem classes, lecturers' office hours and tutorials.

Written feedback on coursework and tests will normally be provided within 2 weeks.

Written feedback is provided on projects.

As feed-forward, you may view and discuss with an appropriate lecturer the marked scripts from your year 1 and 2 exams. Model solutions to all Mathematics exam papers are normally made available to students, together with comments from markers about performance on the papers.

Imperial's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

| Re-sit Policy |
|---|
| Imperial's Policy on Re-sits is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/ |
| Mitigating Circumstances Policy |
| Imperial's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/ |

| Additional Programme Costs | | |
|---|---|---|
| This section should outline any additional costs relevant to this programme which are not included in students' tuition fees. | | |
| Description | Mandatory/Optional | Approximate cost |
| N/A | N/A | N/A |

**Important notice**: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

**Programme Structure**[1]

**Year 1 – FHEQ Level 4**
**You will study all core/ compulsory modules.**

| Code | Module Title | Core/ Compulsory/ Elective | Group* | Term | Credits |
|---|---|---|---|---|---|
| MATH40001 | Introduction to University Mathematics | Core (pass/fail) | - | Autumn | 5 |
| MATH40002 | Analysis 1 | Core | - | Autumn-Spring | 10 |
| MATH40003 | Linear Algebra and Groups | Core | - | Autumn-Spring | 10 |
| MATH40004 | Calculus and Applications | Core | - | Autumn-Spring | 10 |
| MATH40005 | Probability and Statistics | Core | - | Autumn-Spring | 10 |
| MATH40006 | Introduction to Computation | Core | - | Autumn-Spring | 5 |
| MATH40007 | An Introduction to Applied Mathematics | Compulsory | - | Spring | 5 |
| MATH40008 | Individual Research Project | Core | - | Summer | 5 |
| | | | | Credit Total | 60 |

**Year 2 - FHEQ Level 5**
**You will study all core modules. Select one module from Group A and 4 modules from Group B. Electives can be prerequisites for year 3 and 4 modules, but you will be advised about such dependencies prior to making their choice of year 2 electives; prerequisites can be varied at the discretion of the Department.**

| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
|---|---|---|---|---|---|
| MATH50001 | Analysis 2 | Core | - | Autumn-Spring | 10 |
| MATH50003 | Linear Algebra and Numerical Analysis | Core | - | Autumn-Spring | 10 |

[1] **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

| | | | | | |
|---|---|---|---|---|---|
| MATH50004 | Multivariable Calculus and Differential Equations | Core | - | Autumn-Spring | 10 |
| MATH50002 | Group Research Project | Core | - | Summer | 5 |
| | I-Explore | Compulsory (pass/ fail) | A | Autumn &/or Spring | 5 or 7.5 |
| MATH50005 | Groups and Rings | Elective | B | Autumn | 5 |
| MATH50007 | Network Science (not running in 2025-26) | Elective | B | Spring | 5 |
| MATH50010 | Probability for Statistics | Elective | B | Autumn | 5 |
| MATH50006 | Lebesgue Measure and Integration | Elective | B | Spring | 5 |
| MATH50008 | Partial Differential Equations in Action | Elective | B | Spring | 5 |
| MATH50009 | Principles of Programming | Elective | B | Autumn | 5 |
| MATH50011 | Statistical Modelling | Elective | B | Spring | 5 |
| MATH50020 | Classical Mechanics | Elective | B | Spring | 5 |
| | | | | Credit Total | 60 or 62.5 |

**Year 3 - FHEQ Level 6**
**All group A modules are level 6. The list of modules is indicative. Where a module exists in a level 6 and level 7 version a student will not be permitted to take both versions of the module. You will choose at least 52.5 ECTS from Group A and at most one module from group C; modules must total to at least 60 ECTS, but not more than 62.5. Modules from other departments or level 7 Mathematics modules may be allowed with the permission of DUGS.**

| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
|---|---|---|---|---|---|
| MATH60001 | Fluid Dynamics 1 | Elective | A | Autumn | 7.5 |
| MATH60004 | Asymptotic Methods | Elective | A | Autumn | 7.5 |
| MATH60006 | Applied Complex Analysis | Elective | A | Spring | 7.5 |
| MATH60007 | Dynamics of Learning and Iterated Games | Elective | A | Autumn | 7.5 |
| MATH60008 | Dynamical Systems | Elective | A | Autumn | 7.5 |
| MATH60011 | Classical Dynamics (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH60012 | Mathematical Finance: An Introduction to Option Pricing | Elective | A | Autumn | 7.5 |
| MATH60014 | Mathematical Biology | Elective | A | Autumn | 7.5 |

| | | | | | |
|---|---|---|---|---|---|
| MATH60015 | Quantum Mechanics 1 | Elective | A | Autumn | 7.5 |
| MATH60016 | Special Relativity and Electromagnetism | Elective | A | Autumn | 7.5 |
| MATH60019 | Theory of Partial Differential Equations | Elective | A | Autumn | 7.5 |
| MATH60020 | Function Spaces and Applications (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH60023 | Computational Dynamical Systems | Elective | A | Autumn | 7.5 |
| MATH60024 | Computational Linear Algebra | Elective | A | Autumn | 7.5 |
| MATH60026 | Methods for Data Science | Elective | A | Spring | 7.5 |
| MATH60029 | Functional Analysis | Elective | A | Spring | 7.5 |
| MATH60031 | Probability Theory 2 | Elective | A | Autumn | 7.5 |
| MATH60032 | Geometry of Curves and Surfaces | Elective | A | Spring | 7.5 |
| MATH60033 | Algebraic Curves | Elective | A | Autumn | 7.5 |
| MATH60034 | Algebraic Topology | Elective | A | Spring | 7.5 |
| MATH60035 | Algebra 3 | Elective | A | Autumn | 7.5 |
| MATH60036 | Group Theory | Elective | A | Autumn | 7.5 |
| MATH60038 | Graph Theory | Elective | A | Autumn | 7.5 |
| MATH60041 | Number Theory | Elective | A | Autumn | 7.5 |
| MATH60045 | Applied Probability | Elective | A | Autumn | 7.5 |
| MATH60046 | Time Series Analysis | Elective | A | Spring | 7.5 |
| MATH60047 | Stochastic Simulation | Elective | A | Autumn | 7.5 |
| MATH60049 | Introduction to Statistical Learning | Elective | A | Spring | 7.5 |
| MATH60002 | Fluid Dynamics 2 | Elective | A | Spring | 7.5 |
| MATH60003 | Introduction to Geophysical Fluid Dynamics | Elective | A | Spring | 7.5 |
| MATH60005 | Optimisation | Elective | A | Autumn | 7.5 |
| MATH60009 | Bifurcation Theory | Elective | A | Spring | 7.5 |
| MATH60010 | Geometric Mechanics (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH60142 | The Mathematics of Business and Economics (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH60017 | Tensor Calculus and General Relativity | Elective | A | Spring | 7.5 |
| MATH60018 | Quantum Mechanics 2 | Elective | A | Spring | 7.5 |

| | | | | | |
|---|---|---|---|---|---|
| MATH60021 | Advanced Partial Differential Equations 2 | Elective | A | Spring | 7.5 |
| MATH60022 | Finite Elements: Numerical Analysis and Implementation | Elective | A | Spring | 7.5 |
| MATH60025 | Computational Partial Differential Equations | Elective | A | Spring | 7.5 |
| MATH60027 | Scientific Computation (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH60028 | Probability Theory 1 | Elective | A | Autumn | 7.5 |
| MATH60030 | Fourier Analysis and the Theory of Distributions | Elective | A | Spring | 7.5 |
| MATH60037 | Galois Theory | Elective | A | Autumn | 7.5 |
| MATH60039 | Group Representation Theory | Elective | A | Spring | 7.5 |
| MATH60040 | Formalising Mathematics | Elective | A | Spring | 7.5 |
| MATH60042 | Algebraic Number Theory | Elective | A | Spring | 7.5 |
| MATH60043 | Statistical Theory | Elective | A | Spring | 7.5 |
| MATH60044 | Applied Statistical Inference | Elective | A | Autumn | 7.5 |
| MATH60048 | Survival Models | Elective | A | Spring | 7.5 |
| MATH60050 | Research Project in Mathematics | Elective | A | Spring-Summer | 7.5 |
| MATH60130 | Stochastic Differential Equations in Financial Modelling | Elective | A | Autumn | 7.5 |
| MATH60132 | Mathematical Logic | Elective | A | Spring | 7.5 |
| MATH60131 | Consumer Credit Risk Modelling (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH60137 | Mathematical Biology 2: Systems Biology | Elective | A | Spring | 7.5 |
| MATH60138 | Rough Paths and Applications to Machine Learning (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH60139 | Spatial Statistics | Elective | A | Spring | 7.5 |
| MATH60140 | Geometric Complex Analysis | Elective | A | Spring | 7.5 |
| MATH60141 | Introduction to Game Theory | Elective | A | Autumn | 7.5 |
| MATH60143 | Dynamics, Symmetry and Integrability | Elective | A | Spring | 7.5 |
| MATH60146 | Advanced Dynamical Systems (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH60147 | Statistical Mechanics | Elective | A | Autumn | 7.5 |
| MATH60135 | Advanced Partial Differential Equations 1 | Elective | A | Autumn | 7.5 |

| | | | | | |
|---|---|---|---|---|---|
| MATH60054 | Introduction to Stochastic Differential Equations and Diffusion Processes | Elective | A | Autumn | 7.5 |
| MATH60148 | Probabilistic Generative Models (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH50005 | Groups and Rings | Elective (level 5) | B | Autumn | 5 |
| MATH50007 | Network Science (not running in 2025-26) | Elective (level 5) | B | Spring | 5 |
| MATH50010 | Probability for Statistics | Elective (level 5) | B | Autumn | 5 |
| MATH50006 | Lebesgue Measure and Integration | Elective (level 5) | B | Spring | 5 |
| MATH50008 | Partial Differential Equations in Action | Elective (level 5) | B | Spring | 5 |
| MATH50009 | Principles of Programming | Elective (level 5) | B | Autumn | 5 |
| MATH50011 | Statistical Modelling | Elective (level 5) | B | Spring | 5 |
| MATH50020 | Classical Mechanics | Elective (level 5) | B | Spring | 5 |
| | Horizons or BPES module | Elective | C | Autumn &/or Spring | 5 or 7.5 |
| | | | | Credit Total | 60-62.5 ECTS |

**Year 4 - FHEQ Level 7**
**All modules are level 7. The list of modules is indicative. You will choose 6 modules from Group A. You may not take both the level 6 and level 7 version of a module. Modules from other departments may be allowed with the permission of DUGS.**

| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
|---|---|---|---|---|---|
| MATH70050 | Research Project in Mathematics | Core | - | Autumn-Summer | 15 |
| MATH70001 | Fluid Dynamics 1 | Elective | A | Autumn | 7.5 |
| MATH70004 | Asymptotic Methods | Elective | A | Autumn | 7.5 |
| MATH70006 | Applied Complex Analysis | Elective | A | Spring | 7.5 |

| | | | | | |
|---|---|---|---|---|---|
| MATH70007 | Dynamics of Learning and Iterated Games | Elective | A | Autumn | 7.5 |
| MATH70008 | Dynamical Systems | Elective | A | Autumn | 7.5 |
| MATH70011 | Classical Dynamics (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH70012 | Mathematical Finance: An Introduction to Option Pricing | Elective | A | Autumn | 7.5 |
| MATH70014 | Mathematical Biology | Elective | A | Autumn | 7.5 |
| MATH70015 | Quantum Mechanics 1 | Elective | A | Autumn | 7.5 |
| MATH70016 | Special Relativity and Electromagnetism | Elective | A | Autumn | 7.5 |
| MATH70019 | Theory of Partial Differential Equations | Elective | A | Autumn | 7.5 |
| MATH70020 | Function Spaces and Applications (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH70023 | Computational Dynamical Systems | Elective | A | Autumn | 7.5 |
| MATH70024 | Computational Linear Algebra | Elective | A | Autumn | 7.5 |
| MATH70026 | Methods for Data Science | Elective | A | Spring | 7.5 |
| MATH70029 | Functional Analysis | Elective | A | Spring | 7.5 |
| MATH70031 | Probability Theory 2 | Elective | A | Autumn | 7.5 |
| MATH70032 | Geometry of Curves and Surfaces | Elective | A | Spring | 7.5 |
| MATH70033 | Algebraic Curves | Elective | A | Autumn | 7.5 |
| MATH70034 | Algebraic Topology | Elective | A | Spring | 7.5 |
| MATH70035 | Algebra 3 | Elective | A | Autumn | 7.5 |
| MATH70036 | Group Theory | Elective | A | Autumn | 7.5 |
| MATH70038 | Graph Theory | Elective | A | Autumn | 7.5 |
| MATH70041 | Number Theory | Elective | A | Autumn | 7.5 |
| MATH70045 | Applied Probability | Elective | A | Autumn | 7.5 |
| MATH70046 | Time Series Analysis | Elective | A | Autumn | 7.5 |
| MATH70047 | Stochastic Simulation | Elective | A | Autumn | 7.5 |
| MATH70054 | Introduction to Stochastic Differential Equations and Diffusion Processes | Elective | A | Autumn | 7.5 |
| MATH70058 | Manifolds | Elective | A | Autumn | 7.5 |
| MATH70061 | Commutative Algebra | Elective | A | Autumn | 7.5 |
| MATH70064 | Elliptic Curves | Elective | A | Autumn | 7.5 |

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| MATH70002 | Fluid Dynamics 2 | Elective | A | Spring | 7.5 |
| MATH70003 | Introduction to Geophysical Fluid Dynamics | Elective | A | Spring | 7.5 |
| MATH70005 | Optimisation | Elective | A | Autumn | 7.5 |
| MATH70009 | Bifurcation Theory | Elective | A | Spring | 7.5 |
| MATH70010 | Geometric Mechanics (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH70143 | Dynamics, Symmetry and Integrability | Elective | A | Spring | 7.5 |
| MATH70017 | Tensor Calculus and General Relativity | Elective | A | Spring | 7.5 |
| MATH70018 | Quantum Mechanics 2 | Elective | A | Spring | 7.5 |
| MATH70021 | Advanced Partial Differential Equations 2 | Elective | A | Spring | 7.5 |
| MATH70022 | Finite Elements: Numerical Analysis and Implementation | Elective | A | Spring | 7.5 |
| MATH70025 | Computational Partial Differential Equations | Elective | A | Spring | 7.5 |
| MATH70027 | Scientific Computation (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH70028 | Probability Theory 1 | Elective | A | Autumn | 7.5 |
| MATH70030 | Fourier Analysis and the Theory of Distributions | Elective | A | Spring | 7.5 |
| MATH70037 | Galois Theory | Elective | A | Autumn | 7.5 |
| MATH70039 | Group Representation Theory | Elective | A | Spring | 7.5 |
| MATH70040 | Formalising Mathematics | Elective | A | Spring | 7.5 |
| MATH70042 | Algebraic Number Theory | Elective | A | Spring | 7.5 |
| MATH70043 | Statistical Theory | Elective | A | Spring | 7.5 |
| MATH70044 | Applied Statistical Inference | Elective | A | Autumn | 7.5 |
| MATH70048 | Survival Models | Elective | A | Spring | 7.5 |
| MATH70049 | Introduction to Statistical Learning | Elective | A | Spring | 7.5 |
| MATH70051 | Vortex Dynamics | Elective | A | Spring | 7.5 |
| MATH70052 | Hydrodynamic Stability | Elective | A | Spring | 7.5 |
| MATH70053 | Random Dynamical Systems and Ergodic Theory | Elective | A | Spring | 7.5 |
| MATH70055 | Stochastic Calculus and Applications to Non-linear Filtering | Elective | A | Spring | 7.5 |
| MATH70056 | Algebraic Geometry | Elective | A | Spring | 7.5 |
| MATH70057 | Riemannian Geometry | Elective | A | Spring | 7.5 |

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| MATH70059 | Differential Topology | Elective | A | Spring | 7.5 |
| MATH70060 | Complex Manifolds | Elective | A | Spring | 7.5 |
| MATH70062 | Lie Algebras | Elective | A | Autumn | 7.5 |
| MATH70063 | Algebra 4 | Elective | A | Spring | 7.5 |
| MATH70131 | Consumer Credit Risk Modelling (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH70130 | Stochastic Differential Equations in Financial Modelling | Elective | A | Autumn | 7.5 |
| MATH70134 | Mathematical Foundations of Machine Learning | Elective | A | Spring | 7.5 |
| MATH70135 | Advanced Partial Differential Equations 1 | Elective | A | Autumn | 7.5 |
| MATH70132 | Mathematical Logic | Elective | A | Spring | 7.5 |
| MATH70137 | Mathematical Biology 2: Systems Biology | Elective | A | Spring | 7.5 |
| MATH70138 | Rough Paths and Applications to Machine Learning (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH70139 | Spatial Statistics | Elective | A | Spring | 7.5 |
| MATH70140 | Geometric Complex Analysis | Elective | A | Spring | 7.5 |
| MATH70141 | Introduction to Game Theory | Elective | A | Autumn | 7.5 |
| MATH70142 | The Mathematics of Business and Economics (not running in 2025-26) | Elective | A | Spring | 7.5 |
| MATH70146 | Advanced Dynamical Systems | Elective | A | Spring | 7.5 |
| MATH70147 | Statistical Mechanics | Elective | A | Autumn | 7.5 |
| MATH70066 | Advanced Topics in Mathematics (not running in 2025-26) | Elective | A | Autumn | 7.5 |
| MATH70148 | Probabilistic Generative Models | Elective | A | Autumn | 7.5 |
| | | | | Credit Total | 60 |

* ‘Group’ refers to module grouping (e.g. a group of electives from which one/two module(s) must be chosen).

Progression and Classification

**Progression**

In order to progress to the next level of study, you must have passed all modules (equivalent to 60 ECTS) in the current level of study at first attempt, at resit or by a compensated pass.

In order for you to progress to the next year of the programme, the overall aggregate mark for the year, including where a module(s) has been compensated, must normally be as follows:
year 1: 40.00 percent
year 2: 60.00 percent
year 3: 58.00 percent.

A student who fails to meet the above threshold in year 2 may remain on the G103 programme if they have a year 2 aggregate mark of at least 55.00 percent. However, they will normally be required to achieve an aggregate mark of at least 60.00 percent in year 3.

A student who is not permitted to remain on G103 for year 3 will be transferred to a BSc degree.

A student who is not permitted to remain on G103 for year 4 will graduate with an appropriate exit award (BSc/ Dip HE).

In year 1 the Board of Examiners may apply compensation in non-core modules up to a value of 5 ECTS.

In year 2 the Board of Examiners may apply compensation in elective modules up to a value of 5 ECTS.

In year 3 the Board of Examiners may apply compensation in elective modules up to a value of 7.5 ECTS

In year 4 the Board of Examiners may apply compensation in elective modules up to a value of 15 ECTS

**Classification**

The raw marks from each assessment will be weighted and combined to produce a raw module mark; the raw module mark will then be converted to a 0-100 scale.

Due to the nature of Mathematics as an academic discipline it is often necessary for module marks to be scaled in order to ensure comparability across modules and so that they map appropriately onto the undergraduate degree classification system. In accordance with the Regulations, this process is applied consistently to all students in the cohort and reported to External Examiners and the Board of Examiners. Further details regarding the Department's approach to scaling may be found in the programme handbook.

The agreed mark for each module will be used to calculate year marks and final classifications using a weighted average. Pass fail/ modules in any year will be zero-weighted in computing the year average.

Aggregate marks from each year will be combined with the following percentage weightings to produce an overall aggregate mark:

Year 1: 7.50 percent
Year 2: 20.00 percent
Year 3: 36.25 percent
Year 4: 36.25 percent.

In order to be considered for an award, you must have achieved the minimum number of credits at the required levels prescribed for that award and met any programme specific requirements as set out in the Programme Specification.

Your classification will be determined through:

i) Aggregate Module marks for all modules
ii) Year Weightings

This is known as the Programme Overall Weighted Average.

In a case where a student has accumulated more than 60 ECTS in year 3, modules in option range A will be weighted as if the student had taken 60 ECTS; modules in option ranges B and C will have reduced weighting.

The university sets the class of undergraduate degree that may be awarded as follows:

| | | |
|---|---|---|
| i) | First | 70.00% or above for the average weighted module results |
| ii) | Upper Second | 60.00% or above for the average weighted module results |
| iii) | Lower Second | 50.00% or above for the average weighted module results |
| iv) | Third | 40.00% or above for the average weighted module results |

Please find the full Academic Regulations at www.imperial.ac.uk/about/governance/academic-governance/regulations/. Please follow the prompts to find the set of regulations relevant to your programme of study.

Programme Specific Regulations

Note the comments regarding scaling and treatment of 'excess' credit.

| **Supporting Information** |
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| The Programme Handbook is available from the department. |
| The Module Handbook is available from the department. |
| Imperial's entry requirements for postgraduate programmes can be found at:<br>www.imperial.ac.uk/study/pg/apply/requirements |
| Imperial's Quality & Enhancement Framework is available at:<br>www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance |
| Imperial's Academic and Examination Regulations can be found at:<br>www.imperial.ac.uk/about/governance/academic-governance/regulations |
| Imperial College London is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of Imperial's Centenary, 8th July 2007, established Imperial as a University with the name and style of "The Imperial College of Science, Technology and Medicine".<br>www.imperial.ac.uk/admin-services/secretariat/university-governance-structure/charters/ |
| Imperial College London is regulated by the Office for Students (OfS)<br>www.officeforstudents.org.uk/advice-and-guidance/the-register/ |
| **This document provides a definitive record of the main features of the programme and the learning outcomes that you may reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.** |