Imperial College London

Programme Specification for the MSc Computing for Industry

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://www3.imperial.ac.uk/computing/. 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:** N/A
4. **Name of Final Award** (BEng / BSc / MEng etc): MSc
5. **Programme Title** (e.g. Biochemistry with Management): Computing for Industry
6. **Name of Department / Division:** Department of Computing
7. **Name of Faculty:** Engineering Faculty
8. **UCAS Code** (or other coding system if relevant): NA

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

http://www.qaa.ac.uk/academicinfrastructure/benchmark/masters/MastersDegreeCharConsult2009.pdf

http://www.qaa.ac.uk/academicinfrastructure/fheq/EWNI/default.asp

http://www.bcs.org (Qualifications, Higher Education Accreditation)

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

Master's (MSc, MRes) M (Levels 6 & 7)

11. Mode of Study:

Part-time

12. Language of Study: English

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

May 2011

14. Educational aims/objectives of the programme:

The programme aims to:

Give computing professionals the opportunity to study a wide variety of topics in depth and with dedicated experts.
Allow students the opportunity to acquire competence in up-to-date techniques and tools in a wide spectrum of areas of software engineering leading to enhanced professional capabilities.
Give students a critical understanding of emerging trends and research in Computing.
Give students practical experience, in order that they may appreciate the needs of end-users of the technology and address issues related to the design and subsequent management and performance of large-scale software.
Extend students' previous experience of programming and update it to include the major programming paradigms including object-oriented programming methods and design.
Attract highly motivated students.

15. Programme Learning Outcomes:

The part-time, modular programme provides opportunities for postgraduate students, who are already computing professionals, to extend their knowledge and understanding of current trends in computing while studying a flexible and varied curriculum in Computing, according to initial expertise. Students are able to apply the techniques learned to real applications through the workplace individual project, which is supervised by an academic member of the Department.

Knowledge and Understanding

Knowledge and Understanding of:

Emerging trends in Computing and an awareness of how these can be adapted in industrial applications.

Detail and essential material relevant to the student's interests and specialisations.

Competence in up-to-date techniques in Computing and Software Engineering.

Communication skills, including project design, written and oral reports and presentations and literature search, both web-based and hard copy.

How achieved:

Acquisition of 1 to 3 is through a combination of lectures, tutorials and practical work in taught modules.

Acquisition of 4 is through the individual, supervised project work normally carried out in the workplace.

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

Assessment of the knowledge base is through a combination of unseen written examinations (1,2,3), assessed coursework and individual project dissertation and presentation (1,2,3,4).
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Skills and other Attributes

Intellectual Skills:

1. Analyse and formally specify computing and programming problems of varying types.

2. Match problems to tools and techniques most suitable for solving them.

3. Apply specialist material to an industrial problem relevant to the student's work environment.

4. Be aware of current technologies and principles behind them for effective leadership.

5. Develop an understanding of more advanced computing topics, including in the areas of Artificial Intelligence, High Performance Informatics, Software Engineering and Distributed Systems, Databases, Computational Management Science and Visual Information Processing.

6. Plan, conduct and write-up a programme of original research and software development.

How achieved:

Intellectual skills are developed through teaching and learning methods outlined in section 11.

Skills 1,2, 4 and 5 are taught and developed through the taught modules, the courseworks and individual project work.

Skill 5 is taught and developed through the specialised optional modules.

Skills 3 and 6 are taught and developed through the individual project.

Taught modules are assessed by written examinations, and have continuous assessment in the form of laboratory work or coursework associated with them. Advanced Topics in Software Engineering is assessed by a series of practical assignments.

Practical Skills:

1. Use computing tools and techniques, such as database, web-based and graphic tools and techniques.

2. Analyse computing and computing-related problems and devise solutions to them.

3. Apply specialist material to a real problem.

4. Give technical presentations.

5. Prepare technical reports.

6. Conduct detailed literature searches.

7. Conduct in-depth research on tools and languages available on line.

How achieved:

Practical skill 1 is taught and developed through the taught modules and courseworks and the individual projects.

Practical skill 2 is taught and developed through the specialised optional modules and through the individual project work.

Practical Skill 3 is taught and developed throughout the year through the taught modules, laboratory and coursework and individual project work.

Practical skills 4-7 are taught and developed through the individual project.

Assessment of the individual project is by a detailed dissertation and a demonstration.

Other Practical skills are assessed through laboratory work and courseworks.

Transferable Skills:

1. Communicate effectively through oral presentations, computer presentations and written reports.

2. Make use of the major computer programming paradigms to solve problems.

3. Use the World Wide Web effectively.

5. Integrate and evaluate information from multiple and diverse sources.

6. Apply management skills such as co-ordination, project design and evaluation and decision processes as applied in software engineering.

7. Manage resources and time.

8. Learn independently with open-mindedness and critical enquiry.

9. Learn effectively for the purpose of continuing professional development.

How achieved:

Skill 1 is developed through feedback on coursework, reports and presentations.

Skill 2 is taught through lectures and practical coursework. It is further developed, as appropriate, in the individual project.

Skills 3 and 4 are developed through the individual project work.

Skill 5 is developed through project work.

Skill 6 is developed throughout the course by deadlines for coursework.

Skills 7 and 8 are not explicitly taught but are encouraged and developed throughout the course.

Skill 1 is assessed through coursework, project presentations and reports and written examinations.

Skill 2 is assessed through coursework and a laboratory based examination.

Skill 5 is assessed in the individual project.

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.

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http://www3.imperial.ac.uk/computing/teaching/postgraduate/indmsc (Course web pages)

http://www.qaa.ac.uk/academicinfrastructure/benchmark/masters/MastersDegreeCharacteristics.pdf

http://www.qaa.ac.uk/academicinfrastructure/fheq/EWNI/default.asp

http://www.bcs.org (Qualifications, Higher Education Accreditation)

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

The MSc in Computing for Industry programme is offered as a part-time course over a maximum of four years and leads to the MSc degree. Registration is usually in October or January. Students select eight taught modules from a wide selection, according to their previous experience. All modules are normally examined by coursework and one written paper. Students must also complete an individual project, equivalent to four taught modules, which may be started normally after six modules have been passed. The project is normally carried out at the workplace and students will have a workplace advisor as well as a Department of Computing supervisor. The marks of all written papers are aggregated and the pass mark is 50%. There is also a requirement to pass at least six individual modules, that is, to obtain 50% on each of the examination and the coursework for the module. The dissertation of the individual project is assessed by the supervisor and second marker as fail, pass or distinction. Each of these three parts - written examinations aggregate, six separate taught modules and individual project must be passed in order to obtain the MSc degree. If the written examination aggregate is at least 70% and the individual project has been awarded a distinction, then the MSc will be awarded with distinction.

Module Organisation: Modules are offered over nine weeks, usually in three-hour sessions, either October to December or January to March.

Modules are offered in the areas of Software Engineering, including Object-oriented Design and Programming, Databases, Distributed Systems, Parallel Computing, High Performance Computing, Artificial Intelligence and Computational Management Science. All taught modules consist of 18 lectures and 9 supporting tutorials.

Students are given advice as to which modules are most suited to their previous experience and current interests. Depending on previous experience, a student may be required to take one or two core modules, such as Object-oriented Design and Programming, and Communications and System Architecture. The choice of optional courses and projects available to students may, to some extent, be restricted by the schedule of lectures and availability of staff.

Examinations for all courses are held in May.

It is possible for a qualified student to register for, and attend, an individual taught course as an occasional student. If such a student should later wish to register for the full MSc, then he/she may count passes in up to two taught modules taken in the year prior to registration towards those required for the MSc.

Normally, once six taught modules have been passed, students may commence an individual project culminating in the presentation of a dissertation. In workload, the project is equivalent to four taught modules and a maximum of one year is allowed for its completion. Projects are normally undertaken at the student's workplace; the Project Co-ordinator will help students to find a suitable project title, which may either be suggested by a Department of Computing academic staff member or by the student. In the latter case, the co-ordinator will suggest possible academic supervisors. In both cases, a member of academic staff will be assigned to advise and monitor student progress and students would normally have a workplace advisor as well. Project assessment is based on a written dissertation and a demonstration to the supervisor and a second marker. As well as reinforcing concepts from the taught modules, the

project gives students practical experience in the organisational and presentation aspects of realistic engineering practice.

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

•Extensive library facilities.
•State-of-the-art Computing facilities, with about 200 workstations available. The stock is regularly upgraded and the scheduled lab sessions have lab staff to assist with technical queries.
•Students are each allocated a personal tutor. The tutor's role is to assist their tutees with personal problems and to advise students on academic issues that may arise during the course. In addition to this an academic member of the Department facilitates the administration and co-ordination of the degree.
•Students have email and open personal access to their tutorial support, including the Course Director.
•Students have access to the Internet and the MSc web-page gives details of courses available, their syllabuses and a guide to completing project work, as well as a FAQ page. Students also have access to the Departmental web pages which include examination and lecture timetables, an in house "Continuous Assessment Tracking Engine" (CATE) used for the electronic administration of coursework via the web and an online computing dictionary, links to careers and the main College web site.
• Access through CATE to teaching material, lecture notes, tutorial exercises, as well as the schedule of assessed work.
•Access to student counselors on-site.
•A large community of postgraduate research students and postdoctoral research workers located on-site who interact with MSc Computer Science students in the course of their learning.
•Access to Teaching and Learning Support Services, which provide assistance and guidance e.g. on careers.
•Students are given the opportunity to carry out their research project at their place of work during which time an academic member of the Department is responsible for overseeing the student's welfare and monitoring progress.
•Employer needs and opinions feed into the programme through frequent guest lectures from industry, industry based group and individual projects and collaboration between staff and industry in research and consultancy. The Department's student society (DOC SOC) regularly invites guest speakers from industry to discuss career and technical issues.
•An Industrial panel consisting of influential members of Industry and professional institutions has been formed partly with the purpose of feeding needs and opinions into our teaching programmes.

19. Criteria for admission:

The minimum qualification for admission is normally at least an Upper Second Class Honours degree from a UK academic institution or an equivalent overseas qualification, together with current employment in the computing industry. Where an applicant has a lesser degree qualification but has several years of relevant experience, the MSc Admissions Tutor may submit a special case for admission to the College.

20. Processes used to select students:

All UK applicants, where it is considered possible to make them an offer, are invited for interview with the MSc Admissions Tutor. Other applicants may be contacted by telephone or email.

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

Committees with responsibility for monitoring and evaluating quality and standards:

•Departmental Academic Committee·
•Staff-Student Committee·
•Board of Examiners - meets in July and November to consider awards· Imperial College Graduate School of Engineering and Physical Sciences Management Committee· Imperial College Senate Mechanisms for gaining student feedback on the quality of teaching and their learning experience.

Mechanisms for gaining student feedback on the quality of teaching and their learning experience.

•Feedback from lecturer evaluation questionnaires;·
•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 Course Director.

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.

Mechanisms for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

• Regular Reports on the different programmes by the various Course Directors and Year Coordinators submitted to the monthly meetings of the Academic Committee.
•Feedback from students both at the termly meetings of the Staff-Student Committee and through returns from the student lecture evaluation questionnaires.
•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 Graduate School of Engineering and Physical Sciences Management Committee.

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 **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.

The **Academic Committee** meets monthly and deals with both the strategic and the regular day to day decisions about the Departments teaching. Subcommittees are formed and look at problem areas. Year and Course Coordinators discuss problems of their constituencies. Topics for discussion can come from any member of the teaching staff and sometimes come from the Departments Operations Committee. Decisions requiring regulations to be changed go to the Engineering Studies Committee and then to College Senate.

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:

Marking and the dissemination of marks are required to be completed within three weeks of being handed in. This is monitored on our online tracking engine called CATE.

CATE requires students to submit their work either electronically or manually via this system. The Senior Tutor is informed of late submissions. Once submitted the system will then track the progress of the work being marked and will publish the marks when complete. Failure to publish the marked work within the set time will result in CATE emailing the relevant lecturers of the lateness.

Methods for checking effectiveness include:

•Feedback from lecturer evaluation questionnaires.
•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 Course Director.

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:

•Feedback from lecturer evaluation questionnaires;
•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 Course Director

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

•Feedback from lecturer evaluation questionnaires
•Staff-Student Committee held each term; feedback from this is passed on to the Academic Committee·
•Regular meetings between student representatives and Course Director.

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.

Staff development priorities for this programme include:

•Active research programme in multiple fields of Computing.
•Staff appraisal schemes and staff development programmes (e.g. CASLAT).
•Updating professional development.

22. Regulation of Assessment.

Assessment Rules and Degree Classification:

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.

Marking Schemes for postgraduate taught programmes:

In order to pass the MSc students have to satisfy all of the following requirements:

Each student sits eight written papers each of two hours duration. Each paper covers one taught module. The marks for all eight papers are aggregated into a "written examination mark" with a 50% pass mark. All modules have a continuously assessed component and there is an additional requirement to pass at least six individual modules. To pass a module a student must obtain 50% in both the written paper and the coursework component of the module.

The individual project is graded separately as fail/pass/distinction.

Each student must pass both of the preceding two components, namely the written examinations aggregate and six separate modules as well as the individual project, to be awarded the MSc. Students obtaining a mark of 70% in both the written examination aggregate and a distinction in the individual project will be awarded the MSc with distinction.

Summary of grades, marks and their interpretation for MSc degree classification

GRADE MARKS INTERPRETATION		
A	70% - 100%	Marks represent a distinction performance
B	60% - 69%	Marks represent a merit performance
C	50% - 59%	Marks represent a pass
D	40% - 49%	Marks represent a fail performance at MSc level
E	0% - 39%	Marks represent a fail performance (with major shortcomings)

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.

Processes for determining degree classification for borderline candidates:

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.

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:

•Recognition amongst employers.
•Favourable comments from the students.
•Favourable comments by External Examiners.
•Recognition and high profile of the course amongst applicants (as judged by the large number of applicants and their quality).
•Recognition in academic institutions of the quality of PhD candidates emerging from the MSc course.

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

http://www3.imperial.ac.uk/computing/teaching/postgraduate/msc-computing-specialism

http://www3.imperial.ac.uk/pgprospectus/facultiesanddepartments/computing/postgraduatecourses/computing