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

1. Summary

<table>
<thead>
<tr>
<th>School</th>
<th>Computer Science</th>
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<tbody>
<tr>
<td>Faculty</td>
<td>Engineering &amp; Physical Sciences</td>
</tr>
<tr>
<td>Awarding Institution</td>
<td>The University of Manchester</td>
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<tr>
<td>Programme Accreditation</td>
<td>BCS</td>
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<tr>
<td>Relevant QAA benchmark(s)</td>
<td>QAA Subject Benchmark Statement: Masters degrees in computing</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Award</th>
<th>Programme Title</th>
<th>Duration</th>
<th>Mode of study</th>
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</thead>
<tbody>
<tr>
<td>MSc Advanced Computer Science and IT Management</td>
<td>1 year</td>
<td>Full-time</td>
<td></td>
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<tr>
<td>MSc Advanced Computer Science and IT Management with specialisation in Information Management</td>
<td>1 year</td>
<td>Full-time</td>
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<tr>
<td>MSc Advanced Computer Science and IT Management</td>
<td>2-4 years</td>
<td>Part-time</td>
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<td>2-4 years</td>
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<tr>
<td>MSc Advanced Computer Science and IT Management</td>
<td>3-4 years</td>
<td>Modular</td>
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</tr>
<tr>
<td>MSc Advanced Computer Science and IT Management with specialisation in Information Management</td>
<td>3-4 years</td>
<td>Modular</td>
<td></td>
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<tr>
<td>PG Diploma Advanced Computer Science and IT Management</td>
<td>1 year</td>
<td>Full-time (exit award only)</td>
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<tr>
<td>PG Diploma Advanced Computer Science and IT Management</td>
<td>2-3 years</td>
<td>Part-time (exit award only)</td>
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<td>PG Diploma Advanced Computer Science and IT Management</td>
<td>2-3 years</td>
<td>Modular (exit award only)</td>
<td></td>
</tr>
<tr>
<td>PG Certificate Advanced Computer Science and IT Management</td>
<td>1 year</td>
<td>Full-time (exit award only)</td>
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<tr>
<td>PG Certificate Advanced Computer Science and IT Management</td>
<td>2 years</td>
<td>Part-time (exit award only)</td>
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<tr>
<td>PG Certificate Advanced Computer Science and IT Management</td>
<td>2 years</td>
<td>Modular (exit award only)</td>
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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: June 2016

Further Links: Programme web site at http://studentnet.cs.manchester.ac.uk/pgt/

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.
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1. At PG Certificate level: Produce computing professionals with specialised knowledge of selected advanced topics in Computer Science

2. At PG Diploma level: Produce high quality computing professionals and researchers across a broad range of Computer Science

3. 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

4. Continue to attract the highest-quality students from the UK and overseas

5. Provide an opportunity to engage in a small research project in Advanced Computer Science and IT management

6. At MSc level: As above 1 – 5 together with 6 and 7: Offer the opportunity to focus on one of a range of specialisations.

7. At MSc level: 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 Computer Science and IT Management, following themes and units selected from those in Figure 1.

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
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<tbody>
<tr>
<td>D2.</td>
<td>Understand ethical issues related to professional activities</td>
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<tr>
<td>D3.</td>
<td>Write theses and reports to a professional standard (MSc and PG Diploma)</td>
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<tr>
<td>D4.</td>
<td>Perform independent and efficient time-management</td>
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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 and 5.2; B1 is covered in 5.5; B2-3 are covered in 5.2; 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 5.5.

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 and IT Management 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.

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.

The defining regulations and procedures for the MSc programme are laid down in the University’s Ordinances and Regulations.
## Learning & Teaching Processes for A
(to allow students to achieve intended learning outcomes)

**ALL**
Because of the wide range of topics and content, each advanced course unit utilises methods appropriate to the subject matter.

**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 Diploma level**
Following the taught part of the programme, students undertake a programme of supervised individual research, leading to a 90 cr dissertation at MSc level and a 30 cr dissertation at PG Diploma level.

## Assessment (of intended learning outcomes)

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.

A1- A3 is also assessed via the research project, and examination of the dissertation.

## Learning & Teaching Processes for B

**B1.** is mainly demonstrated during the research project, and the Research Skills & Professional Issues training that is part of the project.

The intellectual ability B2. is learned through small-group lecturing and practical lab exercises designed to put theoretical knowledge into practice.

**B3.** is mainly demonstrated during the research project, mini-projects and problem-based learning in teams.

## Assessment

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 initial report.

B2. is assessed through laboratory exercises, either marked on-line or by written report.

B3 is also assessed by reports from mini-projects (individual & group).

## Learning & Teaching Processes for C

**C1.** and **C3.** are demonstrated in practical lab exercises and mini-projects, as well as during the research project.

**C2.** and **C4.** are demonstrated during the research project. **C4.** is also present in many course units.

The practical skill **C4.** is demonstrated in the preliminary preparation for each course unit.

## Assessment

**C1.** and **C3.** are assessed through laboratory exercises, either marked on-line or by written report.

**C2.** and **C4.** are developed and assessed during the Research Skills and Professional Issues training that is part of the project, as reflected in the initial report and dissertation.

**C4.** is assessed by the Research Project and by a report or marked presentation in some course units.

## Learning & Teaching Processes

**D1.** is evident in team practical projects used in a number of course units, supported through eLearning environment

**D2.** is demonstrated in the research project.

## Assessment

**D1.** is assessed through reports and marked presentations.

D2 and D3. are assessed by the research project.
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D3. is demonstrated through lab practical and mini-project reports and the research project dissertation.

D4. is demonstrated by the ability to meet a number of deadlines throughout the year, and to effectively carry out a research project on time.

D4. is assessed by course unit teachers & the exams office, who must ensure coursework and dissertations are submitted on time.

Support for student learning and development:
In addition to the Director of PGT, we have Programme Directors for full and part time students, whose main responsibility is the pastoral care for the MSc in ACS and ITM students and, as members of the school PG Committee, to monitor students’ attendance and progress, and to oversee the general running of the MSc in ACS and ITM. Students are encouraged to contact the Director when problems arise and are informed of this during the introductory period. During the period of the second Semester and the research project, an individual assigned supervisor is also available. The relationship with the supervisor is outlined in the taught Research Skills and Professional Issues material that is included as part of the Project.

We also have an effective Student Support Office, with several staff who work principally with postgraduate students, whose members provide support for students in all aspects of their learning and development, and work closely with the directors and the PG committee through formal meetings and other means.

We implement a project model where the students submit, at the end of Semester 2, an Initial Report. In this way, students are encouraged to develop early a clear vision and plan for their project, including for its evaluation, and to 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.

The project process is overseen by a Project Coordinator, whose role is to ensure that projects are allocated and supervised in an effective way, that feedback is provided in a timely and constructive manner, and that the training provided to students is appropriate.

All students are directed to the Faculty’s Personal Development Plan web site and encouraged to participate, and the site is also linked from the MSc Handbook http://www.cs.manchester.ac.uk/postgraduate/prospectus/.

4. Programme Structure

Students choose three course units from a selection of ACS units and three course units offered by the Manchester Business School. A student must make their choice so that they study four course units in Semester 1 and two course units in Semester 2.

In Semester 1, students choose one of the following ACS themes:
- Data on the Web
- Data Engineering and Systems Governance
- Learning from Data
- Parallel Computing in the Multi-Core Era
- Security
- Software Engineering 1

In addition, in Semester 1 students choose two course units from the IT Management 1 theme, which is offered with the Manchester Business School.

In Semester 2, an additional advanced Computer Science course unit is chosen from the following list:
- COMP61532 Component-based Software Development
- COMP62542 Pattern-based Software Development
- COMP61332 Text Mining
- COMP61342 Computer Vision
- COMP61242 Mobile Communications
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- COMP61232 Mobile Systems
- COMP60542 Introduction to Health Informatics
- COMP60532 Principles of Digital Biology
- COMP60332 Automated Reasoning and Verification
- COMP62342 Ontology Engineering for the Semantic Web

and an additional course unit offered by the Manchester Business School is chosen from the following IT Management 2 theme units:
- BMAN60422 Data Analytics for Business Decision Making
- BMAN71652 Information and Knowledge Management
- BMAN60092 Risk, Performance and Decision Analysis
- BMAN70142 Simulation and Risk Analysis
- BMAN73292 Games Businesses Play
- MCEL40042 Business Feasibility Study

Students on the Information management pathway take the following two themes:
- Information Management 1
- Data Engineering and Systems Governance

In Semester 2, the students also take one course unit from the Information Management 2 theme.

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). Some of the practical exercises are assessed work.

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 and themes to pathways is shown in the Handbook)
- students choose themes and course units
- students take part in an on-line course about plagiarism

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. They follow two MBS course units throughout Semester 1.

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, and they work half-time on their projects, leading to the production of an initial report.

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).

Summary of the exit qualifications:
A student with 60 credits from the taught part can exit with a PG Certificate.
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A student who has passed all 90 credits of the taught part, and a 30 Credit Diploma Project can exit with a PG Certificate.
Neither PG Certificate nor the PG Diploma can carry a pathway specialisation.

5. Mechanisms for Programme Revision

There is an annual Programme Review, which reflects on the year that is coming to an end, and which informs an annual PGT Action Plan that is reviewed by faculty. This action plan regularly includes items relating to programme revision. Progress against the Action Plan is a standing item on PG Committee Meetings. There are also annual interactions with MBS, reviewed by the PG Committee, to identify the most suitable MBS contributions to the programme.
Figure 1: Course Units

1. Data on the Web:
   - COMP60411 Modelling Data on the Web
   - COMP62421 Querying Data on the Web
2. Data Engineering and Systems Governance:
   - COMP60711 Data Engineering
   - COMP60721 IT Governance
3. Learning from Data:
   - COMP61011 Foundations of Machine Learning
   - COMP61021 Modelling & Visualization of high-dimensional data
4. Parallel Computing in the Multi-Core Era:
   - COMP60611 Parallel Programs and their Performance
   - COMP60621 Designing for Parallelism and Future Multi-core Computing
5. Security:
   - COMP61411 Cryptography
   - COMP61421 Cyber Security
6. Software Engineering 1:
   - COMP61511 Software Engineering Concepts in Practice
   - COMP62521 Agile Software Development
7. IT Management 1
   - BMAN60111 IS Strategy and Enterprise Systems
   - BMAN70391 Managing projects
   - BMAN73271 Decision Behaviour, Analysis and Support
   - BMAN71641 Social Media and Web Analytics
   - BMAN60101 Mathematical Programming and Optimisation
   - MCEL40021 Entrepreneurial Commercialisation of Knowledge
8. IT Management 2
   - BMAN60422 Data Analytics for Business Decision Making
   - BMAN71652 Information and Knowledge Management
   - BMAN60092 Risk, Performance and Decision Analysis
   - BMAN70142 Simulation and Risk Analysis
   - BMAN73292 Games Businesses Play
   - MCEL40042 Business Feasibility Study