

MSc Bioinformatics and Theoretical Systems Biology

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	Bioinformatics and Theoretical Systems Biology			
Award(s)	MSc			
Programme Code	C4U7			
Associateship	None			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Natural Sciences			
Department	Department of Life Sciences			
Main Location of Study	South Kensington Campus			
Mode and Period of Study	1 academic year, full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degree Characteristics			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7			
EHEA Level	2 nd cycle			
External Accreditor(s)	None			
Specification Details				
Student cohorts covered by specification	2021-22 entry			
Person responsible for the specification	Professor Michael J E Sternberg			
Date of introduction of programme				
Date of programme specification/revision	August 2021			

Programme Overview

This is a multidisciplinary research-based MSc course, designed for applicants with a biomedical, computational or mathematical background. It equips students with the necessary skills to produce effective research in computational genetics and bioinformatics.

The programme is taught by experts in relevant fields within the College, and also makes use of collaborations with other researchers.

For students who are interested in pursuing a PhD, this course also forms the first year of the Wellcome Trust-funded [PhD programme in Theoretical Systems Biology and Bioinformatics](#).

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

Knowledge and Understanding of:

1. Principles of the modern life- and biomedical sciences;
2. Basic Mathematics and Statistics;
3. Programming in Python and familiarity with Linux/UNIX environments;
4. Analysis of DNA, Protein, biological diversity and molecular interaction data;
5. Use of bioinformatics and systems biology data bases;
6. Detailed knowledge and understanding of algorithms in bioinformatics and theoretical systems biology;
7. Understanding of principles and practice of software development;
8. Research techniques, including information and data retrieval, study design, program development and implementation, data analysis and statistics, and mathematical modelling;
9. Management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific publications.

Intellectual Skills:

1. Understand and evaluate current research through reading published papers in recommended journals;
2. Decide appropriate scientific methods and techniques for analysing raw data and solving phylogenetic problems;
3. Develop and implement strategies for modelling biological systems;
4. Plan, undertake and write up an original and individual research project.

Practical Skills:

1. Use bioinformatics and systems biology tools and databases to collect, model and analyse data;
2. Plan, develop, implement, and document bioinformatics and modelling software;
3. Plan and execute an individual research project in bioinformatics/systems biology;
4. Prepare technical reports;
5. Prepare reports for an intelligent lay audience;
6. Give technical presentations;
7. Use the scientific literature effectively;
8. Use computational tools and packages.

Transferable Skills:

1. Communicate effectively through oral presentations, computer processing and presentations, written reports and scientific publications;
2. Apply statistical and modelling skills; management skills: decision processes, objective criteria, problem definition, project design and evaluation, risk management, teamwork and coordination, extension needs;
3. Integrate and evaluate information from a variety of sources;
4. Transfer techniques and solutions from one discipline to another; use Information and Communications Technology;
5. Manage resources and time;
6. Learn independently with open-mindedness and critical enquiry;
7. Learn effectively for the purpose of continuing professional development.

Entry Requirements

Academic Requirement	Normally at least a 2.1 UK Bachelor's Degree with Honours in a Biological, Physical, Computational or Mathematical subject.
Non-academic Requirements	None
English Language Requirement	Standard requirement IELTS score of 6.5 overall (minimum 6.0 in all elements)

The programme's competency standards document can be found at: <http://www.imperial.ac.uk/media/imperial-college/faculty-of-natural-sciences/departments-of-life-sciences/public/postgraduate/masters/Life-Sciences-Competence-standards-PG.pdf>

Learning & Teaching Strategy

Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Lectures • Problems Classes • Formal Presentations • Practical Classes • Assignments • Computer Assignments
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • Computer-based Work • Software Development Project • Programming Lectures • Programming Practicals • Online Lecture Materials
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Group Project; software development (10-12 weeks) • Data Analysis Projects, Website Development (11-12 weeks) • Individual Research Project & Dissertation (12-13 weeks)

Assessment Strategy					
Assessment Methods	<ul style="list-style-type: none"> • Coursework • Exams • Computer Assignments • Computer Exam (open book) • Mathematics Assignment • Dissertations • Group Report • Website Development • Presentations • Viva 				
Academic Feedback Policy					
<p>Coursework is double-marked and comments by the markers annotated on the original (electronically for submissions on blackboard). A summary of the feedback will be completed, and provisional grades will be given (actual marks will be ratified by the board of examiners). These papers will then be returned to the students as soon as possible and within the later of 20 working days of submission or any subsequent oral presentation by the student.</p> <p>A provisional indication of a student's exam result will be given no later than 2 months after the exam (actual marks will be ratified by the board of examiners).</p> <p>Staff-student meetings are held at least termly to communicate general feedback between student representatives and the course directors, to discuss exam formats and project report formats, to aid in the preparation of project write-ups, and to provide guidance on project selection.</p> <p>Dissertations and project reports are marked by supervisor and two independent assessors, who also grade presentations and reports for using bespoke assessment pro formae, and, for the final project also assess the report through a viva voce exam.</p>					
Re-sit Policy					
<p>The College's Policy on Re-sits is available at: http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</p>					
Mitigating Circumstances Policy					
<p>The College's Policy on Mitigating Circumstances is available at: http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</p>					
Programme Structure					
Full-time	Pre-session	Autumn Term	Spring Term	Summer Term	Summer Vacation
Core Modules	0	4	0	0	0

Elective Modules	0	0	0	0	0
Projects	0	0	1	1	1
Assessment Dates & Deadlines					
Written Examinations	Spring term				
Coursework Assessments	Autumn term & Spring term				
Project Deadlines	Spring term, Summer term, Summer vacation				
Practical Assessments	Spring term, Summer term, Summer vacation				
Assessment Structure					
Marking Scheme					
<p>Pass:</p> <ul style="list-style-type: none"> The Pass Mark is 50%. Students must pass all elements in order to be awarded a degree. <p>Merit:</p> <ul style="list-style-type: none"> In order to be awarded a result of merit, a candidate must obtain a mark of 60% or greater in each element <p>Distinction:</p> <ul style="list-style-type: none"> In order to be awarded a result of distinction, a candidate must obtain a mark of 70% or greater in each element; 					
Module Weightings					
Element (% Weighting)	Module			% Module Weighting	
Taught (30%)	Bioinformatics and Systems Biology 1			11.1%	
	Mathematics and Statistical Inference			22.2%	
	Computing			11.1%	
	Bioinformatics and Systems Biology 2			55.5%	
Projects 1 and 2 (40%)	Computing Project			40%	
	Data Analysis Project			60%	
Project 3 (30%)	Bioinformatics and Systems Biology Project			100%	

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Writte n Exam	% Course- work	% Practical	FHEQ Level	ECTS
	Bioinformatics and Systems Biology 1	Core	20	167.5	0	187.5	100%	0%	0%	7	7.5
	Mathematics and Statistical Inference	Core	38	212	0	250	75%	25%	0%	7	10
	Computing	Core	42	145.5	0	187.5	0%	100%	0%	7	7.5
	Bioinformatics and Systems Biology 2	Core	40	335	0	375	75%	25%	0%	7	15
	Computing Project	Core	0	0	375	375	0%	67%	33%	7	15
	Data Analysis Project	Core	0	0	375	375	0%	67%	33%	7	15
	Bioinformatics and Systems Biology Project	Core	0	0	500	500	0%	67%	33%	7	20

Supporting Information

The Programme Handbook is available at: <http://www.imperial.ac.uk/life-sciences/postgraduate/masters-courses/msc-in-bioinformatics-and-theoretical-systems-biology/>

The Module Handbook is available at: <http://www.imperial.ac.uk/life-sciences/postgraduate/masters-courses/msc-in-bioinformatics-and-theoretical-systems-biology/>

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: <https://www.imperial.ac.uk/about/governance/academic-governance/regulations>

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

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