Postgraduate Programme Specification:
MSc in Advanced Computer Science and IT Management

1. Summary

School	Computer Science
Faculty	Engineering & Physical Sciences
Awarding Institution	The University of Manchester
Programme Accreditation	BCS
Relevant QAA benchmark(s)	N/A – currently only at undergraduate level

Award	Programme Title	Duration	Mode of study
MSc	Advanced Computer Science and IT Management	1 year	Full-time
MSc	Advanced Computer Science and IT Management	2 -4years	Part-time
MSc	Advanced Computer Science and IT Management	3-4 years	Modular
PG Diploma	Advanced Computer Science and IT Management	1 year	Full-time (exit award only)
PG Diploma	Advanced Computer Science and IT Management	2-3 years	Part-time (exit award only)
PG Diploma	Advanced Computer Science and IT Management	2-3 years	Modular (exit award only)
PG Certificate	Advanced Computer Science and IT Management	1 year	Full-time (exit award only)
PG Certificate	Advanced Computer Science and IT Management	2 years	Part-time (exit award only)
PG Certificate	Advanced Computer Science and IT Management	2 years	Modular (exit award only)

Benchmarks and Frameworks: as a Master programme, the MSc in ACS corresponds to Level 7 of the Framework for Higher Education Qualifications (see http://www.qaa.ac.uk/academicinfrastructure/FHEQ/EWNI08/default.asp) and is guided by the the **QAA** subject benchmark for masters' degrees in computing (see http://www.qaa.ac.uk/Publications/CircularLetters/Documents/QAA386_Computing.pdf).

Role of this Programme Specification: to outline the intended knowledge, understanding, skills and attributes of a student completing that course. It also gives details of teaching and assessment methods as well as linking the course to the framework for HE qualifications and any subsequent professional qualification and career path.

Date of Completion:

Further Links: Programme web site at http://www.cs.manchester.ac.uk/postgraduate/taught/programmes/acs/index.php?pathwayid=9 and Handbook at http://www.cs.manchester.ac.uk/postgraduate/prospectus/.

2. Aims and Intended Learning Outcomes

The aim of this programme is to provide students with a state-of-the-art collection of knowledge, understanding, and skills in the area of Advanced Computer Science and IT Management. This collection

aims to be, on the one hand, of sufficient breadth so as to reflect the discipline's breadth of techniques and areas and, on the other hand, of sufficient depth so as to provide the student with the relevant knowledge, understanding, and skills at an advanced level. It is designed for students with a good first degree in Computer Science or related areas who which to broaden and deepen their understanding, knowledge, and skills in both Computer Science and IT management, and aim at a career in either Industry or Academia.

1	At PG Diploma level: Produce the highest quality of computing professionals and researchers across a broad range of Computer Science
2	Provide a vehicle for dissemination of leading-edge knowledge and skills, focusing on the research strengths of a large School covering most major topics in Advanced Computer Science and its applications
3	Continue to attract the highest-quality students from the UK and overseas
4	Provide an opportunity to engage in a small research project in Advanced Computer Science and IT management
5	At MSc level: As above 1 – 4 together with 5 and 6: Offer the opportunity to focus on one of a range of specialisations.
6	Provide high quality training and experience in research in Advanced Computer Science and IT management

A. Knowledge & Understanding

Students will be able to:

A1.	(At all levels) Acquire a knowledge of a range of advanced topics in Computer Science and IT management beyond undergraduate level and at the forefront of research
A2.	(At all levels) Understand, apply and develop leading-edge technologies in IT Management and in three course units from the following themes • Advanced Web Technologies • Data Engineering and IT Governance • Managing Data • Security • Software Engineering
A3.	(MSc & PG Diploma) Have a knowledge & understanding of research methodology & practice

B. Intellectual Skills

Students will be able to:

B1.	Develop and evaluate original ideas in a research context (MSc and PG Diploma levels only)
B2.	Use methodologies for development of computational systems at an advanced level (All)
B3.	Perform problem-solving in academic and industrial environments (All)

C. Practical Skills

Students will at MSc, PG Diploma & PG Certificate levels be able to:

C1.	Develop applications to satisfy given requirements
C2.	Organise & pursue a scientific or industrial research project (MSc and PG Diploma only)
C3.	Use, manipulate and develop large computational systems
C4.	Perform independent information acquisition and management

D. Transferable Skills and Personal Qualities	
Students will be able to:	
D1.	Work and communicate effectively as a team member
D2.	Prepare and present seminars to a professional standard (MSc level only)
D3.	Understand ethical issues related to professional activities
D4.	Write theses and reports to a professional standard (MSc and PG Diploma)
D5.	Perform independent and efficient time-management

These Aims and Intended Learning Outcomes are informed by the QAA subject benchmark for computing, and relate as following to those mentioned there: A1-A3 are covered in 5.1; B1–B3 are coverd in 5.4; C1-C3 are covered in 5.2 and 5.4; C4 is covered in 5.5; D1, D2, D4, and D5 are covered in 5.3 and 5.4; D3 is covered in 5.2 and 5.1.

Further relevant informatio can be found at
http://www.cs.manchester.ac.uk/postgraduate/prospectus/ and
http://www.campus.manchester.ac.uk/tlao/map/teachinglearningassessment/teaching/degreeregulations/ .

3. Teaching, Learning, and Assessment Methods

 The programme's teaching and learning forms and assessment methods are informed by the QAA subject benchmark for computing, and are designed to ensure that any student graduating with an MSc in Advanced Computer Science have demonstrated the understanding, awareness, and skills at threshold level as described in Section 7 of the benchmark.

We use a variety of teaching forms, from face-to-face lectures via supervised and unsupervised labs, to self-study elements and supervised projects. Where appropriate, we use blended learning and enquiry-based learning. In general, knowledge-intensive parts of a course-unit are taught through lectures (either face-to-face or via alternative delivery), with aspects of self-study and enquiry-based learning. Other parts of our course units that are aimed at the students' acquisition of skills (either intellectual or practical) are mostly taught through (supervised or unsupervised) labs and workshops. These are also often used to enhance the students' communication and teamwork skills.

All our course units combine a knowledge and understanding learning outcomes with suitable skills learning outcomes. Moreover, in Computer Science, applying a certain technology, formalism, or method is a key requirement for understanding it fully. As a consequence, all our taught course units use coursework as a part of formative assessment, to deepen (and assess) both knowledge and understand and to teach (and assess) relevant skills. As a default, our course-units are assessed 50% through coursework and 50% through exam, to give equal weight to normative and formative assessment. We allow, however, for limited flexibility and, if a course unit's specific features require it, for assessments through 66% coursework and 34% exam, or other distributions. Similarly, all MBS modules involve by default individual and/or group work worth at least 30%.

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We are implementing a best-practice model for designing 'implementation related coursework' so that it (i) enhances students' experience, (ii) enhance students' skills in applying good (software) design practice, (iii) can be assessed fairly and effectively.

The defining regulations and procedures for the MSc programme are laid down in the University's Ordinances and Regulations.

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Learning & Teaching Processes for A (to allow students to achieve intended learning outcomes)	Assessment (of intended learning outcomes)
ALL Because of the very wide range of topics and content, each advanced course unit utilises methods appropriate to the subject matter.	A1 – A3 are assessed by a mixture of written examinations, computer-based practical work, and a range of coursework assessments including assessed miniprojects, group projects, reports, essays etc.
ALL Small group lectures, supervised laboratory work, mini-projects (group & individual) and independent preparatory learning are the main vehicles for dissemination of knowledge & understanding during the first half of the programme	
MSc and Diplom level Following the taught part of the programme, students undertake a programme of supervised individual research, leading to a 90 cr dissertation at <u>MSc level</u> and a 30 cr dissertation at <u>PG Diploma level</u>	A1- A3 is also assessed via the research project which includes an oral presentation of the research, and examination of the dissertation.

Learning & Teaching Processes for B	Assessment
B1. is mainly demonstrated during the research project, and the Research Skills & Professional Issues unit (COMP60992).	B1. & B3 are developed and assessed during the research project through presentation of a seminar and examination of the dissertation, as well as the Project Background Report (COMP60992).
The intellectual ability B2. is learned through small-group lecturing and practical lab exercises designed to put theoretical knowledge into practice.	B2. is assessed through laboratory exercises, either marked on-line or by written report.
B3. is mainly demonstrated during the research project, mini-projects and problem-based learning in teams.	B3 is also assessed by reports from mini-projects (individual & group).

Learning & Teaching Processes for C	Assessment
C1. and C3. are demonstrated in practical lab exercises and mini-projects, as well as during the research project.	C1. and C3. are assessed through laboratory exercises, either marked on-line or by written report.
C2. and C4. are demonstrated during the research project. C4. is also present in many course units.	C2. and C4. are developed and assessed during the Research Skills and Professional Issues unit and the Research Project through presentation of a seminar and examination of the dissertation
The practical skill C4. is demonstrated in the preliminary preparation for each course unit	C4. is assessed by COMP60992, the Research Project and by a report or marked presentation in some course units.

Learning & Teaching Processes	Assessment
D1. is evident in team practical projects used in a number of course units, supported through eLearning environment	D1. is assessed through reports and marked presentations.

D2. is demonstrated during COMP60992, the research project seminar, and also within a number of course units.	D2. is assessed during the research project seminar, where there is feedback on presentation skills.
D3. is demonstrated in COMP60992	D3 and D4. are assessed by the research project dissertation, and the Preliminary Project Report.
D4. is demonstrated through lab practical and mini-project reports and the research project dissertation.	
D5. is demonstrated by the ability to meet a number of deadlines throughout the year, and to effectively carry out a research project on time	D5. is assessed by course unit teachers & the exams office, who must ensure coursework and dissertations are submitted on time. The research project internal examiners assess progress of the project at the project seminar.

Support for student learning and development:
In addition to the Director of PGT, we have a Programme Director for this programme whose main responsibility is the pastoral care for the MSc in ACS&ITM students and, as member of the school PG Committee, to monitor students' attendance and progress, and to overlook the general running of the MSc in ACSwITM. Students are encouraged to contact the Director when problems arise and are informed of this during the introductory period. The School also has a drop-in Advice Centre for lunch-time help-sessions. During the period of the second Semester and the research project, an individual assigned supervisor is also available. Relationship with the supervisor is outlined in the Programme Handbook and the Research Methods and Professional Skills course unit (COMP60990).

We also have a well-functioning Student Support Office whose members provide reliable support for students in all aspects of their learning and development, and work closely with the directors and the PG committee through monthly meetings and other means.

We are using eLearning environments for timely communication with and amongst students, and are currently implementing a default model for providing feedback via suitable eLearning mechanisms. This model is set to ensure that students are provided with timely feedback on their coursework, and use the eLearning environment to communicate amongst themselves and with the teaching staff.

We implement a project model where the students submit, around mid-May, a Project Progress Report (worth 30 of the 90 credits of the project). In this way, students are encouraged to develop early a clear vision and plan for their project and communicate it to their supervisors in writing, so that potential issues regarding technical misunderstandings or writing problems can be detected early and appropriate actions be taken.

COMP60990 lecturers, who are also members of the PG Committee, collaborate with its members and with the School's eLearning Champion to ensure that projects are allocated and supervised in an effective way, and that feedback is provided in a timely and constructive manner.

All students are directed to the Faculty's PDP web site and encouraged to participate, and the site is also linked from the MSc Handbook http://www.cs.manchester.ac.uk/postgraduate/prospectus/.
We have also collected links to relevant information for PGT students at EPS's SOS web site, currently available at http://130.88.138.26/~sosshared/comp/index.html .

4. Programme Structure

A student following this programme chooses

• **three out of ten Manchester Business School course units**, i.e, three from IS Strategy and Enterprise Systems (BMAN60111), Entrepreneurial Commercialisation of Knowledge (MSEC40001), IT Leadership Forum (BMAN71621), e-Business (BMAN71701), IT Trends (BMAN????), Application and Evaluation of IS (BMAN60091), Business Feasibility Study (MSEC60922), Decision Behaviour, Analysis and Support (BMAN61102), Human Computer Interaction and Web User Interfaces (BMAN71642), Information and Knowledge Management (BMAN71652), and

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• **three course units from Computer Science course units**, two of which belong to one of five ACS theme (themes are: Advanced Web Technologies, Data Engineering and IT Governance, Managing Data, Security, and Software Engineering 1). Each of these consists of a conceptually coherent set of three course units of 15 credits each.

This makes up the 90 credits taught part of the programme. In addition, they follow the COMP60990 (Research Methods and Professional Skills) course unit and work on their project. The project is assessed in two parts, through the Project Progress Report (which counts 85% of the 30 credits for COMP60990) and the Dissertation (60 credits).

Course units in general:

School of Computer Science course units are taught in an intensive mode over a period of 6 weeks: 1 day a week for the first 5 weeks are 'taught' days consisting of lectures, supervised labs etc., which are complemented with 1.5 days a week for the first 5 weeks of practical exercises; 2.5 days of a coursework completion week (the 6th week) are also practical exercises. Some of the practical exercises are assessed work. By default, course units are assessed through coursework (50%) and end-of-semester examination (50%). However, flexibility is allowed in the delivery and assessment, allowing methods appropriate for each subject. Further information is available at: http://intranet.cs.man.ac.uk/Intranet_subweb/Postgrad/ .

MBS course units are taught over a period of 12 weeks with a variety of methods of delivery, including lectures, seminars, visiting speakers, individual/group work and presentations, etc.

Chronology of the programme:

The (full time version of the) programme lasts 1 year, and starts in September with an induction week, during which
• introductory talks for each course unit are offered
• the structure of the programme, expectations, rules & regulations, pathways and themes are explained (the allocation of course units to themes is shown in the Curriculum map and in the handbook)
• (in case they haven't yet) students choose themes and course units
• students take part in an on-line course about plagiarism and
• students take English Language assessments and, depending on their outcome, are advised to attend (free) in-sessional English classes. This is followed up and re-enforced if required.

Semester 1: September – January
Students usually take 60 credits-worth of course units in the 1st semester, i.e. four of the course units, two from Computer Science and two from Manchester Business School. In particular, they follow one Computer Science theme by taking one course unit in Period 1 and one in Period 2 as identified in Figure 1 below. They follow two MBS course units throughout Semester 1. In addition, they follow selected sessions of COMP60990, "Research Methods and Professional Skills", related to academic and professional literacy, ethics, testing usability, careers, etc.

Semester 2: January - May
Students usually take 30 credits-worth of course units in the 2nd semester, i.e. two of the course units, one from each School. To continue towards the project for MSc award, students need to pass the taught component in this Semester. In addition, they follow selected sessions of COMP60990 "Research Methods and Professional Skills".

By the end of January, the project allocation process takes place, and students start with the background research of their project and prepare their Project Progress Report. The report counts towards 85% of the 30 credits of COMP60990, the rest is assessed in session through course work.

In addition to passing the taught course units, the mark awarded to the Project Progress Report must be at least 40%. If the Report receives marks between 30% and 40%, the student can re-submit the report and, in case it gets at least 40%, exit the programme with a Postgraduate Diploma. Otherwise, the student is deemed to have failed the component and exits with a Postgraduate Certificate according to the assessment regulations.

Core Project Work: May – September

The student continues to work on his/her project, and writes up a dissertation (or Group and Individual Reports for group projects). The dissertation counts 60 credits towards the 90 credits of the project mark (the other 30 credits are made up from the COMP60990 mark, which is mostly determined by the Project Progress Report mark).

Summary of the exit qualifications:

A student with 60 credits from the taught part can exit with a PG Certificate.

A student who has passed all 90 credits of the taught part, and with at least 40% awarded for his/her Project Progress Report can exit with a PG Diploma.

Figure 1: Course Units and themes they belong to

1. (Semester 1) Advanced Web Technologies:
   (a) COMP60411 Semi-structured Data & the Web
   (b) COMP60421 Ontology Engineering for the Semantic Web
2. (Semester 1) Data Engineering and IT Governance:
   (a) COMP60711 Data Engineering
   (b) COMP60721 IT Governance
3. (Semester 1) Managing Data:
   (a) either COMP60711 Data Engineering or COMP60411 Semi-structured Data & the Web
   (b) COMP60731 Advanced Database Management Systems
4. (Semester 1) Security:
   (a) COMP61411 Cryptography
   (b) COMP61421 Computer & Network Security
5. (Semester 1) Software Engineering 1:
   (a) COMP61511 Software Engineering Overview
   (b) COMP61521 Component-based Software Development
6. (Semester 1) Management modules (select two from the list)
   - MSEC40001 Entrepreneurial Commercialisation of Knowledge
   - BMAN60111 IS Strategy and Enterprise Systems
   - BMAN71621 IT Leadership Forum
   - BMAN71701 e-Business
   - BMAN ????? IT Trends
   - BMAN60091 Application and Evaluation of IS
7. (Semester 2) One module from the following
   - COMP61542 Agile and Test-Driven Development
   - COMP61532 Pattern-based Software Development
   - COMP61332 Text Mining
   - COMP61342 Computer Vision
   - COMP61242 Mobile Communications
   - COMP61232 Mobile Systems
   - COMP60542 Introduction to Health Informatics
   - COMP60532 Principles of Digital Biology

8. (Semester 2) One MBS module from the following list
   - MSEC60922 Business Feasibility Study
   - BMAN61102 Decision Behaviour, Analysis and Support
   - BMAN71642 Human Computer Interaction and Web User Interfaces
   - BMAN71652 Information and Knowledge Management

4. Mechanisms for Programme Revision

The School has created the new role of a School Teaching Strategy Leader. Together with members of the PG Strategy Team (theme leaders), we will analyse the running programme in terms of recruitment of students and successful graduation, and plan changes.

April 2nd, 2012