

Programme Specification for the MSc Human Molecular Genetics

PLEASE NOTE. This specification provides a **concise** summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. This specification provides a source of information for students and prospective students seeking an understanding of the nature of the programme and may be used by the College for review purposes and sent to external examiners. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the course handbook or on-line at

<http://www1.imperial.ac.uk/medicine/teaching/postgraduate/taughtcourses/moleculargenetics/>.

The accuracy of the information contained in this document is reviewed by the College and may be checked by the Quality Assurance Agency.

1. **Awarding Institution:** Imperial College London
2. **Teaching Institution:** Imperial College London
3. **External Accreditation by Professional / Statutory Body:** Not applicable
4. **Name of Final Award (BEng / BSc / MEng etc):** MSc
5. **Programme Title (e.g. Biochemistry with Management):** Human Molecular Genetics
6. **Name of Department / Division:** Division of Genetics of Common Diseases, School of Public Health
7. **Name of Faculty:** Medicine
8. **UCAS Code (or other coding system if relevant):** Not applicable
9. **Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points**
Not applicable
10. **Level(s) of programme within the Framework for Higher Education Qualifications (FHEQ):**

Master's (MSc, MRes)	Level 7
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11. Mode of Study

F/T only

12. Language of Study: English

13. Date of production / revision of this programme specification (month/year):

November 2009

14. Educational aims/objectives of the programme

The programme aims/objectives are to:

1 MSc Human Molecular Genetics

- To provide training and skills for a career in human genetics
- To provide the necessary skills and basic knowledge required to underpin a higher degree in the same or a related discipline
- To facilitate the conversion of graduates from other relevant disciplines to human molecular genetics
- To produce students that are able to carry out “unsupervised” practical work in all basic molecular biology techniques and follow all experimental instructions with some supervision
- To provide students with the knowledge and skills to interpret, analyse and present scientific data, develop and apply scientific thought and experimental design skills and develop independent scientific thought
- To attract highly motivated students, both from within the UK and from overseas;
- To develop new areas of teaching in response to advances in the field of Human Molecular Genetics and the needs of vocational training.

15. Programme Learning Outcomes

1. Knowledge and Understanding

Knowledge and Understanding of

1. fundamentals of human molecular genetics
2. approaches to the study of human genetic disease
3. cytogenetics and molecular diagnostics
4. population genetics, polygenic disease and quantitative genetics
5. animal models of genetic disease, comparative genetics
6. cancer genetics
7. gene therapy
8. An introduction to clinical genetics and NHS genetics services
9. statistical genetics, computing and data analysis
10. lab skills and research techniques including experimental design, molecular techniques and bioinformatics
11. presentation and communication skills, including, problem solving, teamwork, poster presentation, oral presentations and critical appraisal of scientific papers
12. the essential concepts, principles and theories relevant to the students chosen research project area

2. Skills and other Attributes

Intellectual Skills

1. analyse and interpret genetic data and critically appraise scientific papers
2. integrate and evaluate information.
3. formulate hypotheses, devise, explain and defend experimental strategies to test the hypotheses
4. plan, conduct and write-up a programme of original research.

Practical Skills

1. plan and execute safely a series of experiments
2. use laboratory methods to generate data
3. analyse experimental results and determine their strength and validity
4. prepare technical reports
5. give technical presentations
6. use the scientific literature effectively
7. use computational tools and packages

Transferable Skills

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1. communicate effectively through oral presentations, debates, computer based data analysis and presentations, written reports
2. apply statistical and modelling skills;
3. management skills: decision processes, objective criteria, problem definition, project design and evaluation, risk management, teamwork and coordination,
4. integrate and evaluate information from a variety of sources
5. transfer techniques and solutions from one situation to another;
6. use Information and Communications Technology
7. manage resources and time
8. present a coherent application and cv
9. learn independently with open-mindedness and critical enquiry
10. learn effectively for the purpose of continuing professional development

Learning Outcomes are supported by lectures, workshops, oral presentations and computer sessions as well as by VLE activities and both summative and formative assessments. For example, in addition to demonstrating knowledge and understanding, the poster presentation (a group presentation of an experimental design exercise) develops the skills listed below.

- Intellectual skills 1,2,3
- Practical skills 5,6,7
- Transferable skills 1,2,3,4,5,6,7,9

16. The following reference points were used in creating this programme specification

- 1) Course Handbook
- 2) FHEQ qualifications descriptors (given below)

Masters degrees are awarded to students who have demonstrated:

i a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their academic discipline, field of study, or area of professional practice;

ii a comprehensive understanding of techniques applicable to their own research or advanced scholarship;

iii originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline;

iv conceptual understanding that enables the student:

- *to evaluate critically current research and advanced scholarship in the discipline;*
- *and to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.*

Typically, holders of the qualification will be able to:

a deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences;

b demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level;

c continue to advance their knowledge and understanding, and to develop new skills to a high level;

and will have:

d the qualities and transferable skills necessary for employment requiring:

- *the exercise of initiative and personal responsibility;*
- *decision-making in complex and unpredictable situations; and*
- *the independent learning ability required for continuing professional development.*

17. Programme structure and features, curriculum units (modules), ECTS assignment and award requirements

The programme leads to the MSc degree and is offered as a full-time, one calendar year course. The course is not modular. There are two course elements: the written examinations and viva (50 ECTS points) and the research project and coursework (40 ECTS points).

The first three months (October-December) typically comprise lectures and other learning sessions covering fundamentals of human molecular genetics, statistical genetics and computing and laboratory practicals covering the basic techniques in molecular genetics. Lectures and symposia in more specialised topics are covered in the second term (January-February). There is a programme of formative and summative coursework throughout the first six months (typically including group exercises, individual tests and poster and oral presentations). Written examinations are held at the end of February. The remainder of the course consists of an individual (six-month) research project, with a report submitted at the end of August, followed by a *viva* with the External Examiner (usually at the end of September). The overall pass mark is 50%.

Term 1: All students are required to attend all parts of the taught course. The first two weeks are taught jointly with other MSc courses in the Faculty of Medicine and cover basic concepts in cell and molecular biology, an introduction to immunology and an introduction to analysis of complex diseases. The next two weeks covers the fundamentals of clinical genetics. Throughout the term there is training in presentation skills (through oral presentations), two weeks of full-time practical laboratory work and statistics/computing lectures and workshops. Organisation of the computing and practical components of the course depends upon the availability of computing and practical laboratory space, so exact timing may vary slightly from year to year. Students are given an experimental design assignment (poster) at the start of the course to be assessed in term 2. Students are advised to start thinking about their choice of project during this term.

Term 2: Throughout January and early February, there are lectures covering more advanced aspects of human molecular genetics, typically including topics such as DNA repair and genome instability, gene mapping, complex genetic diseases, animal models of genetic disease, approaches to gene therapy and pharmacogenomics. This is followed by two weeks of laboratory practicals. Exam revision workshops are also scheduled. Projects are organised during January. Written examinations are held around the end of February. The exams comprise three, 3-hour unseen written examinations (Paper 1- Fundamentals of Human Molecular Genetics, Paper 2- Data Analysis and Experimental Strategy and Paper 3- Recent Advances in Human Molecular Genetics). Individual research projects begin in March. The projects will usually be conducted at Imperial College, but may occasionally be carried out at recognised external academic research institutions in the UK or overseas, subject to academic staff approval of the project, location and supervisor.

Term 3: Each student gives a mid-project presentation in July. This presentation is formally assessed. Project reports are submitted at the end of August or the first week in September. All students have a *viva voce* examination, on their project and other aspects of the course, prior to the MSc Examination Board meeting in late September.

18. Support provided to students to assist learning (including collaborative students, where appropriate).

- There is an induction day to introduce the students to the department, staff, and health and safety procedures. Sessions are scheduled in week 1 to allow the students to register at

the library, obtain security cards and sort out any registration or accommodation problems off-site.

- An MSc Student Handbook is provided which includes information about the course and department
- A study skills session is held during the induction period. This includes specific training on academic integrity and plagiarism.
- Students are organised into study groups for peer support (typically 2-5 students per group) and have scheduled meetings with a tutor who offers academic and pastoral support. In this system, they also have structured support on CV preparation and on application for research positions
- Blackboard VLE supports the course – there is a session during the induction programme to introduce the students to this. The induction system includes an online questionnaire designed to identify specific learning needs (such as for English Language support) and direct students to sources of help. Course support material appears on a weekly basis timed to co-ordinate with curriculum content. There are self-test materials to support basic concepts in genetics, clinical genetics and molecular biology. The VLE includes links to a wide range of academic and welfare resources. Student-led forums are available for interactive coursework, student discussions and posting of lecture materials. Students are invited to provide feedback to staff on teaching through the VLE and also to give peer-feedback on oral presentations.
- The College's Library Services, online journals and other learning resources provided by the College. A library training session is included in the induction programme.
- There is an MSc course committee (with student representation), that meets twice per year. Student feedback is carefully considered and minutes (where not reserved for confidentiality reasons) are made available to students on the VLE.
- A wide range of research seminars are organised on-site and elsewhere within the College – students are encouraged to attend these
- Students have access to campus tutors and College Tutors as well as to student counsellors
- They have access to Teaching and Learning Support Services, which provide assistance and guidance, e.g. on careers.

19. Criteria for admission:

The minimum qualification for admission is at least a second class honours degree from a UK university or equivalent overseas qualification in biochemical sciences, genetics or a related subject. Normally, students on this course have a 2.1 or 1st class undergraduate degree. Occasionally, students with other qualifications together with relevant work experience may be considered.

20. Processes used to select students:

Applications (including references and personal statements) are scrutinised by the Course Director who makes the majority of decisions, supported where necessary by consultation with the Deputy Course Director.

21. Methods for evaluating and improving the quality and standards of teaching and learning

a) Methods for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

Overall (as opposed to session-specific) student feedback is sought through a course evaluation questionnaire and through the course representatives. Results are discussed at course committee meetings and actions taken as applicable as soon as possible thereafter.

The external examiner system and Boards of Examiners are central to the process by which the College monitors the reliability and validity of its assessment procedures and academic standards. Boards of Examiners comment on the assessment procedures within the College and may suggest improvements for action by relevant departmental teaching Committees.

The Faculty Studies Committees and the Graduate Schools' Postgraduate Quality Committees review and consider the reports of external examiners and accrediting bodies and conduct periodic (normally quinquennial) and internal reviews of teaching provision. Regular reviews ensure that there is opportunity to highlight examples of good practice and ensure that recommendations for improvement can be made.

At programme level, the Head of Department/Division has overall responsibility for academic standards and the quality of the educational experience delivered within the department or division.

Most of the College's undergraduate programmes are accredited by professional engineering and science bodies or by the General Medical Council. Accreditation provides the College with additional assurance that its programmes are of an appropriate standard and relevant to the requirement of industry and the professions. Some postgraduate taught courses are also accredited.

b) Committees with responsibility for monitoring and evaluating quality and standards:

The **Senate** oversees the quality assurance and regulation of degrees offered by the College. It is charged with promoting the academic work of the College, both in teaching and research, and with regulating and supervising the education and discipline of the students of the College. It has responsibility for approval of changes to the Academic Regulations, major changes to degree programmes and approval of new programmes.

The **Quality Assurance Advisory Committee (QAAC)** is the main forum for discussion of QA policy and the regulation of degree programmes at College level. QAAC develops and advises the Senate on the implementation of codes of practice and procedures relating to quality assurance and audit of quality and arrangements necessary to ensure compliance with national and international standards. QAAC also considers amendments to the Academic Regulations before making recommendations for change to the Senate. It also maintains an overview of the statistics on completion rates, withdrawals, examination irregularities (including cases of plagiarism), student appeals and disciplinarys.

The **Faculty Studies Committees** and **Graduate School Postgraduate Quality Committees** are the major vehicle for the quality assurance of undergraduate / postgraduate courses respectively. Their remit includes: setting the standards and framework, and overseeing the processes of quality assurance, for the areas within their remit; monitoring the provision and quality of e-learning; undertaking reviews of new and existing courses; noting minor changes in existing programme curricula approved by Departments; approving new modules, changes in module titles, major changes in examination structure and programme specifications for existing programmes; and reviewing proposals for new programmes, and the discontinuation of existing programmes, and making recommendations to Senate as appropriate.

The **Faculty Teaching Committees** maintain and develop teaching strategies and promote inter-departmental and inter-faculty teaching activities to enhance the efficiency of teaching within Faculties. They also identify and disseminate examples of good practice in teaching.

Departmental Teaching Committees have responsibility for the approval of minor changes to course curricula and examination structures and approve arrangements for course work. They also consider the details of entrance requirements and determine departmental postgraduate student numbers. The Faculty Studies Committees and the Graduate School Postgraduate Quality Committees receive regular reports from the Departmental Teaching Committees.

c) Mechanisms for providing prompt feedback to students on their performance in course work and examinations and processes for monitoring that these named processes are effective:

Feedback is available in the following ways:

- 1) Verbally at the time of assessment (eg to the group for group poster presentations)
- 2) In writing at the time of assessment (eg. for self-test exercises on the VLE, for computer

- marked assessments in statistical genetics)
- 3) In writing following the assessment (eg. pro-forma with individual feedback on responses to questions about the poster presentation and detailed group feedback on the poster itself; and online peer-feedback grading form following individual and group oral presentations in term one)
 - 4) Examination and coursework marks made available on an individual basis through the VLE

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.

d) Mechanisms for gaining student feedback on the quality of teaching and their learning experience and how students are provided with feedback as to actions taken as a result of their comments:

- MSc Staff – Student Course Committee
- Informal discussions and meetings with students
- Course questionnaire evaluation at the end of the course
- Through the VLE on all teaching sessions

e) Mechanisms for monitoring the effectiveness of the personal tutoring system:

Efficiency, usefulness and timeliness of the study group system (including tutors) are considered on the course evaluation form completed by students and are discussed at the term 1 course committee meeting, where student representatives are invited to comment on these aspects.

f) Mechanisms for recognising and rewarding excellence in teaching and in pastoral care:

Staff are encouraged to reflect on their teaching, in order to introduce enhancements and develop innovative teaching methods. Each year College awards are presented to academic staff for outstanding contributions to teaching, pastoral care or research supervision. A special award for Teaching Innovation, available each year, is presented to a member of staff who has demonstrated an original and innovative approach to teaching. Nominations for these awards come from across the College and students are invited both to nominate staff and to sit on the deciding panels.

g) Staff development priorities for this programme include:

- Maintaining an active research programme in Human Molecular Genetics;
- Attendance at conferences and workshops in the field of Human Genetics;
- PRDP, College and external staff development and technical courses; College Teaching Development Grant Scheme to fund the development of new teaching and appraisal methods.

22. Regulation of Assessment

a) Assessment Rules and Degree Classification:

For **postgraduate taught programmes**: The Pass Mark for postgraduate taught courses is 50%. In order to be awarded a result of merit, a candidate must obtain an aggregate mark of 60% or greater; a result of distinction requires an aggregate mark of 70% or greater.

Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60% or greater in each element with the exception of one element AND has obtained a mark of 50% or greater in this latter element.

Where appropriate, a Board of Examiners may award a result of distinction where a candidate has achieved an aggregate mark of 70% or greater across the programme as a whole AND has obtained

a mark of 70% or greater in each element with the exception of one element AND has obtained a mark of 60% or greater in this latter element.

b) Marking Schemes for postgraduate taught programmes:

The Pass Mark for all **postgraduate** taught course modules is 50%. Students must pass all elements in order to be awarded a degree.

c) Processes for dealing with mitigating circumstances:

A candidate for a Master's degree who is prevented owing to illness or the death of a near relative or other cause judged sufficient by the Graduate Schools from completing at the normal time the examination or Part of the examination for which he/she has entered may, at the discretion of the Examiners,

(a) Enter the examination in those elements in which he/she was not able to be examined on the next occasion when the examination is held in order to complete the examination,

or

(b) be set a special examination in those elements of the examination missed as soon as possible and/or be permitted to submit any work prescribed (e.g. report) at a date specified by the Board of Examiners concerned. The special examination shall be in the same format as specified in the course regulations for the element(s) missed.

Applications, which must be accompanied by a medical certificate or other statement of the grounds on which the application is made, shall be submitted to the Academic Registrar who will submit them to the Board of Examiners.

d) Processes for determining degree classification for borderline candidates:

For **postgraduate taught programmes**: Candidates should only be considered for promotion to pass, merit or distinction if their aggregate mark is within 2.5% of the relevant borderline. Nevertheless, candidates whom the Board deems to have exceptional circumstances may be considered for promotion even if their aggregate mark is more than 2.5% from the borderline. In such cases the necessary extra marks should be credited to bring the candidate's aggregate mark into the higher range.

e) Role of external examiners:

The primary duty of external examiners is to ensure that the degrees awarded by the College are consistent with that of the national university system. External examiners are also responsible for approval of draft question papers, assessment of examination scripts, projects and coursework (where appropriate) and in some cases will attend *viva voce* and clinical examinations. Although external examiners do not have power of veto their views carry considerable weight and will be treated accordingly. External examiners are required to attend each meeting of the Board of Examiners where recommendations on the results of individual examinations are considered. External examiners are required to write an annual report to the Rector of Imperial College which may include observations on teaching, course structure and course content as well as the examination process as a whole. The College provides feedback to external examiners in response to recommendations made within their reports.

23. Indicators of Quality and Standards

- Favourable comments by External Examiners.
- Favourable comments in feedback from the students.
- First destination data for MSc graduates, showing a high proportion find employment or further postgraduate research training in Human Molecular Genetics and related areas.
- Independent review of the quality of the educational provision of the School of Medicine by the Quality Assurance Agency subject review process in 2000 achieving an excellent

grading of 21 out of a maximum 24 points.

24. Key sources of information about the programme can be found in

Course Homepage on College website:

<http://www1.imperial.ac.uk/medicine/teaching/postgraduate/taughtcourses/moleculargenetics/>

Course content, entry requirements and assessment procedures are all linked to from this page.