Human Molecular Genetics

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 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.

### Programme Information

<table>
<thead>
<tr>
<th>Programme Title</th>
<th>Human Molecular Genetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Award(s)</td>
<td>MSc</td>
</tr>
<tr>
<td>Programme code</td>
<td>A3BD</td>
</tr>
<tr>
<td>Awarding Institution</td>
<td>Imperial College London</td>
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<tr>
<td>Teaching Institution</td>
<td>Imperial College London</td>
</tr>
<tr>
<td>Faculty</td>
<td>Faculty of Medicine</td>
</tr>
<tr>
<td>Department</td>
<td>Department of Medicine</td>
</tr>
<tr>
<td>Main Location of Study</td>
<td>Hammersmith Campus</td>
</tr>
<tr>
<td>Mode and Period of Study</td>
<td>1 calendar year full-time (12 months)</td>
</tr>
<tr>
<td>Cohort Entry Points</td>
<td>Annually in October</td>
</tr>
<tr>
<td>Relevant QAA Benchmark Statement(s) and/or other external reference points</td>
<td>Master’s Awards in Human Molecular Genetics</td>
</tr>
<tr>
<td>Total Credits</td>
<td>ECTS: 90 CATS: 180</td>
</tr>
<tr>
<td>FHEQ Level</td>
<td>Level 7 - Master’s</td>
</tr>
<tr>
<td>EHEA Level</td>
<td>2nd cycle</td>
</tr>
<tr>
<td>External Accreditor(s)</td>
<td>None</td>
</tr>
</tbody>
</table>

### Specification Details

| Student cohorts covered by specification | 2018-19 entry |
| Person Responsible for the specification | Dr Toby Andrew |
| Date of introduction of programme       | October 2017  |
| Date of programme specification/revision | November 2017 |
Programme Overview

The MSc in Human Molecular Genetics is a 1-year full time programme aimed at undergraduate scientists, who are interested in a career in genetics, either in academic, industry or healthcare based research.

The MSc is based in the Department of Medicine and focuses on understanding the genetic and molecular mechanisms that underlie rare and common human diseases. The students on this programme learn genetic theory and practical application for all aspects of genomics and how to develop and test well-designed genomic hypotheses.

The programme is delivered in four taught modules and one research project:

1. Fundamentals of Molecular Genetics;
2. Genetics of Rare and Common Diseases;
3. Analytical Methods in Human Genetics;
4. Genomics in the Laboratory.

These modules cover topics on Mendelian disorders, statistical methods applied to genetics, bioinformatics, genomic study design, molecular technologies, cancer genetics, diabetes, epigenetics and more. The programme content is delivered in the form of lectures, tutorials and laboratory practicals led by research experts in the field at Imperial College. The programme contents are continuously updated in order to keep up to date with the field, with recent additions in areas such as precision medicine and genome editing.

Students undertake a 6-month research project in one of the participating laboratories (based at Imperial College, KCL, UCL, the Crick, Oxford, Cambridge and other universities), for which the student will write their thesis and have an oral examination to defend their dissertation and assess their critical understanding.

In short, the MSc programme equips the student to begin to think like a scientist.

Learning Outcomes

By the end of the programme should be able to demonstrate the following:

1. A systematic knowledge of the fundamentals of molecular genetics and ability to appraise the current genetics literature; critically assess and evaluate scientific evidence and research;
2. An ability for deep learning and not accept statements at face value;
3. Evaluate new research results and methods, develop critiques of them and where appropriate, propose new hypotheses;
4. Utilise genomic information and data to formulate testable hypotheses to assess potential causal mechanisms at a molecular level; independently develop and implement genomic study designs;
5. A comprehensive understanding of genomic techniques in the laboratory that are applicable to their research and a knowledge of texts and databases that will facilitate their implementation;
6. Originality in the application of knowledge, as demonstrated through their research thesis;
7. Independent learning ability required for continuing professional and scientific development;
8. Clear science communication skills; for example, being able to present key concepts in written and verbal format to an audience with different disciplinary or lay backgrounds;
9. A critical ability to distinguish between science and technological development;
10. An ability for research led, self-directed and autonomous study;
11. Approach complex issues both systematically and creatively, making sound judgements in the absence of complete data.

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

<table>
<thead>
<tr>
<th>Academic Requirement</th>
<th>The minimum requirement is normally a 2.1 UK Bachelors Honours degree in biochemical sciences, genetics or a related subject (or a comparable qualification recognised by the College).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicants who can demonstrate substantial relevant industry or equivalent experience may be admitted by the Department making a special case on behalf of the student to the College.</td>
<td></td>
</tr>
<tr>
<td>Home/EU/international applicants may be invited to attend a post-application interview if required, to further assess the strength of their application based on the requirements (including by Skype).</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>English Language Requirement</th>
<th>Higher requirement IELTS score of 7.0 overall (minimum 6.5 in all elements).</th>
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</thead>
</table>

The programme’s competency standards documents can be found at: www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/msc-human-molecular-genetics/

### Learning & Teaching Strategy

| Scheduled Learning & Teaching Methods | Lectures  
Workshops  
Practical laboratory classes  
Tutorials  
Study group learning  
Class conference field trip |
|--------------------------------------|---------------------------------------------------------------------------|
| E-learning & Blended Learning Methods | Blackboard Learn (BL)  
Panopto (lecture capture)  
Mentimeter  
Video & MP4 files  
BL-embedded Qualtrics surveys |
| Project and Placement Learning Methods | 6-month student research project  
Research project placement |

### Assessment Strategy
Assessment Methods

- Essays
- Written examination
- Oral examination
- Research Dissertation
- Lab performance
- Tutorial discussions
- Study groups
- Journal clubs
- Presentations (poster, oral and in the lab)
- e-learning exercises.
- Peer formative assessment methods are used.

Academic Feedback Policy

The programme complies with the College policy and will provide students with feedback within a timely and appropriate turnaround time. Students will be provided with a bespoke assessment schedule confirming all submission deadlines, marking periods and feedback points to manage their expectations and ensure feedback can inform the next assessment, where appropriate.

We follow best practice using a tutor group system, which ensures regular academic & informal contact between staff and students, providing a supportive learning environment, regular feedback and pastoral care.

We provide in depth feedback to students throughout the year in order to encourage students to reflect upon and to improve their progress. Our feedback methods include:

- Individual written comments;
- Whole class feedback in seminars, tutorials and workshops (e.g. discussion of common errors; sample/model answers) or by written comments;
- Oral feedback in laboratories and while on research placements;
- Electronic feedback on IT-based tests and quizzes;
- Peer feedback as part of an assessment task;
- On-going conversations in meetings with Personal Tutors, lecturers and programme staff

Efficiency, usefulness and timeliness of feedback procedures are considered on the course evaluation form completed by students and are discussed at each course committee meeting, where student representatives are invited to comment on these aspects.

Re-sit Policy

Students will be permitted to re-enter a failed examination or resubmit a piece of failed coursework on a single occasion. Marks for re-sit exams and resubmitted work will be capped at a Pass, unless the MSc Exam Board agrees there are mitigating circumstances (see next section). Examination re-sits may only be available at the next available sitting (i.e. in the next following academic year).

Mitigating Circumstances Policy

The College’s Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams
Programme Structure

<table>
<thead>
<tr>
<th>Programme Component</th>
<th>ECTS</th>
<th>% Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Molecular Genetics</td>
<td>7.5</td>
<td>8.3%</td>
</tr>
<tr>
<td>Genetics of rare and common disease</td>
<td>7.5</td>
<td>8.3%</td>
</tr>
<tr>
<td>Analytical Methods in Human Genetics</td>
<td>15</td>
<td>16.6%</td>
</tr>
<tr>
<td>Genomics in the Laboratory</td>
<td>15</td>
<td>16.6%</td>
</tr>
<tr>
<td>6 month Research Project</td>
<td>45</td>
<td>50%</td>
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<tr>
<td>Total</td>
<td>90</td>
<td>100%</td>
</tr>
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</table>

Marking Scheme

The MSc can be awarded as a Pass, Merit or Distinction.

In order to be awarded a Pass for the Masters award, a student must:
- Achieve a mark of at least 40% in each assessment
- Achieve an aggregate pass mark of at least 50% in each module
- Students may be condoned in a maximum of 15 ECTS for the Masters award (i.e. excluding the Research Project) with an aggregate mark of at least 40% in each module providing the overall aggregate mark for the programme is at least 50%
- Achieve a mark of at least 50% in the Research Project

In order to be awarded a Merit for the Masters award, a student must:
- Achieve a mark of at least 40% in each assessment
- Achieve an aggregate mark of at least 60% in each module
• Students may be condoned in a maximum of 15 ECTS for the Masters award (i.e. excluding the Research Project) with an aggregate mark of at least 40% in each module providing the overall aggregate mark for the programme is at least 60%
• Achieve a mark of at least 60% in the Research Project

In order to be awarded a Distinction for the Masters award, a student must:
• Achieve a mark of at least 40% in each assessment
• Achieve an aggregate pass mark of at least 70% in each module
• Students may be condoned in a maximum of 15 ECTS for the Masters award (i.e. excluding the Research Project) with an aggregate mark of at least 40% in each module providing the overall aggregate mark for the programme is at least 70%
• Achieve a mark of at least 70% in the Research Project

Exit award

In exceptional circumstances, students may be permitted to be awarded a PG Certificate as an exit award, subject to examination board approval and on successful completion of the three taught modules Fundamentals of Molecular Genetics, Genetics of rare and common disease and Analytical Methods in Human Genetics.

In order to be awarded a PG Cert as an exit award, a student must:
• Achieve a mark of at least 40% in each assessment
• Achieve an aggregate pass mark of at least 50% in each module
## Indicative Module List

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Core/Elective</th>
<th>Year</th>
<th>L&amp;T Hours</th>
<th>Ind. Study Hours</th>
<th>Placement Hours</th>
<th>Total Hours</th>
<th>% Written Exam</th>
<th>% Coursework</th>
<th>% Practical</th>
<th>FHEQ Level</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBC</td>
<td>Fundamentals of Molecular Genetics</td>
<td>Core</td>
<td>1</td>
<td>38</td>
<td>149.5</td>
<td>0</td>
<td>187.5</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>TBC</td>
<td>Genetics of rare and common disease</td>
<td>Core</td>
<td>1</td>
<td>50</td>
<td>137.5</td>
<td>0</td>
<td>187.5</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>TBC</td>
<td>Analytical Methods in Human Genetics</td>
<td>Core</td>
<td>1</td>
<td>75</td>
<td>300</td>
<td>0</td>
<td>375</td>
<td>15%</td>
<td>85</td>
<td>0%</td>
<td>7</td>
<td>15</td>
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<tr>
<td>TBC</td>
<td>Genomics in the Laboratory</td>
<td>Core</td>
<td>1</td>
<td>138</td>
<td>237</td>
<td>0</td>
<td>375</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
<td>7</td>
<td>15</td>
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<tr>
<td>TBC</td>
<td>6-Month research project</td>
<td>Core</td>
<td>1</td>
<td>25</td>
<td>1,100</td>
<td>0</td>
<td>1125</td>
<td>60%</td>
<td>0%</td>
<td>40%</td>
<td>7</td>
<td>45</td>
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Supporting Information

The Programme Handbook is available at:
www.imperial.ac.uk/media/imperial-college/medicine/study/postgraduate/MSc-Human-Molecular-Genetics-Handbook-2016-17.pdf

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/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”.
www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE)
www.hefce.ac.uk/reg/register/

<table>
<thead>
<tr>
<th>Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Remove the Merit and Distinction awards from the Postgraduate Certificate Exit Award with effect from September 2018.</td>
</tr>
</tbody>
</table>