

**MSc Applied Mathematics**

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 s/he takes 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	Applied Mathematics			
Award(s)	MSc			
Programme Code	G1U2 (1YFT)	G1U224 (2YPT)		
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Natural Sciences			
Department	Department of Mathematics			
Mode and Period of Study	1 calendar year, full-time (12 months) or 2 calendar years, part-time (24 months)			
Cohort Entry Points	Annually in October			
Relevant <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points	<a href="#">Mathematics, Statistics and Operational Research</a>			
Total Credits	ECTS:	90	CATS:	180
<a href="#">FHEQ Level</a>	Level 7			
<a href="#">EHEA Level</a>	2 <sup>nd</sup> cycle			
External Accreditor(s)	None			
<b>Specification Details</b>				
Student cohorts covered by specification	2016/17 entry			
Person responsible for the specification	Ryan Barnett			
Date of introduction of programme				
Date of programme specification/revision	June 2017			

## Description of Programme Contents

This course will provide you with outstanding training in many different aspects of Applied Mathematics.

We offer a great variety of courses with depth of instruction, small classes and a substantial research project.

The skill set obtained during the Applied Mathematics MSc programme is highly transferable, which opens opportunities for a career in industry or for further advanced study in diverse areas ranging from engineering and physics to finance.

The very broad choice of modules available covers all areas of applied mathematics and mathematical physics, reflecting the research interests of the [Applied Mathematics and Mathematical Physics](#) section of the Department of Mathematics.

## Learning Outcomes

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](http://www.imperial.ac.uk/students/academic-support/graduate-attributes)

### Knowledge and Understanding of:

1. The fundamentals of Mathematics as a rigorous living discipline in its own right.
2. The development of the application of Mathematics as a language in a wide range of situations relevant to research and industry.
3. The importance of precision of argument.
4. Problem-solving strategies and methods (including basic computational skills).
5. A selection of subjects which students study in greater depth, according to their interests, leading to current developments at the frontiers of the subject.
6. A particular research topic agreed with a Supervisor, on which the student writes an original account in his or her own words.

### Intellectual Skills:

1. Ability to assimilate and understand a large body of complex concepts and their inter-relationships.
2. Knowledge and understanding of the role of logical mathematical argument and deductive reasoning, together with formal processes of mathematical proof and development of mathematical theories.
3. Use of a structured mathematical analytical approach to problem solving, including the importance of assumptions made and consequences of their violation.
4. Use of Mathematics to describe and model in applications, including appropriate solution methods, and interpretation of results.
5. Carry out extended investigative mathematical work as an individual.

### Practical Skills:

1. Carry out investigative project work as an individual;
2. Use symbolic and numerical software as part of practical computation.

**Transferable Skills:**

1. 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.
2. Carry out an independent investigation using textbooks and other available literature, searching databases and interacting with colleagues and staff to extract important information.
3. Communicate effectively by listening carefully and presenting complex information in a clear and concise manner orally, on paper and using IT.
4. Use analytical skills, paying attention to detail and using technical language correctly, to manipulate precise and intricate ideas, to construct logical arguments.
5. Use IT skills for communication and analysis.
6. Work independently, use their initiative, organise themselves to meet deadlines, plan and execute an extended project.
7. Work and interact constructively with others.

**Entry Requirements**

Academic Requirement	2.1 Honours degree in mathematics, applied mathematics or a related subject, such as engineering or physics.
Non-academic Requirements	None
English Language Requirement	Standard requirements - IELTS 6.5 with no element below 6.0 (or equivalent)

The programme's competency standards document can be found at:

<http://www.imperial.ac.uk/media/imperial-college/faculty-of-natural-sciences/department-of-mathematics/public/study/admissions/pg/msc/DASILVA.pdf>

**Learning & Teaching Strategy**

Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Problem sheets</li> <li>• Individual student/lecturer consultations</li> <li>• Group tutorials</li> <li>• Problem classes</li> <li>• Research seminars</li> </ul>
E-learning & Blended Learning Methods	N/A
Project and Placement Learning Methods	<ul style="list-style-type: none"> <li>• Independent research project</li> </ul>

**Assessment Strategy**

Assessment Methods	<ul style="list-style-type: none"> <li>• Examination</li> <li>• Coursework</li> <li>• Practical</li> <li>• Dissertation</li> <li>• Oral assessment</li> </ul>
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### Academic Feedback Policy

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

There is access to lecturers informally and through a formal 'office hours' system. MSc student meetings are also held in December and February.

Indicative feedback from the Programme Director or module leader after the May-June examinations will be provided.

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.

### Re-sit Policy

The College's Policy on Re-sits is available at: [www.imperial.ac.uk/registry/exams/resit](http://www.imperial.ac.uk/registry/exams/resit)

### Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: [www.imperial.ac.uk/registry/exams](http://www.imperial.ac.uk/registry/exams)

### Programme Structure

Full-time	Pre-session	Autumn Term	Spring Term	Summer Term	Summer Vacation
Core Modules	0	0	0	0	0
Elective Modules	0	4	4	0	0
Projects	0	0	1		
Part-time (Year 1)	Pre-session	Autumn Term	Spring Term	Summer Term	Summer Vacation
Core Modules	0	0	0	0	0
Elective Modules	0	2	2	0	0
Projects	0	0	0	0	0
Part-time (Year 1)	Pre-session	Autumn Term	Spring Term	Summer Term	Summer Vacation
Core Modules	0	0	0	0	0
Elective Modules	0	2	2	0	0
Projects	0	0	1		

Assessment Dates & Deadlines	
Written Examinations	May or June (exceptionally January)
Coursework Assessments	Continuous
Project Deadlines	September
Practical Assessments	Oral assessment normally within a week of project submission.
Assessment Structure	
Marking Scheme	
<p>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.</p> <p>Due to the nature of Mathematics as an academic discipline it is often necessary for these module marks to be scaled in order that they map appropriately onto the British undergraduate degree classification system. In accordance with paragraph 18.4 of the <a href="#">Regulations for the Examination of BSc, MSci, BEng, MEng, MBBS Degrees</a>, this process is conducted in consultation with the relevant External Examiner, applied consistently to all students in the cohort and reported at the final meeting of the Board of Examiners. Further details regarding the Department's approach to scaling (known colloquially as PTEM) may be found in the programme handbook.</p> <p>The Pass Mark for postgraduate Master's level programmes is 50%.</p> <p>A candidate must pass both elements in order to be awarded a degree.</p> <p>To obtain a <b>pass</b> mark, a candidate must:</p> <ul style="list-style-type: none"> <li>• Take 8 module examinations. Earn a pass mark in 6 examinations papers with no mark below 40%, and score an average of at least 50%. A student who earns below 40% in an examination will have to re-sit that paper.</li> <li>• Earn a pass mark (i.e., a score of at least 50%) in the research project.</li> </ul> <p>To obtain a <b>merit</b> mark, a candidate must:</p> <ul style="list-style-type: none"> <li>• Earn a pass mark in all 8 examinations with an average mark of 60% or above, and score 60% or above on the project.</li> </ul> <p>Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60% or greater in each element with the exception of one element AND has obtained a mark of 50% or greater in this latter element.</p> <p>To obtain a <b>distinction</b> mark, a candidate must:</p> <ul style="list-style-type: none"> <li>• Earn a pass mark in all 8 examinations with an average mark of 70% or above, and score 70% or above in the project.</li> </ul> <p>Where appropriate, a Board of Examiners may award a result of distinction where a candidate has</p>	

achieved an aggregate mark of 70% or greater across the programme as a whole AND has obtained a mark of 70% or greater in each element with the exception of one element AND has obtained a mark of 60% or greater in this latter element.

**Module Weightings**

Element (% weighting)	Module	% Module Weighting
Taught Element (67%)	8 x elective modules	12.5% each
Research Element (33%)	Research Project	100%

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
M5A2	Fluid Dynamics I	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A6	Special Relativity and Electromagnetism	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5PA16	Geometric Mechanics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A49	Mathematical Biology	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5F22	Mathematical Finance	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A28	Introduction to Geophysical Fluid Dynamics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A42	Applied Stochastic Processes	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A43	Inference, Control and Driving in Natural Systems	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5M6	Methods of Mathematical Physics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5M7	Asymptotic Analysis	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5M9	Applied Functional Analysis	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5PA23	Dynamical Systems	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5PA38	Advanced Dynamical Systems (Seminar Course)	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
M5N7	Numerical Solution of ODEs	Elective	32	155.5	0	187.5	0%	100%	0%	7	7.5
M5A4	Mathematical Physics I: Quantum Mechanics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A7	Tensor Calculus and General Relativity	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A10	Fluid Dynamics II	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A29	Theory of Complex Systems	Elective	32	155.5	0	187.5	0%	100%	0%	7	7.5
M5A30	Hydrodynamic Stability	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A32	Vortex Dynamics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5A44	Computational Stochastic Processes	Elective	32	155.5	0	187.5	75%	25%	0%	7	7.5
M5M3	Introduction to Partial Differential Equations	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5M8	Advanced topics in Partial Differential Equations	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5PA2	Bifurcation Theory	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5PA36	Ergodic Theory (Seminar Course)	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5N10	Computational Partial Differential	Elective	32	155.5	0	187.5	0%	100%	0%	7	7.5



Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
	Equations										
M5SC	Scientific Computation	Elective	32	155.5	0	187.5	0%	100%	0%	7	7.5
M5MA47	Finite Elements: Numerical Analysis and Implementation	Elective	32	155.5	0	187.5	50%	50%	0%	7	7.5
M5PA48	Dynamics of Games	Elective	32	155.5	0	187.5	0%	60%	40%	7	7.5
M5PA50	Introduction to Riemann Surfaces and Conformal Dynamics	Elective	32	155.5	0	187.5	100%	0%	0%	7	7.5
M5N9	Computational Linear Algebra	Elective	32	155.5	0	187.5	0%	100%	0%	7	7.5
G1U2PROJ	Research Project	Core	0	450	0	450	0%	90%	10%	7	30

In some cases, students may also take modules from the Department's other Master's courses and approved modules from Colleges of the University of London with the approval of the MSc Course Director. 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 Course Director.

## Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/mathematics/postgraduate/msc/msc-in-applied-mathematics/current-students/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/mathematics/postgraduate/msc/msc-in-applied-mathematics/current-students/>

The College's entry requirements for postgraduate programmes can be found at:

[www.imperial.ac.uk/study/pg/apply/requirements](http://www.imperial.ac.uk/study/pg/apply/requirements)

The College's Quality & Enhancement Framework is available at:

[www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance](http://www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance)

The College's Academic and Examination Regulations can be found at:

<http://www3.imperial.ac.uk/registry/proceduresandregulations/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".

<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE)

<http://www.hefce.ac.uk/reg/of/>