Imperial College London

Programme Specification (Master's Level)

PG Cert, PG Dip and MSc Genomic Medicine

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		Genomic Medicine				
Award(s)		PG Cert	PG Dip	MSc		
Programme Code(s)		A3GC4 A3GC12	A3GD8 A3GD24	A3GM A3GM24		
Awarding Institution		Imperial College London				
Teaching Institution		Imperial College London Institute for Cancer Research *(1 x module)* Brunel University *(1 x module)*				
Faculty		Faculty of Medicine				
Department		National Heart and Lung Institute				
Main Location of Study		Various (including South Kensington, Royal Brompton and Charing Cross)				
Mode and Period of Study (Flexible and modular)	PG Cert	4 months, full-time or 1 academic year, part-time				
	PG Dip	8 months, full time or 2 academic years, part-time				
	MSc	1 academic year, full-time or 2 academic years, part-time				
Cohort Entry Points		Annually in October				
Relevant QAA Benchmark Statement(s) and/or other external reference points		There is no Master's level subject benchmark statement specifically encompassed by this programme, however, the programme has been designed in line with the requirements of Health Education England, the NHS and Genomics England Ltd.				
Total Credits	PG Cert	ECTS:	30	CATS:	60	
	PG Dip		60		120	
	MSc		90		180	

FHEQ Level	Level 7
EHEA Level	2nd cycle
External Accreditor(s)	None
Specification Details	
Student cohorts covered by specification	2021-22 entry
Person responsible for the specification	Professor Michael Lovett, NHLI
Date of introduction of programme	October 2015
Date of programme specification/revision	September 2021

Description of Programme Contents

This clinical Master's level programme will educate students from a wide range of backgrounds (e.g. medicine, nursing, healthcare scientists and technologists) to interpret and understand genomic DNA data that increasingly impacts on service delivery to patients.

The programme is flexible and modular and includes full- and part-time MSc options, delivered over one or two years respectively. There are also full-time and part-time Postgraduate Certificate (PG Cert) or Postgraduate Diploma (PG Dip) options. If choosing the full-time PG Cert or PG Diploma mode of study students should be aware that module choices will be limited. Students will be made aware of their options during the admissions process. Some optional modules may not run if there is not enough demand.

The aim of the programme is to enhance knowledge and skills in this rapidly evolving field by providing a flexible, multi-disciplinary and multi-professional perspective in genomics as applied to clinical practice and medical research. In so doing, it fulfils the requirements of Genomics England, Health Education England and Public Health England for MSc, PG Dip and PG Cert programmes to transform the NHS workforce in readiness for the 100 Thousand Genomes Project, set out in a tender in 2017. Imperial College was successful in its bid to continue to run the programmes and has been designated a preferred provider by Health Education England.

The programme comprises core and optional taught modules of 7.5 ECTS each that will be taught using a blended approach (direct teaching and online distance learning) to provide flexibility for health professionals to combine their study with NHS and Public Health service duties. The MSc programme also includes a core research module (30 ECTS).

Most modules will consist of one week of face-to face teaching and up to three weeks of eLearning and independent study (exceptions are noted below).

The modules are offered on a cycle of 12 months, so that all modules become available once in each 12-month cycle.

The programme includes collaborations with the Institute for Cancer Research (providing the core Cancer Genomics Module), and Brunel University London (providing the optional Economic Evaluation in Human Genomics Module). The Institute of Cancer Research and Brunel may also co-supervise research projects.

MSc programme

All MSc students are required to take 8 taught modules plus an independent research project.
In total students will complete 6 core modules and 1 Elective A module and one Elective B from the list below.

Core Modules
Fundamentals in Human Genetics and Genomics
Omics Technologies and their Application to Genomic Medicine
Application of Genomics in Infectious Disease
Molecular Pathology of Cancer and Application in Cancer Diagnosis, Screening and Treatment (delivered by the Institute of Cancer Research)
Genomics of Common and Rare Inherited Diseases
Bioinformatics, Quality Control, Analysis & Interpretation of Sequencing Data

Indicative Optional Modules (Elective A)
Ethical, Legal and Social Issues in Applied Genomics
Genomics and the Patient

Indicative Optional Modules (Elective B)
Pharmacogenomics and Stratified Medicine
Economic Evaluation in Human Genomics (delivered by Brunel University London)
Genome-Based Therapeutics
Professional and Research Skills (e-Learning module)

PG Dip programme
All PG Dip students are required to take 8 taught modules (which will include **either** Ethical, Legal and Social Issues in Applied Genomics or Genomics and the Patient, but not both). In total students will complete all 6 core modules and 1 Elective A module and one Elective B module from the list shown above.

PG Cert programme
All PG Cert students are required to take 4 taught modules (which may include **either** Elective A module Ethical, Legal and Social Issues in Applied Genomics **or** the Genomics and the Patient module, but not both). In total students must complete the Fundamentals module and 3 further modules, 1 of which can be from the Elective B list above.

*Please note: Students will be provided with information prior to enrolment to help them make modules and mode of study choice which will best suit their study and career ambitions. It is intended to offer each module at least once in every 12-month cycle so students opting for the full-time Postgraduate Certificate and Postgraduate Diploma may be limited in their option choices. Some optional modules may not run if there is not enough demand.

Learning Outcomes

On graduation, all students will be able to:

PG Cert

- Critically appraise and synthesise genomic medicine data from a range of sources;
- Communicate core concepts in genomic medicine clearly and effectively with both scientifically-literate and lay audiences;

- Evaluate the potential of large-scale patient genome analysis to revolutionise healthcare in at least one domain;
- Self-critique by reflecting on coursework evaluation, project reports, critical reviews of scientific papers.

PG Dip

Learning Objectives for the PG Cert plus:

- Evaluate the potential of large-scale patient genome analysis to revolutionise healthcare across inherited disease, cancer and infectious disease and its implications in the healthcare setting;
- Demonstrate awareness of the societal and ethical context of genomic medicine, including the complexities of protecting patient information;
- Critically evaluate strengths and limitations of techniques suitable for assessing genomic variation relating to different clinical problems and disease states;
- Demonstrate competency in analysing and interpreting patient genomic analysis results and communicating their implications effectively to the patient.

MSc

Learning Objectives for PG Cert and PG Dip plus:

- Demonstrate synoptic knowledge and deep understanding of medical genomics;
- Deploy effective problem-solving strategies in data analysis and experimental design;
- Appreciate the success, failure and the uncertainty inherent in research;
- Effectively communicate scientific information in both written and oral forms;
- Use project management skills in the context of the research project;
- Select and deploy suitable research resources and strategies;
- Synthesise complex research findings into a clear dissertation and oral presentation.

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 Bachelor's Degree with in a relevant medical, biomedical or healthcare subject (or a comparable qualification recognised by the College).
Non-academic Requirements	This course is aimed at all healthcare professionals who will increasingly need to be able to interpret and understand genomic data as part of their role, as well as at biomedical scientists. All short-listed applicants will be interviewed (either in person or via Skype). Applicants who do not meet the College's normal entry requirements but who have substantial relevant healthcare experience may be admitted.

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: TBC	
Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	• Lectures • Seminars • Keynote lectures • Problem-based group work • Journal clubs • Debates • Discussion sessions • Laboratory teaching • Data analysis sessions • Computer lab teaching
E-learning & Blended Learning Methods	• On-line discussion forums • On-line lecture materials • Interactive content including video and module quizzes
Project	• Research project (MSc students only)
Assessment Strategy	
Assessment Methods	• Coursework • Practical
Academic Feedback Policy	
Feedback will be appropriately tailored for the type of assessment and will be provided in a timely manner. The exact turnaround time will depend upon the length and complexity of the submission, but will normally be within two weeks. Where it is longer, students will be told when they may expect to receive their feedback.	
Re-sit Policy	
Students will be permitted to re-enter a failed examination on a single occasion. At the discretion of the Programme Director, students may be counselled to wait until the following year to re-sit. A failed piece of coursework can be resubmitted on one occasion, with a deadline to be agreed with the relevant module leader and Programme Director, normally between 1 week and 2 months after the original submission deadline. If the MSc research project is failed, students may resubmit on one occasion in the following academic year, with a deadline to be agreed with their project supervisor and the Programme Director. Re-sitting/re-submitting assessments will normally be capped at the pass mark. 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					
Indicative Programme Structure					
Full-time MSc (1 YEAR)	Pre-session	Autumn Term	Spring Term	Summer Term	Summer Vacation
Core Modules	0	3	2	1	0
Elective Modules (A)	0	0	1	0	0
Elective Modules (B)	0	0	1	0	0
Projects	0	0	0	1	

Assessment Dates & Deadlines	
Written Examinations	Any written examinations will be scheduled within the taught module.
Coursework Assessments	Deadlines for coursework assessments are usually set approximately two weeks after the end of the face-to-face teaching week.
Project Deadlines (MSc only)	Mid-September for full-time students Normally within 12 months for part-time students.
Practical Assessments	Modules such as Pharmacogenomics and Genome-based Therapeutics include an oral presentation. The MSc research project includes an oral presentation to a mixed audience with two internal examiners (Sept).

Assessment Structure for the MSc		
Programme Elements	ECTS	% Weighting
PG Certificate (4 x taught modules) – all modules are equally weighted Additionally, all students must pass a zero weighted, not for credit, on-line Primer for Genomics course	30	33%
Additional 4 modules for PG Diploma – all modules are equally weighted	30	33%
Research project – consisting of written report (80%) and an oral presentation (20%)	30	34%
Total	90	100%

Assessment Structure for the PG Dip		
Programme Elements	ECTS	% Weighting
4 x taught modules for the PG Certificate – all modules are equally weighted Additionally, all students must pass a zero weighted, not for credit, on-line Primer for Genomics course	30	50%
4 x taught modules - all modules are equally weighted	30	50%
Total	60	100%
Assessment Structure for the PG Cert		
Programme Elements	ECTS	% Weighting
4 x taught modules – all modules are equally weighted	30	100%

Rules of Progression

Students should register for the qualification they wish to exit with. However, students enrolled on the PG Cert who wish to continue on the programme without a break can transfer to the PG Dip after completing Fundamentals and 2 other modules, provided they have demonstrated satisfactory academic progress in their first 3 modules. Similarly, students enrolled on the PG Dip can transfer to the MSc after completing two further modules, provided they have demonstrated satisfactory academic progress.

Satisfactory progress will normally be judged achieving at least 50% for module assessments completed. Enrolled PG Cert students who have failed a single module with a mark between 45-49% may still transfer to PG Dip, subject to confirmation on passing the failed coursework and/or exam on the second and final attempt. The same applies to enrolled PG Dip students who have failed one of their two post-PG Cert modules.

Students who register for and successfully complete the PG Cert may use the credit gained towards registration for the PG Dip or the MSc at a later point, provided that the PG Dip is completed within 4 years and the MSc is completed within 5 years, of initial registration for the Postgraduate Certificate. These students may be asked to surrender the associated PG Cert and/or PG Diploma on registration for the higher award.

Likewise, students who register for and successfully complete the PG Dip may use the credit gained towards the MSc, provided that the MSc is completed within 5 years of their initial registration of the lowest award. These students may be asked to surrender the associated PG Dip on registration for the MSc.

Students who register for the MSc in the first instance will have a “virtual” PG Cert confirmed if the requirements for the PG Cert have been met. The pass mark for the PG Cert will be carried forward and the credits will accumulate towards the next level. On successful completion of eight modules (six Core, one Elective A and one Elective B), students will have a “virtual” PG Dip. The pass mark will

be carried forward and the credits will accumulate towards the MSc. Should these students subsequently fail to achieve the requirements for the MSc they will be awarded the PG Dip.

Marking Scheme

The pass mark for each module is 50%. Within a module, no assessment less than 40% will be considered as a condoned pass regardless of the aggregate mark for the module.

All students must pass a zero weighted, not for credit, on-line Primer for Genomics course.

MSc
Students who have already completed the taught pathway must pass the research project module (with a minimum aggregate mark of 50%) in order to be awarded the MSc. Students may be permitted a marginal fail (45-49%) in the oral presentation elements long as they achieve a mark of 50% or above in the research dissertation, and their aggregate mark for the project is 50% or above.

Provided a candidate has achieved at least 50% in their aggregate mark, they will be awarded a result of pass. In order to be awarded a result of merit, a candidate must achieve at least 60% in their aggregate mark for the programme and at least 60% in the Research Project module In order to be awarded a result of distinction, a candidate must achieve at least 70% in their overall aggregate mark for the programme and a mark of at least 70% in their Research Project module.

The Postgraduate Certificate and Postgraduate Diploma are not classified.

Candidates will normally only be considered for promotion to pass, (or for merit or distinction for MSc awards) if their aggregate mark is within 2.5% of the relevant borderline. Candidates whom the Board of Examiners deems to have exceptional circumstances may be considered for promotion even if their aggregate mark is more than 2.5% from the borderline. A viva will normally be called to examine students who are being considered for promotion to a higher degree classification.

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
	Fundamentals of Human Genetics and Genomics	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Omics Technologies and their Application to Genomic Medicine	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Genomics of Common and Rare Inherited Diseases	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Molecular Pathology of Cancer and Application in Cancer Diagnosis, Screening and Treatment *(Institute of Cancer Research)*	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Application of Genomics in Infectious Disease	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Bioinformatics, Quality Control, Analysis & Interpretation of Genome Sequencing Data	Core	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Ethical, Legal and Social Issues in Applied Genomics	Elective (A)	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Genomics and the Patient	Elective (A)	60	127.5	0	187.5	0%	50%	50%	7	7.5
	Pharmacogenomics and Stratified Medicine	Elective (B)	60	127.5	0	187.5	0%	50%	50%	7	7.5
	Economic Evaluation in Human Genomics *(Brunel)*	Elective (B)	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Genome Based Therapeutics	Elective (B)	60	127.5	0	187.5	0%	50%	50%	7	7.5
	Professional and Research Skills	Elective (B)	60	127.5	0	187.5	0%	100%	0%	7	7.5
	Research project	Core	490	260	0	750	0%	80%	20%	7	30

Supporting Information
The **2021-22 Programme Handbook** is available on Blackboard.
Module information is available in the **2021-22 Programme Handbook** on Blackboard.
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/staff/tools-and-reference/quality-assurance-enhancement/
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/
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