Programme Information		
Programme Title	Programme Code	HECoS Code
Computational Methods in Ecology and Evolution	C1Y9	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MRes	1 Calendar Year (12 months)	Full Time	Annually in October	90	180

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Natural Sciences
Teaching Institution	Imperial College London	Department	Life Sciences
Associateship	N/A	Main Location(s) of Study	Silwood Park Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		N/A	
FHEQ 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		Samraat Pawar, Course Director	
Student cohorts covered by specification		2022-23 entry	
Date of introduction of programme		October 14	
Date of programme specification/revision		October 2022	

Programme Overview

Over the past 10–20 years, biology has become increasingly quantitative, and mathematical sciences have in turn been increasingly influenced by biology.

It has been said that “mathematics is biology's next microscope, only better” (Cohen, Plos Biology, 2004) because mathematical, statistical, and computational sciences will continue to reveal unsuspected and entirely new worlds within biology, just as the microscope revealed previously unseen worlds following its invention.

It has also been said that “biology is mathematics' next physics, only better” (Cohen, Plos Biology) because biology will in turn continue to spur major new developments in computation, mathematics and statistics, just as physics has done in past centuries.

In this unique course you will learn quantitative methods and biological concepts together, through application of the methods to cutting-edge biological research problems.

This course is suitable for:

- Life scientists wishing to expand their quantitative skills in light of the increasingly quantitative nature of modern biology
- Physical scientists (mathematicians, physicists, statisticians, computer scientists) with a strong interest in biology

The course serves as ideal preparation for PhD studies or employment in fields of applied quantitative biology, such as resource management and conservation in both academic and non-academic sectors.

Learning Outcomes

Please refer to the Teaching Toolkit for advice on the role and purpose of Intended Learning Outcomes (ILO): www.imperial.ac.uk/staff/educational-development/teaching-toolkit/intended-learning-outcomes

Knowledge and Understanding

1. Know basic principles of several fields within ecology, evolution, and evolutionary ecology, from a quantitative viewpoint.
2. Identify analytical, statistical and modelling methods appropriate for specific lines of inquiry in these fields.
3. Understand the fundamental role of mathematical models in modern biology and what can and cannot be accomplished with modelling.
4. Critically evaluate different modelling frameworks, their strengths and weaknesses.
5. Have detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student’s chosen area of specialisation.

Skills

1. Plan and conduct a programme of original research designed to address specific questions.
2. Integrate and quantify biological knowledge and questions into models and testable hypotheses.
3. Implement and analyse mathematical models with computer simulations.
4. Apply programming, data analytical, statistical and data modelling skills.
5. Use and/or develop computational tools and packages.
6. Use a suite of basic statistical tools for fitting mathematical models to data and comparing the performance of those models.
7. Use the scientific literature effectively.
8. Use advanced project management skills: decision making, problem definition, project design and evaluation, risk management, teamwork and coordination.

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 a Biological, Ecological, or other Life Sciences subject, or in a Physical Sciences

	subject (or a comparable qualification recognised by the College). In addition, for candidates with a biology background, a minimum of B at A-level maths AND/OR a degree AND/OR work/research experience that demonstrates at least basic knowledge of computing is required. Candidates with non-biological backgrounds (for example maths, physics, or geography) or qualifications below the minimum level of the College academic regulations i.e. a lower Second Class Honours degree will need to convince the course directors of their interest, eligibility and/or suitability through their statement of intent in their application, and if necessary, through an informal interview. 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: http://www.imperial.ac.uk/media/imperial-college/faculty-of-natural-sciences/department-of-life-sciences/public/postgraduate/masters/Life-Sciences-Competence-standards-PG.pdf

Learning & Teaching Approach

Learning and Teaching Delivery Methods

Scheduled
- Lectures
- Primers
- Seminars
- Workshops

E-learning & Blended
- Computer-based work with cloud-based version control
- Online lecture and assessment materials
- Online seminar recordings

Projects and Placements
- One mini-project
- Individual research project and dissertation (5 months), which can include placements

You will experience a range of learning teaching methods. Because the course is focused on computing skills – which are better learned by practice – staff will mix short lectures followed by practical sessions consisting of short exercises and longer self-standing practicals. The longer practicals will present problems, which will require a mix of independent and group work. These will be supported by graduate teaching assistants and teaching staff. Taught topics in Term 1 will usually include students from the CMEE MSc and MRes only (not shared with other courses) – usually 20-30 students.

You will need to complete three coursework elements (in addition to a seminar diary; see Table in next section). Each element will consist of a section of taught material to introduce the task and then a period of independent work to complete the element. During these periods, there will be scheduled help sessions and continued access to support by peer-to-peer discussion, graduate teaching assistants and staff support.

Finally, your research project component is an extended piece of independent research where you are expected to take the lead in developing the research question and driving the work forward. You will be supported by an academic supervisor, who will be responsible for the day-to-day guidance on your project, as well as by a set of taught research skills topics introducing core skills used in projects. These core research skills are taught across a wider set of Masters programmes and will have larger class sizes (usually 100-130 students).

We also expect you to attend departmental seminars, which provide research level presentations across a wide range of topics within ecology and evolution.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time for this 90 ECTS credit course is 2250 hours per year. Typically, you will spend around 20% of your time in lectures and practicals and about 30% of your time in independent study during the taught part of the course. The remaining 50% of your time will be spent on independent study on your research project.

Assessment Strategy

Assessment Methods

Assessment will be predominantly formative, with a summative assessment at the end (below):

Component	% of Course	% of Component
Coursework		
Computing (Introduction to Biological Computing)	14.75	59
CMEE Mini-project	6	24
High Performance Computing Long Practical	4	16
Seminar Diary	0.25	1
Coursework Total	25	100
Project		
Final Report	45	60
Viva	18.75	25
Presentation	7.5	10
Supervisor mark	3.75	5
Project Total	75	100

Academic Feedback Policy

Coursework (including exam questions) is double-marked and comments by the markers annotated directly on the papers (typically, electronically). A summary of the feedback and an indicative mark will be given. The papers will then be returned to the students as soon as possible and within two weeks of submission. A meeting will be held after the end of the taught component, at which each student will have a one- to-one discussion with the Course Director on progress to date, coursework marks achieved and expectations for the upcoming project.

Marks for major components (see table above) will only be released after final exam board approval.

Staff-student meetings are held termly to communicate general feedback between student representatives and the course directors. Additional meetings are held to provide general feedback and guidance e.g. on exam performance and project selection.

Research projects are marked by 2 independent assessors, based on the thesis itself, a research presentation and a viva. Your supervisor will also provide an assessment of your research practice. Electronic feedback of these assessments are returned automatically to students after the final examiners meeting.

The College'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
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		
This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.		
Description	Mandatory/Optional	Approximate cost
Laptop computer capable of running a UNIX-based OS	Mandatory	Will be loaned by department if required.

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 7 **Students study all core modules.**					
Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
LIFE70012	Introduction to Biological Computing	Core		1	15
LIFE70013	CMEE Biological Computing Miniproject	Compulsory		1	10
LIFE70014	High Performance Computing	Compulsory		1	5
LIFE70015	CMEE MRes Research Project	Core		2/3	60
				Credit Total	90

[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.

Progression and Classification

Award of a Postgraduate Degree (MRes)
To qualify for the award of a postgraduate degree a student must have:

1. accumulated credit to the value of no fewer than 90 credits at level 7 or above of which no more than 15 credits may be from credit level 6;
2. and no more than 15 credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

Classification of Postgraduate Taught Awards

The College sets the class of Degree that may be awarded as follows:

1. Distinction: The student has achieved an overall weighted average of 70.00% or above across the programme.
2. Merit: The student has achieved an overall weighted average of above 60.00% but less than 70.00%.
3. Pass: The student has achieved an overall weighted average of 50.00% but less than 60.00%.

a. For a Masters, students must normally achieve a distinction (70.00%) mark in the dissertation or designated final major project (as designated in the programme specification) in order to be awarded a distinction.
b. For a Masters, students must normally achieve a minimum of a merit (60.00%) mark in the dissertation or designated final major project (as designated in the programme specification) in order to be awarded a merit
c. 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.

Programme Specific Regulations

N/A

Supporting Information
The Programme Handbook is available at: www.imperial.ac.uk/life-sciences/postgraduate/masters-courses/computational-methods-in-ecology-and-evolution/
The Module Handbook is available at: www.imperial.ac.uk/life-sciences/postgraduate/masters-courses/computational-methods-in-ecology-and-evolution/
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/
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 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.

Modifications			
Description	**Approved**	**Date**	**Paper Reference**
Curriculum Review	Programmes Committee	22/03/22	PC.2021.62