Imperial College London

Programme Specification for the MSci Joint Mathematics and Computer Science

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 on-line at http://www3.imperial.ac.uk/mathematics/students/undergraduate/courseguides

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:** IET, British Computer Society, Associate of the Royal College of Science (ARCS), Institute of Actuaries and Institute of Mathematics and its Applications

4. **Name of Final Award**: **MSci (Honours)**

5. **Programme Title**): **Mathematics and Computer Science**

6. **Name of Department / Division:** **Mathematics/Computing**

7. **Name of Faculty:** **Natural Sciences**

8. **UCAS Code**: **GG41 (entry prior to 2011)**

9. **Relevant QAA Subject Benchmarking Group(s) and/or other external/internal reference points**

Mathematics, Statistics, Operational Research and Computer Science

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

Bachelor's (BSc, BEng, MBBS)	Level 6
Integrated Master's (MSci, MEng)	Levels 6 and 7
Master's (MSc, MRes)	Level 7

11. **Mode of Study**

FULL TIME

12. **Language of Study:** English

13. **Date of Revision:** **October 2013 [for degree entry prior to 2011]**
– NB: October 2013 will be last iteration of this degree for Year 4 only

14. Educational aims/objectives of the programme

The programme aims/objectives are to:

- Provide high quality education in both Computing and Mathematics techniques within an environment committed to excellence in both teaching and research.
- To attract well-qualified students and provide intellectual challenge in a structure that contains an appropriate level of flexibility so that students can develop their special interests and skills for critical independent scholarship.
- To teach and provide the opportunities to learn a core of foundation topics in both mathematics and computing, together with a wide-range of options in both Mathematics and Computer Science.
- Place special emphasis on the fundamental principles underlying computing and give a solid background in mathematics relevant to computing and its applications.
- Introduce students to a wide-range of computing and mathematical applications
- Equip students with a range of computing and mathematical skills – in problem-solving, mathematics, applied computing, project work and presentations – which, individually and/or combined, will enable them to take prominent roles in a wide spectrum of employment and research.
- **Provide training in the professional aspects of computing and mathematics, including professional conduct and professional ethics;** give students extensive practical experience, through a wide range of supporting laboratory and problem solving classes and through project work.
- Provide some limited broadening of study through a range of Management and Humanities options.

15. Programme Learning Outcomes

I. Knowledge and Understanding

A. Knowledge and Understanding of

1. Major paradigms of programming – functional, declarative, imperative and object-oriented.
2. Basic computing, including programming, program design, human-compute interaction, e-commerce, computer systems, hardware, network and communications, compilers, databases and many application areas such as graphics and artificial intelligence.
3. Underlying mathematics including logic, discrete mathematics, methods and statistics, computability theory, complexity, pure mathematics, numerical analysis and statistics.
4. Formal practical programming and mathematical skills, including specification and reasoning.
5. The development of the application of Mathematics as a language in a wide range of situations relevant to research and industry.
6. Problem-solving strategies and methods.
7. A selection of differing subject knowledge which students study to a greater depth according to their interests and degree coding.

Teaching/learning methods and strategies

Acquisition of A1 to A4, A6 and A7 is through compulsory and core courses in years 1 and 2 together with a combination of more specialised options in years 2, 3 and 4. Lectures are an integral part of course delivery at Imperial College, supported by tutorial classes, tutorial groups, practical work, and office hours. All mathematics courses are accompanied by “problem-solving“ worksheets, which students work through privately and supported by group tutorials. There is a project in each of year 1 [maths group project] and year 2 [group-based computing topic] and year 3 [computing and maths group projects].

In the final year there is an individual project work that can be in either mathematics or computing.

Acquisition of A5 and A6 is through both individual and group supervised projects with accompanying reports and presentations.

Students are encouraged to undertake independent reading to supplement and consolidate what is being learned and to broaden their knowledge and understanding of computing.

Assessment of knowledge and understanding is through a combination of unseen written examinations, unseen practical tests, assessed coursework and laboratory work, group project documentation and presentations, individual project dissertation and presentation.

II. Skills and other Attributes

B. Intellectual Skills:

1. Analyse and formally specify and solve programming, computing system and mathematical design problems of different types.
2. Reason about program correctness and algorithm complexity.
3. Understand the role of logical mathematical argument and reasoning, together with formal methods of proof and development.
4. Assimilate and understand a large body of complex concepts and their relationships.
5. Construct and solve abstract and mathematical models of computer and communication systems.
6. Use mathematics to describe and model applications, to identify appropriate solution methods, and to interpret and analyse results.
7. Match problems to techniques and tool most suitable for solving them.
8. Perform critical evaluation of alternative designs and implementation.
9. Design experiments for the purpose of testing and evaluation.

Teaching/learning methods and strategies

All lecture courses are accompanied by problem sheets, which students work through privately and during the tutorial hours integrated within the timetabled lecture period, and supported by group tutorials, which are separately timetabled for compulsory/core courses in year 1.

Skills B1-4 are developed through core taught courses in years 1 and 2, optional courses in years 3 and 4, the laboratory work, coursework and project work. Skill B5 is developed throughout the laboratory program, assessed laboratory work, coursework and project work, skill B6 is acquired through core courses in years 1 and 2, and optional courses in the last two years, respectively. The remaining skills are developed through the group and individual projects.

Assessment is primary by unseen written examination, together with assessed courseworks in the form of laboratory work, problem sheets or projects.

Mathematics lecture courses are also supported by problem sheet classes, group and individual tutorials, and access to lecturers informally and through a formal "office hours" system.

C. Practical Skills – able to:

1. Design and develop programs of varying levels of complexity using a number of different programming languages and paradigms, for example object-oriented programming, logic programming, functional programming and imperative programming.
2. Use many computing tools and techniques, such as database, web-based and graphic tools and techniques.
3. Use symbolic and numerical software as part of practical computation
4. Analyse computing and mathematical problems and devise solutions to them.

Teaching/learning methods and strategies

There are compulsory supervised laboratory and project work in year 1, 2, 3 and 4.

C1, C2 and C4 are taught and developed throughout the taught courses, laboratory program, the program design and programming courses, the assessed laboratory work, courseworks and on-line tests, and the group and individual projects. 3 is taught and developed through the specialised optional courses, and through the group and individual project work.

Group projects in Computing are assessed through production of written technical reports on software engineering methods applied to the project and a final technical report, including a detailed log, and technical presentation with product demonstration. Individual projects are assessed through detailed dissertation and demonstration. Other practical skills are assessed through laboratory work, courseworks and on-line tests. The continuous assessment (laboratory work and courseworks) throughout the degree and the programming tests provides valuable feedback for the staff and the students.

D. Transferable Skills:

1. Communicate effectively by presenting complex information in a clear and concise manner orally, by computer presentations and in written reports.
2. Program in the major computer programming paradigms.
3. Use the internet effectively, respecting professional conduct and professional ethics.

4. Integrate and evaluate information from multiple and diverse sources.
5. Work independently, use their problem solving initiative, organize themselves to meet deadlines.
6. Work within and contribute to a team, using management skills such as co-ordination, decision processes, project design and evaluation.
7. Transfer techniques and solutions from one area to another.
8. Learn independently with open-mindedness and critical enquiry.
9. Learn effectively for the purpose of continuing professional development.

Teaching/learning methods and strategies

Acquisition of D1 is through feedback on coursework, supervised preparation of reports and presentations for the individual and group projects.

Acquisition of D2 comes through lectures and practical coursework. It is further developed in the individual project. Acquisition of D3, D4, D6 and D7, is through progressive problem solving, compulsory professional issues course in year 1, compulsory group projects in years 1, 2 and 3, and through final year project. Acquisition of 5 is developed progressively throughout the course as students take control of their own learning, and have to meet a series of staged deadlines. 8 and 9 are not explicitly taught but are encouraged and developed throughout the degree.

D1 is assessed through coursework, reports, project presentations and written examinations. 2 is assessed through coursework and a laboratory based examination. 6 is assessed through group projects, whereas the other skills are not assessed formally, but are implicitly assessed through coursework and the group and individual project reports.

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

- Subject benchmarking information for Computing
- Subject benchmarking information for Mathematics, Statistics and Operational Research (QAA)
- All information being subject to approval by the Science Studies Committee of Imperial College
- Student Handbook for Course approved by Senate of Imperial College

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

This programme, is offered jointly by the two departments, and is designed as mathematical courses oriented towards computing science and is suited to mathematically able students with interests in both subjects. The programme gives a firm foundation in Mathematics, in particular Pure Mathematics, Numerical Analysis and Statistics, and covers all the essentials of Computer Science, with an emphasis on developing software and reasoning formally about it, as well as more theoretical topics. The teaching is divided approximately equally between the two Departments. The course is unit based. Students take two units from each Department in each of the first two years. In the third year students select a total of four units to support their particular interests and areas of specialisation.

ECTS assignment is contained within a separate document.

Year One

All students take 4 half-unit lecture courses in Mathematics in the first two terms. Currently, these are Geometry and Linear Algebra, Analytical Methods and Analysis, Analysis I and Algebra I. Courses are assessed by examination and coursework/tests. Courseworks contributes 10% to each Mathematical half-unit.

All students take also 2 units in Computer Science. Computer Science I, a full unit, currently includes the lecture courses Logic, Reasoning about Programs and Architecture. Programming and Data Structure, a full unit, currently includes Laboratory, which is across three terms and consists of labwork, from Mathematics and Computing, and four lecture courses Programming I and II, and Object Oriented Programming, in Terms 1 and 2, and Programming III with labwork in Term 3.

Computing courses included in Computer Science I unit are assessed by examination and coursework. Coursework is weighted as one-seventh of the examination/coursework contribution for each of these course. Computing courses included in Programming and Data Structure unit are assessed via on-line tests.

Students must pass all Mathematics half-units and all the Computing units to proceed to the second year. To pass each Mathematics half-unit 40% [College scale] overall is required. To pass Computer Science I an examination average of 40% is required and an overall average of 40%, including coursework.

To pass Programming and Data Structure unit, a weighted overall average of 40% is required.

Students who fail to obtain a particular unit or half-unit may be allowed to resit, either in September or in the following year.

Component	Units	ECTS
Four mathematics half-units including coursework (each contributing 6 ECTS)	2	24
Computer Science 1 (Logic: 5.5 ECTS, Reasoning about Programs: 5.5 ECTS, Architecture: 5 ECTS)	1	16
Programming and Data Structures (Programming I: 8 ECTS, Programming II: 8 ECTS, Programming III: 4 ECTS)	1	20
Total	**4**	**60**

Year Two

In Mathematics, students take 3 compulsory half-units and 1 half-unit option. In Computing, students take 1 compulsory full unit and 1 optional full unit option. The compulsory Computing full unit comprises examination and coursework in Software Engineering – Design and Operating Systems, together with laboratory work. The optional Computing full unit comprises examination and coursework in three Computing courses selected from a specified list of options.
In Mathematics, coursework contributes 10% to each half-unit Mathematics course. In Computing, coursework is weighted as one-seventh of the examination/coursework contribution for each Computing course.
There is a compulsory Mathematics Group project in Term 3.
Students must pass all Mathematics and Computing half-units in order to enter the third year. To pass each Mathematics half-unit 40% [College scale] overall is required. To pass the compulsory Computing full unit an examination average of 40% is normally needed and an overall average, including coursework, of 40%. To pass the optional Computing full unit, an examination average of 40% is required, with at least two marks at 30% or more, and 40% overall average, including coursework.

Component	Units	ECTS
Four mathematics half-units including coursework (each contributing 7 ECTS)	2	28
Two compulsory computing courses (Software Engineering-Design: 4 ECTS, Operating Systems: 4 ECTS and Laboratory: 12 ECTS)	1	20
Computing options (three courses each contributing 4 ECTS)	1	12
Total	**4**	**60**

Year Three

Students must take a total of 8 half-unit options, of which at least 2 must be chosen from Computing and at least 2 from Mathematics. The remaining four options may include a non-language Humanities course from a specified list. There is a compulsory group project in Computing in Term 1 and a group project in Mathematics in Term 3, which together contribute a half-unit.

Each half-unit, except the project half-unit, comprises examination and coursework. In Mathematics, coursework normally contribute 10% to each half-unit Mathematics course. In Computing, coursework is weighted as one-seventh of the examination/coursework contribution for each Computing course. An Industrial Placement has now been included at the end of Year 3 but is credited in Year 4.

To pass each Mathematics half-unit 40% [College scale] overall is required. To pass each Computing half-unit 40% overall, including coursework, is needed. The project half-unit is weighted as if it was 0.5 full unit.

Component	Units	ECTS
Eight half-unit options (each contributing between 6 and 8 ECTS)	4	48—60
Group projects	0.5	12
Total	**4.5**	**60—72**

Year Four

Students must take a total of 7 half-unit options, of which at least 2 must be chosen from Computing and at least 2 from Mathematics. One of the options may be a non-language Humanities course from a specified list.

There is an additional compulsory final project half-unit including an individual project in either Computing or Mathematics, which has enhanced weighting. Each half-unit, except the project half-unit, comprises examination and coursework.

Coursework normally contributes 10% to each half-unit Mathematics course. Mathematics M3 options chosen in the Fourth Year must be offered as an M4 version with an additional mastery examination comprising between 2 and 5 master's level questions. The mastery paper contributes 15% to each half-unit Mathematics course.

In Computing, coursework is weighted as one-seventh of the examination/coursework contribution for each Computing course.

To pass each Mathematics half-unit 40% [College scale] overall is required. To pass each Computing half-unit 40% overall, including coursework, is needed. The project half-unit is weighted as if it was 0.75 full unit. (i.e., it counts 1.5 x other fourth year half-unit.)

Students now need to pass all elements in order to graduate [from 2008 Entry].

Component	Units	ECTS
Seven half-unit options (each contributing between 6 and 8 ECTS)	3.5	48—56
Industrial placement	0	22**
Individual project	0.5	16
Total	**4**	**86—94**

***ECTS for the industrial placement are awarded as part of the individual project half-unit on passing the individual project.*

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

- Before students arrive to start the degree programme they receive academic and other advice about their induction into the two departments.
- On arrival students receive a course document (green), which details necessary information about their courses together with a timetable. They also receive a “Freshers’ Handbook” and other general information about safety, Libraries, computing and other facilities.
- Students in the first year have a one-week orientation at the beginning of the Autumn Term, during which they have an introduction to the Departments, to the libraries, to personal tutors, to the degree programme, and a diagnostic test in Mathematics.
- All students have access to extensive library facilities including the College facilities and the Departments’ technical libraries on-site.
- Students of all years have access to detailed course documents, both in hard copy and on the Web, about course descriptions and assessments. The JMC web-based documentation gives details of courses available, their syllabuses and a guide to completing project work.
- In their first year students are allocated a personal tutor, a personal maths tutor and a personal computing tutor. The tutors’ role is to assist their tutees with personal problems and to advise students on academic issues that may arise during the course of their degree. The role of the computing and maths tutors is to provide a continuous monitoring of students’ academic progress and to pinpoint areas of difficulty that students from a vast range of academic backgrounds experience may encounter in their first year of the course.
- All students have email and open personal access to their tutorial support, including the year co-ordinators, Senior Tutors and the Directors of Studies.
- All students have access to student counsellors on-site.
- Elected student Undergraduate Representatives (one for each of the four years) and the departmental student Representative meet with academics at the staff-student Committee three times a year to discuss issues relating to their study. The Representatives also meet with the JMC coordinator as and when problems arise. In addition, the departmental student Representative sits in on the Academic Committee, which meets once a month.

- All students have access to Teaching and Learning Support Services, which provide assistance and guidance, e.g. on careers, and to state-of-the-art Computing facilities in both Departments. The stock is regularly upgraded and the scheduled lab sessions have lab staff to assist with technical queries.
- An undergraduate handbook is also available in the libraries, with descriptions of every course available on the programme.
- All students have access to the Internet and to Departmental Web pages which include examination and lecture timetables, an online computing dictionary, links to careers and the main college website.
- There are extensive Library facilities in Mathematics and in Computing in the Main College Library. There is an excellent supply of books and resources materials. The new Mathematics Learning Centre offers also a good working environment for private study.
- Employer needs and opinions feed into the programme through frequent guest lectures and seminars from industry, industry based group and individual projects and collaboration between staff and industry in research and consultancy. The Departments' student societies (DocSoc and MathSoc) regularly invite guest speakers from industry to discuss career, technical issues and topics of general mathematical interest.

Other facilities include

- A Student Common Room in both Mathematics and Computing Department.
- Open access to the Senior Tutors and Directors of Studies in both Mathematics and Computing.
- MathSoc and DocSoc – societies for all members of the two Departments for academic and non-academic events.
- PLUS! – a group for those (students and staff) interested in 'non-standard' problem solving.
- Careers advice within the Departments as well as College Careers Service.
- Access to student counsellors on the South Kensington site and a Health Centre.
- Access to a Union advisor.
- Access to College Teaching and Learning Support Services.

19. Criteria for admission:

The minimum entry requirements for the BSc course are three A levels, including:

Grade A* in Mathematics
Grade A* in Further Mathematics
Grade A in one other subject
These grades are the norm, but may be varied occasionally by the admissions tutors

Applications from individuals with equivalent non-GCE qualifications, such as Scottish Advanced Highers, International, French and European Baccalaureates are also considered.

It should be noted that the entry requirements for MSci courses are the same as for the corresponding BSc courses. However, progression into year 3 and 4 requires a good level of performance on courses, currently at upper second class honours level or better – in both Mathematics and Computing. Suitably qualified students may transfer from BSc codings to MSci codings (or from MSci to BSc) at later stages in Mathematics and in Computing.

20. Processes used to select students:

- Primarily UCAS application, Examination Grades and Interview
    - Substantial importance is placed on the motivation for taking a demanding joint degree programme and this is looked for in the UCAS application and at interview
    - Substantial importance is placed on the work ethic and time management skills and this is looked for in the UCAS application and at interview
    - Substantial importance is placed on the potential to succeed in such a degree (even where GCSE results, for instance, have not been outstanding) and this is looked for in the UCAS application and at interview. Usually this consists of the assessment of technical questions designed to demonstrate innate ability rather than raw knowledge of the subject.
    - For overseas students who may not attend a physical interview, a telephone interview and written assessment test may be used
- The interview day consists of:

- a welcome presentation by the Admissions tutor and Director of Studies
- a tour of the College and Department facilities
- demonstrations of undergraduate projects
- a one-to-one academic interview with one of our lecturers

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

- Individual course review initiated through the Directors of Undergraduate Studies.
- Annual course review through the Departmental Examinations Committees.
- Regular reports on the different programmes by the various Course Directors and year Co-ordinators submitted to the monthly meetings of the Academic Committees.
- Feedback from students both at the Staff-Student Committee meetings and through lecture evaluation questionnaires filled in by the students.
- Feedback from Peer Review of Teaching to check for adequate coverage of material in given subject areas.
- Reports from External Examiners commenting on the range of subjects covered and the standard achieved.
- Reports from alumni on the relevance of material taught to their professional work.
- Biennial staff appraisal.
- Periodic review of Departmental teaching by the College's Engineering Studies Committee and Science Studies Committee.

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 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:

- Departmental Academic Committees.
- Departmental Undergraduate Course/Teaching Strategy Committees.
- Departmental Staff Meetings.
- Departmental Examination Committees.
- Departmental Management Committees.
- Joint Undergraduate Staff-Student Committee.
- Board of Examiners - meets in July to consider awards.
- Faculty of Science and Faculty of Engineering Teaching Committees
- Imperial College Quality Assurance Advisory Committee
- Imperial College Senate.

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 **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:

Effective programme of Assessed Coursework/Tests/Computational and Programming Assignments in both Departments. Written feedback and an oral presentation. All monitored and subject to moderation.

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:

- Lecturer evaluation questionnaires.
- Undergraduate Staff-Student Committee held each term - feedback from this is passed on to the Academic Committee.
- Meetings with personal tutees.
- Regular meetings between student representatives and JMC course director.
- Meetings with Personal tutors, Senior Tutors and Directors of Undergraduate Studies.

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

Feedback via Senior Tutors/Coordinators/Reports/JMC Staff-Student Committee

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 and Faculty awards are presented to academic staff for outstanding contributions to teaching, pastoral care or research supervision. A special College

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:

- Active research programme in multiple fields of Computing and Mathematics.
- During probation, lecturers attend a series of College organised workshops on teaching and learning.
- Probationary Lecturers are assigned a mentor.
- Staff are appraised, approximately biennially.
- Staff have available to them courses and occasional seminars on teaching and learning provided by the College Staff Development Programmes (i.e. CASLAT).
- Updating professional developments.

22. Regulation of Assessment

a) **Assessment Rules and Degree Classification:**

- The marks from each discipline (Mathematics and Computing) are accumulated over the four years to obtain two final marks. These are then used to decide the final degree classification (see summary below for MSci degree classification).
- For each Mathematics half-unit course, (honours) marks are awarded on a 0-100 Mathematics scale with fixed points at 0,30 (for Pass), 60% (upper/lower 2nd class boundary), 75 (for lowest 1st class), 100 (nominated maximum marks). [These are not percentages]
- In Mathematics, assessed coursework, where relevant, normally contributes 10% to each half-unit course.
- For each Computing written examination, marks are awarded on a 0-60 scale. The pass mark for each written examination is 40%.
- In Computing, assessed coursework is weighted as one-seventh of the examination/coursework contribution for each Computing course.
- Students who pass all course elements overall, will be awarded an Honours degree classified as First, Second (upper and lower division) or Third. There is no Pass degree category.
- Those students who were originally registered on the enhanced MSci coding and those who have transferred into it are normally required to maintain a good level of performance in mathematics and in computing in order to stay registered on the coding. Those students on coding MSci who make satisfactory progress in third year and have passed at a sufficient standard will be permitted to enter the fourth year.
- The marks for each year are weighted as follows:

  Year Honours Weighting: 1 : 2 : 3 : 4.
- The final Honour assessment is based on total scaled marks after the corresponding year weighting has been applied and by consideration across Mathematics and Computing overall.
- Summary of grades, marks and their interpretation for MSci degree classification [College Scale]

GRADE	MARKS	INTERPRETATION
A	70% - 100%	Marks represent a first class degree
B	60% - 69%	Marks represents a 2:1 degree
C	50% - 59%	Marks represent a 2:2 degree
D	40% - 49%	Marks represent a third class degree
F	0 - 39%	Marks normally represent a fail

"Borderline" cases are discussed individually at the JMC Examiners Meeting on the basis of the full spectrum of academic performance during the programme.

b) Marking Schemes for undergraduate and postgraduate taught programmes:

The Pass Mark for all **undergraduate** modules is 40%. From October 2008 entry all undergraduates are required to pass all their course units to progress to the next year.

c) Processes for dealing with mitigating circumstances:

For undergraduate programmes: Candidates with mitigating circumstances are not subject to the borderline restrictions but should be considered individually. However, as a general principle, candidates whose marks are more than 5% below the borderline should not normally be raised to the next higher classification.

Resit opportunities are available for students who do not achieve a Pass in examinations - according to College rules.
Applications for such to be 'First attempts' normally on medical grounds - which must be accompanied by a medical certificate or other statement of the grounds on which the application is made. These 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 **undergraduate programmes**: Candidates who fall no more than 2.5% below the minimum mark for a higher honours classification shall be eligible for review of their final classification; this review could include an oral examination or practical test or other mechanism appropriate to the discipline. Candidates whose marks are below the 2.5% borderline may be considered for a higher honours classification where certain provisions apply. Detailed records of all decisions should be recorded in the minutes of the meeting of the Board.

e) Role of external examiners:

Two external examiners (from other universities in the UK) are nominated by the chairperson of the Board of Examiners and approved by the Science Studies Committee. External examiners normally serve 4 years. The role of the examiner is that of moderator. In order to do this, they normally:

- approve examination papers.
- review all continuous assessment (Courseworks, laboratory work, group projects).
- review all examination scripts.
- review all individual project dissertations.
- attend the Board of Examiners.
- complete a report to the college**.**

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.
- High proportion of students achieving a high degree classification.
- Favourable comments from the students.
- Recognition amongst employers.
- Recognition and high profile of the course amongst applicants (as judged by the large number of applicants and their quality).

- Professional accreditation – Chartered Engineer status
- First destination data for BSc graduates, indicating a high proportion find employment or further postgraduate training in related areas.
- External College-invited course reviews.
- Best graduating projects win National recognition and awards.

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

- Mathematics and Computer Science resources page – available at: www.doc.ic.ac.uk/go/jmc
- Undergraduate Prospectus, Imperial College London – available on-line at: www.imperial.ac.uk
- Undergraduate Study in Computing at Imperial College – available on-line at: www3.imperial.ac.uk/computing/teaching/
- ECTS assignment for BEng/MEng degrees – available on-line at: http://www3.imperial.ac.uk/computing/teaching/ug/jmc/regulations
- Mathematics Undergraduate Courses – available on-line at http://www3.imperial.ac.uk/mathematics/students/undergraduate/courseguides
- Mathematics: Scheme for the Award of Honours – available on-line at: http://www3.imperial.ac.uk/mathematics/students/undergraduate/programspecifications
- Computing: Scheme for the Award of Honours – available on-line at: http://www3.imperial.ac.uk/computing/teaching/prog-spec