

MSc in Molecular 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 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

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|--|--|----|-------------|-----|
| Award(s) | MSc | | | |
| Programme Title | Molecular Medicine | | | |
| Programme code | A3TX | | | |
| Awarding Institution | Imperial College London | | | |
| Teaching Institution | Imperial College London | | | |
| Faculty | Medicine | | | |
| Department | Medicine | | | |
| Associateship | | | | |
| Mode and Period of Study | MSc: 1 calendar year full-time (12 months) | | | |
| Cohort Entry Points | Annually in October | | | |
| Relevant QAA Benchmark Statement(s) and/or other external reference points | Master's Degrees in Medicine | | | |
| Total Credits | ECTS: | 90 | UK Credits: | 180 |
| FHEQ Level | Level 7 - Master's | | | |
| EHEA Level | 2nd cycle | | | |
| External Accrator(s) | None | | | |
| Specification Details | | | | |
| Student cohorts covered by specification | 2016-17 | | | |
| Person Responsible for the specification | Dr Mick Jones | | | |
| Date of introduction of programme | October 1996 | | | |
| Date of programme specification/revision | July 2017 | | | |

Description of Programme Contents

The MSc programme is intended to present the scope and extraordinary potential which molecular and cellular biology promises in medical fields such as cancer, inherited diseases, infectious diseases and gene therapy. The course will provide a comprehensive lecture programme in the areas in which rapid advances are now being made; in addition, it will teach the theory of state-of-the-art techniques and impart hands-on training in their use.

Element 1, the taught programme, has lectures, tutorials & student active learning sessions focusing on Molecular & Cellular Systems, Technologies and Disease Systems, and a core practical component, the Mini-Research Project (MRP) where students design their own protocols to address a scientific question, and subsequently carry out the planned experiments.

Element 2 is a 6-month laboratory based research project (LBRP) forms a significant part of the course and it is intended that the methods taught in the course will be applied to the investigation of specific questions of medical interest. Each project will be conducted in one of the various laboratories in Imperial College under the guidance of senior academics.

The programme mainly prepares students for further advanced research (e.g. a PhD, medical school) and/or careers as research assistants.

Learning Outcomes

The programme aims/objectives are to:

- Provide postgraduate students with backgrounds in either basic science, medicine, dentistry or veterinary science with an advanced academic and laboratory research training in modern cellular and molecular medicine, with emphasis on the interface between the basic and clinical aspects of the subject.
- Produce postgraduates equipped to pursue careers in molecular medicine, in academia, in hospitals, in industry, the public sector and non-governmental organisations;
- Provide a solid foundation for those who intend to go on to study for a PhD;
- Develop understanding of processes at the molecular and cellular level;
- Provide a training in laboratory and research skills;
- Provide a supportive learning environment;
- Attract highly motivated students, both from within the UK and from overseas;
- Develop new areas of teaching in response to the advance of scholarship and the needs of vocational training.

At the end of the taught element students should have a good understanding of:

- The molecular and cellular mechanisms involved in the development and regulation of cells and tissues under normal and disease states
- Advanced molecular and cellular biology methodology
- Gene Expression and its role in disease
- Molecular Genetics and its application to study disease
- Practical techniques in molecular and cellular biology and medicine.

At the end of the six months research component the students will have:

- Experienced a thorough training in the methods and ethos of laboratory research including:
- The design of a good research project
- Designing and planning of experiments
- Trouble shooting for experimental problems
- Data presentation, analysis and interpretation
- Literature searching
- Critical review
- Preparation and presentation of work for publication (in the form of a written report)
- A clear understanding of good laboratory practice, including safety.

Knowledge and Understanding of:

- 1.1. Fundamental principles of molecular and cellular biology;
- 1.2. Modern technologies of molecular biology;
- 1.3. Molecular biology applied to investigation of disease, including infectious diseases, genetic diseases, cancer, haematology;
- 1.4. Practical research techniques, including essential molecular biology methodologies; Southern blotting, library screening, isolation of recombinant DNA, PCR and DNA sequencing technologies;
- 1.5. Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student's chosen research project;
- 1.6. Management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific publications.

Teaching/learning methods and strategies:

Acquisition of 1.1 to 1.4 is through a combination of lectures, seminars, tutorials and laboratory work, and coursework, (October to February).

Acquisition of 1.5 is through the full-time, individual, supervised research project (March to September).

Acquisition of 1.6 is through a combination of lectures, laboratory exercises, coursework, small group projects linked to workshops with group and individual presentations.

Throughout the students are encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.

Assessment of the knowledge base is through a combination of unseen written examinations (1.1-4, 1.6) and assessed coursework (1.1 - 4, 1.6) in the form of laboratory write-ups (1.1 - 4), essays (1.1 - 4), and the individual research project report and viva (1.5 - 6).

Skills and other Attributes

Intellectual Skills: able to

- 2.1. Understand the nature of disease in terms of molecular and cellular biology
- 2.2. Integrate and evaluate information from a variety of sources
- 2.3. Formulate and test hypotheses
- 2.4. Be creative in the solution of problems and in the development of hypotheses

2.5. Plan, conduct and write-up a programme of original research.

Teaching/learning methods and strategies

Intellectual skills are developed through the teaching and learning methods outlined above and in section 17.

Analysis and problem solving skills are further developed through the tutorials.

Experimental design and research skills are developed in lectures and course practical work in the course and subsequently in the individual research project. Individual formative feedback is given to students on all work produced including oral presentations. The Exams, held in February, provides important feedback on student progress.

Assessment of thinking skills is partly achieved through coursework, unseen written examinations and the individual research project but also in assessed practicals and course work

be able to

- 3.1. Plan and execute safely a series of experiments;
- 3.2. Use laboratory equipment to generate data;
- 3.3. Analyse experimental results and determine their strength and validity;
- 3.4. Prepare technical reports;
- 3.5. Give technical presentations;
- 3.6. Use the scientific literature effectively;
- 3.7. Use computational tools and packages.

Teaching/learning methods and strategies

Practical skills are developed through the teaching and learning programme outlined above.

Practical experimental skills (3.1 to 3.3) are developed through laboratory practicals and project work.

Skills 3.4 and 3.5 are taught and developed through feedback on reports written and presentations made as part of coursework.

Skill 3.6 is developed through lectures, coursework reports and essays, and the individual supervised research project.

Skill 3.7 is taught and developed through coursework exercises and project work.

Practical skills are assessed through laboratory experiment write-up and the research project dissertation.

Professional Skills Development: able to

- 4.1. Communicate effectively through oral presentations, computer processing and presentations, written reports and scientific publications;
- 4.2. Apply statistical and modelling skills;
- 4.3. Management skills: decision processes, objective criteria, problem definition, project design and evaluation, risk management, teamwork and coordination, extension needs;
- 4.4. Integrate and evaluate information from a variety of sources;
- 4.5. Transfer techniques and solutions from one discipline to another;
- 4.6. Use Information and Communications Technology;
- 4.7. Manage resources and time;
- 4.8. Learn independently with open-mindedness and critical enquiry;

4.9. Learn effectively for the purpose of continuing professional development

Teaching/learning methods and strategies

Transferable skills are developed through the teaching and learning programme outlined above and in section 17.

Skill 4.1 is taught through coursework and developed through feedback on reports, essays and oral presentations. Skill 4.2 is taught through lectures and practical work and developed, as appropriate, during individual research project.

Skills 4.3 to 4.5 are developed through group project work. Skill 4.6 is developed through computer-based exercises, projects and other coursework activities and individual learning. Skill 4.7 is developed throughout the course within a framework of staged coursework deadlines and the split examination system.

Although not explicitly taught, skills 4.8 and 4.9 are encouraged and developed throughout the course, which is structured and delivered in such a way as to promote this.

Skill 4.1 is assessed through coursework, workshop presentations, written examinations and the oral examination. Skill 4.2 is assessed through coursework, written examinations and project work. Skills 4.3 to 4.5 are assessed in workshops. The other skills are not assessed formally.

In addition to the training embedded in the programme, the Graduate School runs a Professional Skills Development programme for Master's level students. The programme, consisting of the "MasterClass" workshops and e-learning modules, aims to help students develop the skills needed both in their academic studies and in obtaining and progressing in their future careers. The Careers Advisory Service also provides training and support for students on career options, job seeking and interviews.

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

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|--|--|
| Academic Requirement | Normally a UK Bachelor's degree at 2:2 or equivalent in an appropriate biological science subject (e.g. Biology, Biochemistry, Biomedical Sciences, medicine, dentistry or veterinary science) |
| Additional Requirements | None |
| Applicants who do not meet the academic requirements above but who have substantial relevant industry or clinical experience may be admitted following completion of a 'Special Qualifying Exam' (SQE) | |
| Applicants might be invited to attend a post-application interview. | |
| English Language Requirement | Standard Requirements: IELTS 6.5 with a minimum of 6.0 in each element or equivalent |

| Learning & Teaching Strategy | | | | | |
|--|---|----------|----------|------------|-----------|
| Scheduled Learning & Teaching Methods | <ul style="list-style-type: none"> • Lectures & keynote Lectures • Class tutorials • Small Group Tutorials • Group Work Sessions • Laboratory Teaching • Computer Data Analysis Sessions • Group Revision Sessions | | | | |
| E-learning & Blended Learning Methods | <ul style="list-style-type: none"> • In Course formative assessment on Blackboard. • Online tutorials on Blackboard | | | | |
| Project and Placement Learning Methods | <ul style="list-style-type: none"> • 4 week Mini-Research Project (MRP) • 6 month Laboratory Based Research Project (LBRP) | | | | |
| Assessment Strategy | | | | | |
| Assessment Methods | <ul style="list-style-type: none"> • Written examinations • Data interpretation exercises • Research paper critique • Viva voce • Written Research Thesis | | | | |
| Academic Feedback Policy | | | | | |
| <p>Students can expect to receive feedback within 15 term-time days. In addition to the examinations, the students are assessed informally, with the marks not contributing to their final result (formative feedback). The course director(s) also meet all students individually (usually in May) to discuss student progress and give feedback.</p> | | | | | |
| Re-sit Policy | | | | | |
| <p>Students will be permitted to re-enter a failed examination or resubmit a piece of failed coursework on a single occasion. Examination re-sits will only be available at the next available sitting (i.e. the following academic year).</p> | | | | | |
| Mitigating Circumstances Policy | | | | | |
| <p>The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams</p> | | | | | |
| Programme Structure | | | | | |
| Full-time | Pre-session | Term One | Term Two | Term Three | Term Four |
| Core Modules | 0 | 1 | | 0 | 0 |
| Projects | 0 | 0 | 0 | 1 | |

| Assessment Dates & Deadlines | | |
|---|---|-------------|
| Written Examinations | Assessments for Element 1 will take place in in January. | |
| Coursework Assessments | Assessments of the Mini Research Project will take at the end of February. The LBRP assessments take place in March (poster) and the end of June (research presentation) | |
| Project Deadlines | Submission Dates: Mini Research Project: last week of February. Laboratory Based Research Project: start of September. | |
| Practical Assessments | The oral assessment for the MRP will take place during February. The viva voce examination for the LBRP will take place at the end September. | |
| Assessment Structure | | |
| Programme Component | ECTS | % Weighting |
| Element 1 (composed of the following) | 35 | 50% |
| <i>Element 1 - Exam Paper 1 (Specialised Topics)</i> | | 30% |
| <i>Element 1 - Exam Paper 2 (Paper Critique & Summary)</i> | | 20% |
| <i>Element 1 - Exam Paper 3 (Practical Data Analysis)</i> | | 30% |
| <i>Element 1 - Mini-Research Project Report</i> | | 5% |
| <i>Element 1 - Mini-Research Project Presentation</i> | | 5% |
| <i>Element 1 - Research Project Poster</i> | | 5% |
| <i>Element 1 - Research Project Presentation</i> | | 5% |
| Element 2 - Laboratory Based Research Project | 55 | 50% |
| Total | 90 | 100% |
| Rules of Progression | | |
| Not applicable | | |
| Marking Scheme | | |
| A student must: <ul style="list-style-type: none"> • Achieve a mark of at least 40% in each assessment • Achieve a pass mark of at least 50% in each module | | |

Students may be condoned in one module (excluding module 4 Laboratory Based Research Project) with an aggregate mark of at least 40% providing the overall aggregate mark for the programme is at least 50%

- Achieve a mark of at least 50% in the thesis of the Laboratory Based Research Project

Final Degree Classifications:

The MSc can be awarded as a pass, merit or distinction.

In order to be awarded a result of merit, a candidate must achieve an overall aggregate mark for the programme of at least 60% and an aggregate mark of at least 60% in one of the Elements (Element 1 - Modules 1 to 3, Element 2 - Module 4 Laboratory Based Research Project).

In order to be awarded a result of distinction, a candidate must achieve an overall aggregate mark for the programme of at least 70% and an aggregate mark of at least 70% in one of the Elements (Element 1 - Modules 1 to 3 or Element 2 - Module 4 Laboratory Based Research Project).

| Indicative Module List | | | | | | | | | | | | |
|------------------------|--|-------------------|------|--------------|------------------------|-------------------------|----------------|----------------------|----------------------|----------------|---------------|------|
| Code | Title | Core/ Elective | Year | L&T Hours | Ind. Study Hours | Place- ment Hours | Total Hours | % Written Exam | % Course- work | % Practical | FHEQ Level | ECTS |
| | Element 1 - Lecture Programme | Core | 1 | 240 | 480 | 0 | 720 | 100% | 0% | 0% | 7 | 25 |
| | Element 1 - Mini-Research Project | Core | 1 | 150 | 250 | 0 | 400 | 0% | 50% | 50% | 7 | 10 |
| | Element 2 - Module 4 - Laboratory Based Research Project | Core | 1 | 0 | 1125 | 0 | 1125 | 0% | 0% | 100% | 7 | 55 |

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/msc-molecular-medicine/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/msc-molecular-medicine/>

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:

<http://www.imperial.ac.uk/about/governance/academic-governance/senate-subcommittees/>

The College's Academic and Examination Regulations can be found at:

<http://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".

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

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE)

<http://www.hefce.ac.uk/reg/of/>