Imperial College London

Programme Specification for the 1-year MRes in Mathematical Sciences

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://www /[please add weblink to programme]. 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:** **None**
4. **Name of Final Award** (BEng / BSc / MEng etc): **MRes**
5. **Programme Title** (e.g. Biochemistry with Management): **Mathematical Sciences**
6. **Name of Department / Division:** **Mathematics**
7. **Name of Faculty:** **Natural Sciences**
8. **UCAS Code** (or other coding system if relevant):

9. Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points (please select and list the QAA Subject Benchmark Statement(s) for your programme, where appropriate, which can be found at http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/ There may be other external /internal reference points that you may also wish to add here):

Mathematics, statistics and operational research

10. Level(s) of programme within the Framework for Higher Education Qualifications (FHEQ): Level 7

11. Mode of Study: Full-time

12. Language of Study: English

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

October 2012

14. Educational aims/objectives of the programme
The programme aims/objectives are to:

1 **MRes in Mathematical Sciences**

- Provide high quality education in Mathematics within an environment committed to excellence in both teaching and research.
- Attract well-qualified students and to provide intellectual challenge in a structure containing an appropriate amount of flexibility, so that students can develop their specialist interests.
- Teach and provide the opportunities to learn a core of advanced Pure Mathematics, Applied mathematics or Statistics, together with a range of more specialised options.
- Introduce students to a wide range of applications of Mathematics.
- Equip students with a range of mathematical skills – in problem-solving, extended project work, computation and presentation – to enable them to take prominent roles in a wide spectrum of employment and research.
- Provide further breadth and depth of Mathematics or Statistics, at a level beyond the 4th year of an MSci, including an extended research project.

15. Programme Learning Outcomes

Any student successfully completing this course will be able to

- answer questions on a range of advanced topics in Mathematics or Statistics,
- perform an initial literature survey for a research problem,
- carry out an extended research project,
- write up, explain, and answer questions about this research.

1. Knowledge and Understanding

Knowledge and Understanding of:

1. The fundamentals of Mathematics or Statistics as a living discipline in its own right.
2. The development of the application of Mathematics and Statistics in a wide range of situations relevant to research and industry.
3. The importance of precision of argument.
4. Problem-solving strategies and methods.
5. Computational skills.
6. A selection of subjects which students study in greater depth, according to their interests leading to current developments at the frontiers of the subject.

Students should already have acquired these through their undergraduate course, in which they should have obtained a degree class of 2i or higher in Mathematics or a related subject. These skills will be developed to a higher level by the taught courses in this degree; the research project is intended to develop points 2-6 even further.

2. Skills and other Attributes

Intellectual Skills:

1) Ability to assimilate and understand a large body of complex concepts and their inter-relationships.
2) Knowledge and understanding of the role of logical mathematical argument and deductive reasoning, together with formal processes of mathematical proof and development of mathematical theories.
3) Use of a structured mathematical analytical approach to problem solving, including the importance of assumptions made and consequences of their violation.

4) Use of Mathematics to describe and model in applications, including appropriate solution method, and interpretation of results.
5) Carry out extended investigative mathematical work as an individual.

All lecture courses are accompanied by problems, which students work through privately, and supported by group tutorials/problems classes; these are integrated within the timetabled lecture periods. There is access to lecturers informally and through a formal 'office hours' system. Assessment of the lecture material is primarily by unseen written examination, together with assessed courseworks and assignments. 5) is acquired through the compulsory individual research project.

Practical Skills:

1. Carry out investigative project work as an individual and as part of a small group.
2. Use symbolic and numerical software as part of practical computation.

There is a compulsory major research project.
Projects are assessed through production of hard copy and oral presentation.
Students should have acquired 2 in their undergraduate course. There is opportunity for more advanced computation (e.g. in C) in option courses, as well as in the project.

Transferable Skills:

1. Solve open-ended problems and problems with well-defined solutions by formulating problems in precise terms, identifying key issues and trying different approaches in order to make progress.
2. Carry out an independent investigation using textbooks and other available literature, searching databases and interacting with colleagues and staff to extract important information.
3. Communicate effectively by listening carefully and presenting complex information in a clear and concise manner orally, in paper and using IT.
4. Use analytical skills, paying attention to detail and using technical language correctly, to manipulate precise and intricate ideas, to construct logical arguments.
5. Use IT skills for communication and analysis.
6. Work independently , use their initiative, organize themselves to meet deadlines, plan and execute an extended project
7. Work in groups, interacting constructively with others.

Acquisition of 1 is partly through the methods and strategies outlined in B above.

Acquisition of 2, 3, 4 comes through courseworks, and through the essay and project.

Acquisition of 5 is through guided preparation of the project dissertation and presentation.

Acquisition of 6 is developed progressively through courseworks, through the course as students take control of their own learning, through private study, project work, classes., as well as the essay and project.

Acquisition of D7 is mainly through the compulsory project, where the student should interact with the supervisor to obtain an understanding of the research problem.

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

- Subject benchmarking information for Mathematics, Statistics and Operational Research (QAA)
- All draft course information being subject to approval by MQC of Imperial College.

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

This degree programme is offered as a full-time course lasting 1 academic year, and leads to the MRes degree. This is assigned 90 ECTS overall.

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

- To attract the ablest PG students the Department and Faculty both run a PG Open Day, and the Department maintains detailed course descriptions on its website.
- Before successful applicants arrive they receive academic and other advice about their induction into the Department.
- On arrival students receive an overall course document together with timetables. They also receive a Freshers' Handbook and other general information about safety, Libraries, computing facilities, etc.
- The Department's staff are our major resource. Most Academic Staff are involved in teaching/learning/project support, which have strong research input.
- Each student has a Course Advisor to assist with personal and academic problems (normally for the duration of the degree course) allocated by the Course Organiser, in term 3 of year 1 they may seek guidance from the relevant staff member for their essay, and in June of year 1 they must choose a Project Supervisor who will assist and guide them in their chosen year 2 research project, initially by directing their vacation reading.
- In all lecture courses, classes are held regularly during the timetabled lecture periods.
- All courses are included within the 'office-hour' system, where there is a timetabled period for individual student/lecturer consultations.
- In the main College Library there is an extensive Mathematics collection, which has an excellent supply of books and materials and provides a good working environment for private study. Within the Department there is a further computer room designated for the use of Master's students.

19. Criteria for admission:

- **Normally a 2i Honours degree or above in Mathematics or a related subject.**

20. Processes used to select students:

- **The applicants are selected on the basis of their undergraduate performance; those showing evidence of aptitude for research will be preferred.**

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:

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 School's Masters Quality Committee review and consider the reports of external examiners and accrediting bodies and conduct periodic (normally biennial) 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. The Department monitors student feedback on courses, both formal and informal, to maintain standards.

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.

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 disciplinaries.

The **Master's Quality Committee** is the major vehicle for the quality assurance of postgraduate Master's courses. Its 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.

The **Mathematics Department Postgraduate Committee,** meeting regularly, will address any concerns raised by the student representatives from the course. If students have any immediate concerns, they are encouraged, either directly or via their representatives, to discuss them with the Course Organiser.

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:

Any assessed coursework done as part of a course, will be marked promptly and returned to the student. Students are encouraged to discuss difficulties with the course lecturer. On the project, students will meet their supervisor at least weekly to discuss their progress. They should choose advanced courses to complement their project, and discuss their work on these with their supervisor.

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:

Students may give feedback on courses via the PG SOLE survey, or more immediately via their representatives and the Course Organiser. Any remedial action will be notified to students via the representatives.

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

Students with concerns about their Course Tutor, or about their Project Supervisor, should notify the Course Organiser or the PG Tutor at once.

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:

- **Very active research programme in Mathematics.**
- **During probation, lecturers attend a series of College organised workshops on teaching and learning.**
- **Probationary lecturers are assigned a mentor.**
- **Staff are appraised annually.**
- **Staff have available to them College courses and occasional seminars on teaching and learning.**

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 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:

For postgraduate taught programmes: 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

- **External examiners' reports will give an objective and impartial assessment of how well the course meets its objectives.**
- **After the first cohort graduates, we would monitor first destination data; in particular the proportion continuing with either industrial or academic research.**
- **The College has robust procedures, administered by PQC, for monitoring both academic standards and the quality of administrative procedures, on any postgraduate course.**

24. Key sources of information about the programme can be found in (links to course handbook, prospectus, departmental website, syllabus etc):

These are in preparation.