

MSc Statistics (Biostatistics)

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	Statistics (Biostatistics)			
Award(s)	MSc			
Programme Code	G3U1B			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Natural Sciences			
Department	Department of Mathematics			
Main Location of Study	South Kensington Campus			
Mode and Period of Study	1 calendar year, full-time (12 months)			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Mathematics, Statistics and Operational Research			
Total Credits	ECTS:	90 – 92.5	CATS:	180-185
FHEQ Level	Level 7			
EHEA Level	2 nd cycle			
External Accrator(s)	Royal Statistical Society			
Specification Details				
Student cohorts covered by specification	2019/20 entry			
Person responsible for the specification	Dr Marina Evangelou			
Date of introduction of programme	October 2012			
Date of programme specification/revision	March 2019			

Programme Overview

Statistical reasoning, tools, and methods are used in almost all employment sectors, including banking and finance, government, medical and scientific research, the pharmaceutical industry, and the digital economy.

This one-year full-time programme provides outstanding training both in theoretical and applied statistics. A common set of core modules in the first term ensure all students obtain advanced knowledge in the fundamental areas of probability theory, statistical inference and applied and computational statistics. A large and diverse set of elective modules in the second term, coupled with programme streams in Biostatistics, Data Science, Statistical Finance, Applied Statistics, and Statistical Theory and Methods allow sufficient flexibility for students to develop their own specialist interests.

The project element of the programme runs full time from May to September and provides the student the opportunity to work with a member of academic staff on a state-of-the-art research problem that suits their interests and is suitable for their chosen stream.

In addition to obtaining advanced knowledge across a range of subjects within the field of statistical and mathematical science, the course will equip students with a range of transferable skills, including programming, problem-solving, critical thinking, scientific writing, project work and presentation, to enable them to take on prominent roles in a wide array of employment and research sectors

Learning Outcomes

Upon successful completion of the programme, students should be able to:

1. Explain the fundamentals of Statistics as a living and unique discipline in its own right;
2. Evaluate, derive, compare, and justify statistical methods using the foundational mathematical framework of the discipline;
3. Apply and interpret statistical analyses using state-of-the-art computational techniques;
4. Clean and prepare data for analysis;
5. Program, perform data analysis, and solve problems using a state-of-the-art computing environment for statistical analysis;
6. Explain and deploy statistical reasoning for problem solving;
7. Assess the importance of the assumptions of a statistical method and the consequences of their violation;
8. Solve both open-ended problems and problems with well-defined solutions by formulating them in precise terms, identifying key issues, and trying different approaches in order to make progress;
9. Communicate effectively by listening carefully and presenting complex information in a clear and concise manner orally, on paper, and using IT;
10. Carry out extended statistical work as an individual.
11. Develop and apply statistical theory and methods in a wide range of situations relevant to research and real problems arising in biology and medicine;
12. Extend program outcomes 2 and 3 in greater depth, as they pertain to statistical methods in biostatistics, leading to current developments at the frontiers of the subject;
13. Carry out an independent investigation within the area of biostatistics using textbooks, scholarly articles, and other available literature, searching databases and interacting with colleagues and staff to extract important information.

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	The minimum requirement is normally a 2:1 UK Bachelor's Degree with Honours in statistics, mathematics or a comparable qualification that is recognised by the College in a related subject, such as engineering, physics or computer science.
English Language Requirement	Standard requirement Please check for other Accepted English Qualifications

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"> • Lectures • Office hours • Problem classes • Practical computational sessions • Research seminars • Group tutorials
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • Virtual learning environment • Modern statistical computing skills
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Dissertation • Oral presentation and assessment

Assessment Strategy

Assessment Methods	<ul style="list-style-type: none"> • Written examinations • Assessed coursework/tests • Enhanced coursework assessments • Written project • Oral presentation
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Academic Feedback Policy

All assessed coursework associated with the module is marked and returned to the students promptly. Students are given access to lecturers both informally and through a formal 'office hours' system. This gives them a ready opportunity to discuss any difficulties they encounter with the module lecturer. Students meet at twice termly with their personal tutor during the autumn and spring terms and once in the summer term. Students also regularly meet with their project supervisor while working on their projects. These meetings allow for feedback on individual progress toward the degree, for advice on the choice of modules to complement their project, and discussion of their coursework and later project work with their supervisor. Meetings of the entire MSc student cohort with the Programme

Director are held in December and February with the aim of giving students an open forum for discussing general questions and concerns about the programme requirements, expectations, workload, assessment, and feedback. Indicative feedback they will be provided in January/February for the first term coursework and January exams. Overall indicative feedback from the Programme Director or module leader is given after the May-June examinations.

Re-sit Policy

The College's Policy on Re-sits is available at: 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

Programme Structure

Full-time	Pre-session	Term One	Term Two	Term Three	Term Four
Core Modules	0	4	3	0	0
Elective Modules	0	0-2	1-3	0	0
Projects	0	0	0	1	

Assessment Dates & Deadlines

Written Examinations	January and May
Coursework Assessments	Continuous
Project Deadlines	Mid-September
Practical Assessments	Mid-September

Assessment Structure

Marking Scheme

The Pass Mark for all postgraduate taught course modules is 50%. Students must pass all modules in order to be awarded a degree.

Pass

A student must:

- Achieve an aggregate mark of at least 50% in each module. A student may be compensated in modules up to the value of 15 ECTS with a qualifying mark of at least 40%.
- Achieve a mark of at least 50% in the 'Statistics Research Project' element.
- Achieve an aggregate mark of at least 50% for the programme.

Merit

A student must:

- Achieve an aggregate mark of at least 50% in each module. A student may be compensated in modules up to the value of 7.5 ECTS with a qualifying mark of at least 40%.
- Achieve an aggregate mark of at least 57.5% in one of the two elements.
- Achieve an aggregate mark of at least 60% in the remaining element.
- Achieve an aggregate mark of at least 60% for the programme.

Distinction

A student must:

- Achieve an aggregate mark of at least 50% in each module. A student may be compensated in modules up to the value of 7.5 ECTS with a qualifying mark of at least 40%.
- Achieve an aggregate mark of at least 67.5% in one of the two elements.
- Achieve an aggregate mark of at least 70% in the remaining element.
- Achieve an aggregate mark of at least 70% for the programme.

Programme Structure

Element (% Weighting)	Module		% Weighting
Taught (66.67%)	Probability for Statistics		12.5%
	Fundamentals of Statistical Inference		12.5%
	Applied Statistics		12.5%
	Computational Statistics		12.5%
	Elective modules to the value of 30 - 32.5 ECTS to include:	All (3) modules from elective group (A) At least 1 x module from elective group (B)	50%*
Statistics Research Project (33.33%)	Research Project		100%

* Each module weighted in proportion to its ECTS

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
M5MS01	Probability for Statistics	CORE	30	157.5	0	187.5	100	0	0	7	7.5
M5MS02	Fundamentals of Statistical Inference	CORE	30	157.5	0	187.5	90	10	0	7	7.5
M5MS03	Applied Statistics	CORE	30	157.5	0	187.5	0	100	0	7	7.5
M5MS04	Computational Statistics	CORE	30	157.5	0	187.5	0	100	0	7	7.5
G3U1PROJ	Statistics Research Project	CORE	0	750	0	750	0	90	10	7	30
M5MS13	Biomedical Statistics	ELECTIVE (A)	20	105	0	125	60	40	0	7	5.0
M5MS14	Statistical Genetics and Bioinformatics	ELECTIVE (A)	20	105	0	125	60	40	0	7	5.0
M5S14	Survival Models and Actuarial Applications	ELECTIVE (A)	30	157.5	0	187.5	90	10	0	7	7.5
M5MS05	Advanced Statistical Theory	ELECTIVE (B)	20	105	0	125	80	20	0	7	5.0
M5MS06	Bayesian Methods	ELECTIVE (B)	20	105	0	125	80	20	0	7	5.0
M5MS07	Non-Parametric Smoothing and Wavelets	ELECTIVE (B)	20	105	0	125	90	10	0	7	5.0
M5MS08	Multivariate Analysis	ELECTIVE (B)	20	105	0	125	100	0	0	7	5.0
M5MS09	Graphical Models	ELECTIVE (B)	20	105	0	125	100	0	0	7	5.0
M5MS10	Machine Learning	ELECTIVE (B)	20	105	0	125	0	100	0	7	5.0

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
M5MS11	Introduction to Statistical Finance	ELECTIVE (B)	20	105	0	125	90	10	0	7	5.0
M5MS12	Advanced Statistical Finance	ELECTIVE (B)	20	105	0	125	90	10	0	7	5.0
M5MS15	Big Data	ELECTIVE (B)	20	105	0	125	0	100	0	7	5.0
M5MS17	Data Science I: Data	ELECTIVE (B)	20	105	0	125	0	100	0	7	5.0
M5MS18	Data Science II: Science	ELECTIVE (B)	20	105	0	125	0	100	0	7	5.0
M5S8	Time Series	ELECTIVE	30	157.5	0	187.5	90	10	0	7	7.5
M5A44	Computational Stochastic Processes	ELECTIVE	30	157.5	0	187.5	75	25	0	7	7.5
M5MF12	Algorithmic Trading and Machine Learning	ELECTIVE	30	157.5	0	187.5	100	0	0	7	5.0

Supporting Information

The Programme Handbook is available at: <http://www.imperial.ac.uk/natural-sciences/departments/mathematics/study/admissions/postgraduate/msc/statistics/>

The Module Handbook is available at: <http://www.imperial.ac.uk/natural-sciences/departments/mathematics/study/admissions/postgraduate/msc/statistics/>

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: <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/>

Imperial College London is regulated by the Office for Students (OfS)
<https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/>