Imperial College London

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information		
Programme Title	Programme Code	HECoS Code
Pure Mathematics	G1U3 (1YFT) G1U324 (2YPT)	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc - G1U3	1 Calendar Year (12 months)	Full-Time	Annually in October	90	180
MSc - G1U324	2 Calendar Years (24 months)	Part-Time	Annually in October	90	180
PG Diploma	1 Calendar Year (12 months)	Full-Time	*	60	120
PG Diploma	2 Calendar Yeas (24 months)	Part-Time	*	60	120
PG Certificate	1 Calendar Year (12 months)	Full-Time	*	30	60
PG Certificate	2 Calendar Yeas (24 months)	Part-Time	*	30	60

*The PG Certificate and PG Diploma are exit awards and are not available for entry. All students must apply to and join MSc.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Natural Sciences
Teaching Institution	Imperial College London	Department	Mathematics
Associateship	N/A	Main Location(s) of Study	South Kensington Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		Mathematics, Statistics and Operational Research	
FHEQ Level		Level 7	
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. Travis Schedler, MSc Pure Mathematics Programme Director	
Student cohorts covered by specification		2022-23 entry	
Date of introduction of programme		October 21	
Date of programme specification/revision		October 22	

Programme Overview

This course will provide you with outstanding training in advanced Pure Mathematics.

We offer a variety of modules in core subjects of Pure Mathematics together with a range of more specialised options, and a substantial research project, reflecting broad research interests of the Pure Mathematics section. The Pure Mathematics section is consistently rated one of the top in the country for research, with particular strengths in geometry, number theory, algebra and analysis.

The full time MSc consists of a twelve-month programme in which you will take eight taught courses and work on an independent written project under the direction of a supervisor. This will allow you to design your own learning plan in line with your unique background, interests and the field in which you wish to do your research project. You will choose their MSc project supervisor and topic in late November and start work on it early in the second term, and then full-time over the summer. More information on the structure and regulations of the program and details of assessment can be found in the Course Handbook, which is available on the current MSc students page.

The set of skills obtained during the Pure Mathematics MSc programme is well suited for continuing to PhD level research in pure mathematics. The mathematical skills in problem-solving, project work and presentation are highly transferable and will enable you to take a role in a variety of situations in employment and research. Our graduates find employment in the fields of Education, Research, Actuarial Analysis, Risk Analysis, Investment Banking, Management Consultancy.

Learning Outcomes

Students who have fulfilled all the requirements of the programme will be awarded an MSc. On successful completion of the programme, our aim is that you will have achieved the following Learning Outcomes (divided into three groups):

1. Outcomes from modules element
   - Explore the role of rigorous mathematical argument and deductive reasoning, and apply them through formal processes of mathematical proof and development of mathematical theories.
   - Manipulate precise and intricate ideas and construct logical arguments using appropriate terminology.
   - Communicate effectively using a variety of modes and media including written, oral and digital forms.
2. Advanced outcomes from modules element
   - Exercise deep conceptual understanding of one or more branches of pure mathematics.
   - Use mathematics as a language in a wide range of situations relevant to research.

- Demonstrate independent learning of mathematical constructions and methods.
- Assimilate a large body of complex concepts and their inter-relationships.
- Solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identifying key issues and trying different approaches in order to make progress.
3. Outcomes from research-project element
   - Demonstrate critical thinking and creativity and innovatively apply mathematical skills to tackle complex research problems
   - Design a research project with set hypotheses and objectives within the context of a wide body of scientific literature that you have reviewed.
   - Communicate your expertise in relation to a particular research topic, both orally and in writing.

Students not eligible for an MSc degree, may be awarded exit awards (see "Progression and Classification"). Our aim is that a student awarded a (i) PG Certificate based on four modules would achieve the outcomes in group 1; (ii) PG Certificate based on the project element would achieve the outcomes in groups 3; (iii) PG Diploma based on eight modules would achieve the outcomes in groups 1 and 2; (iv) PG Diploma based on four modules and the project element would achieve the outcomes in groups 1 and 3.

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Entry Requirements

Academic Requirement	Normally a 2.1 UK Bachelor's Degree with Honours in mathematics (or a comparable qualification recognised by the College). For further information on entry requirements, please go to: www.imperial.ac.uk/study/pg/apply/requirements/pgacademic
Non-academic Requirements	N/A
English Language Requirement	Standard requirement (PG) Please check for other Accepted English Qualifications
Admissions Test/Interview	N/A

The programme's competency standards documents can be found at: **TBA**

Learning & Teaching Approach

Learning and Teaching Delivery Methods

- Lectures
- Problem sheets
- Assessed coursework
- Individual student/lecturer consultations, including meetings with personal tutors and project supervisors
- Problem classes
- Office hours
- Research seminars

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 2250 hours over the entire MSc programme (including the summer), this being composed of roughly 1500 hours associated with modules and 750 hours with the research project. As these are indicative study times, you may need to make reasonable adjustments to these suggested times to account for your individual learning style.

You will spend around 300 hours in lectures, problem classes and tutorials over the entire MSc programme. The remaining time is for self-study (including project work) and meetings with your project supervisor.

Assessment Strategy
Assessment Methods

- Examination (usually 90% of module mark)
- Coursework (usually 10% of module mark)
- Dissertation (90% of research project mark)
- Oral assessment (10% of research project mark)

Academic Feedback Policy

Any assessed coursework done as part of a module will be marked and returned to the student within two weeks. Students are encouraged to discuss difficulties with the module lecturer.

There is access to lecturers informally and through a formal 'office hours' system. Two meetings with personal tutors are also held in each term. Another feedback channel is through the student representatives, which also take part in staff-student committee meetings.

Indicative feedback from the Programme Director or module leader about the outcome of the May-June examinations.

On the project, students will meet their supervisor, typically weekly, to discuss their progress. They should choose modules to complement their project, and discuss their work on these with their supervisor.

Students will submit an early report to their project supervisor (shortly following the May-June examinations), formulated as an extended project proposal, which may include a literature review, description of the problem to be addressed and its background, and preliminary results if available. The project supervisors will meet with the students shortly afterwards to provide the student with feedback on their progress.

The students will also receive comments on their project report and oral presentations.

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Additional Programme Costs

No additional costs are anticipated.

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]

FHEQ Level 7
Full-time students choose 4 modules in term 1 and 4 modules in term 2. Work on the individual research project should begin during term 2, with the majority of the work carried out during term 3 and the summer. **Part-time students choose 4 modules in Year 1 and 4 modules in Year 2 (usually 2 modules per term). They normally spread the work on the project over both years.**

Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
MATH70028	Probability Theory	Elective	-	2	7.5ECTS
MATH70029	Functional Analysis	Elective	-	1	7.5ECTS
MATH70030	Fourier Analysis and Theory of Distributions	Elective	-	2	7.5ECTS
MATH70055	Stochastic Calculus with Applications to non-Linear Filtering	Elective	-	2	7.5ECTS
MATH70031	Markov Processes	Elective	-	2	7.5ECTS
MATH70032	Geometry of Curves and Surfaces	Elective	-	2	7.5ECTS
MATH70033	Algebraic Curves	Elective	-	1	7.5ECTS
MATH70034	Algebraic Topology	Elective	-	2	7.5ECTS
MATH70056	Algebraic Geometry	Elective	-	2	7.5ECTS
MATH70057	Riemannian Geometry	Elective	-	2	7.5ECTS
MATH70058	Manifolds	Elective	-	1	7.5ECTS
MATH70059	Differential Topology	Elective	-	2	7.5ECTS
MATH70060	Complex Manifolds	Elective	-	2	7.5ECTS
MATH70035	Algebra 3	Elective	-	1	7.5ECTS
MATH70036	Group Theory	Elective	-	1	7.5ECTS
MATH70037	Galois Theory	Elective	-	2	7.5ECTS
MATH70038	Graph Theory	Elective	-	2	7.5ECTS
MATH70039	Group Representation Theory	Elective	-	2	7.5ECTS
MATH70040	Formalising Mathematics	Elective		2	7.5ECTS
MATH70061	Commutative Algebra	Elective	-	1	7.5ECTS
MATH70062	Lie Algebras	Elective		1	7.5ECTS

[1]In some cases, students may also take modules from the Department's Applied Mathematics MSc and in exceptional cases certain modules from other Master's courses in the department and college, with approval of the involved programme. Students may also take modules from the Department's Undergraduate courses up to a maximum of 15 ECTS at level 6 of the FHEQ with approval of the MSc Programme Director. In any case, no more than 15 ECTS points (divided between at most two modules) can be taken from outside the list herein.

MATH70063	Algebra 4	Elective	-	2	7.5ECTS
MATH70041	Number Theory	Elective	-	1	7.5ECTS
MATH70042	Algebraic Number Theory	Elective	-	2	7.5ECTS
MATH70064	Elliptic Curves	Elective	-	2	7.5ECTS
MATH70135	Analytic Methods in Partial Differential Equations	Elective	-	2	7.5ECTS
MATH70132	Mathematical Logic	Elective	-	1	7.5ECTS
MATH70086	Pure Mathematics Research Project	Core	-	2,3 & summer	30 ECTS
				Credit Total	90ECTS

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.

Progression and Classification

Degree classification is based on assessment results from each of the 8 modules and project mark (each of these assessment results is on the 0-100 scale). These results are then combined, weighted by ECTS, to produce the overall weighted average which is used for the purpose of degree classification.

Example: module results of 65, 73, 63, 79, 55, 71, 79, 72 (60 ECTS) along with a project mark of 73 (30 ECTS) would produce an overall weighted average of 71.4.

Award and Classification for Postgraduate Students

Award of a MSc Degree
To qualify for the award of the Pure Mathematics MSc degree a student must have:
1. accumulated credit to the value of no fewer than 90 credits at level 6 or above of which at least 75 must be from credit level 7;
2. and no more than 15 credits as a Compensated Pass;

Classification of Postgraduate Taught Awards

1. Distinction:
   a. The student has achieved an overall weighted average of 70.00% or above across the programme.
   b. Students must normally achieve a distinction (70.00%) mark in the research project element of the MSc in order to be awarded a distinction.

2. Merit:
   a. The student has achieved an overall weighted average of above 60.00%.
   a. Students must normally achieve a minimum of a merit (60.00%) mark in the research project element in order to be awarded a merit.

3. Pass: The student has achieved an overall weighted average of 50.00%.

Modules taken at level 6 as part of the programme specification for a named postgraduate award will contribute to the determination of pass, merit or distinction for any taught postgraduate award and are included in the calculation of the overall weighted average.

Overall weighted averages 0.5% from the degree borderlines will be automatically rounded up in accordance with item 13.19 in the regulations. The board of examiners will consider other borderline cases, as they are defined in items 13.20–13.22 of the Regulations for the Examination of BSc, MSci, BEng, MEng, MBBS Degrees.

Exit Degrees:

Award of a Postgraduate Certificate (PG Cert)
To qualify for the award of a postgraduate certificate a student must have a minimum of 30 credits at Level 7 (this may include a maximum of 10 credits from Level 6 where this is approved as part of the award). This may be composed of the project element (worth 30 ECTS), or 30 ECTS worth of modules.

Award of a Postgraduate Diploma (PG Dip)
To qualify for the award of a postgraduate diploma a student must have passed modules to the value of no fewer than 60 credits at Level 7 (this may include a maximum of 15 credits from Level 6 and no more than 10 credits as a Compensated Pass. The 60 credits may include the project element (worth 30 ECTS) and 30 ECTS worth of modules, or 60 ECTS worth of modules.

Programme Specific Regulations

N/A

Supporting Information
The Programme Handbook is available at: www.imperial.ac.uk/mathematics/postgraduate/msc/msc-in-pure-mathematics/current-students/
The Module Handbook is available at: www.imperial.ac.uk/mathematics/postgraduate/msc/msc-in-pure-mathematics/modules/
The College's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/pg/apply/requirements
The College's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
The College's Academic and Examination Regulations can be found at: www.imperial.ac.uk/about/governance/academic-governance/regulations
Imperial College 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 the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine". www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/
Imperial College London is regulated by the Office for Students (OfS) www.officeforstudents.org.uk/advice-and-guidance/the-register/
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Modifications			
Description	**Approved**	**Date**	**Paper Reference**
Conditions for pass/merit/distinction updated to new college regulations, introduced exit degrees (PG Certificate and Diploma), the number of modules increased from 7 to 8, the restriction that at least three modules should be core modules is removed	Department of Mathematics Teaching Committee		