THE UNIVERSITY OF MANCHESTER
Postgraduate Programme Specification

Note: To add a new row to any table sit in the last column of the last row and press the Tab key.

1. GENERAL INFORMATION

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

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

2. AIMS OF THE PROGRAMME(S) (must include separate aims for PG Certificate and PG Diploma awards)

The programme aims to: (**NB PG Cert is exit award only**):

01.	**At PG Diploma level**: Produce the highest quality of computing professionals and researchers across a broad range of Computer Science
02.	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
03.	Continue to attract the highest-quality students from the UK and overseas
04.	Provide an opportunity to engage in a small research project in Advanced Computer Science
05.	**At MSc level**: As above 01 – 03 together with 05 and 06: Offer the opportunity to focus on one of a range of specialisations.
06.	Provide high quality training and experience in research in Advanced Computer Science

3. INTENDED LEARNING OUTCOMES OF THE PROGRAMME(S) (must include separate outcomes for PG Certificate and PG Diploma awards)

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A. Knowledge & Understanding

Students will be able to:

A1.	**(At all levels)** Acquire a knowledge of a range of advanced topics in Computer Science beyond undergraduate level and at the forefront of research
A2.	**(At all levels)** Understand, apply and develop leading-edge technologies in one or more of: high performance computing, formal foundations of Computer Science, computer engineering and electronic instrumentation, software engineering, advanced applications, artificial intelligence.
A3.	**(MSc & PG Diploma)** Have a knowledge & understanding of research methodology & practice

Learning & Teaching Processes (to allow students to achieve intended learning outcomes)	**Assessment** (of intended learning outcomes)
At MSc, PG Diploma & PG Certificate levels 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.
At MSc, PG Diploma & PG Certificate levels 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	
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**	A1- A3 is also assessed via the research project which includes an oral presentation of the research, and examination of the dissertation.

B. Intellectual Skills

Students will be able to:

B1.	Develop 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)**

Learning & Teaching Processes	**Assessment**
B1. is mainly demonstrated during the research project.	B1. & B3 are developed and assessed during the research project through presentation of a seminar and examination of the dissertation.
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).

C. Practical Skills

Students will <u>at MSc, PG Diploma & PG Certificate levels</u> be able to:

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

Learning & Teaching Processes	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 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 also assessed by a report or marked presentation in some course units.

D. Transferable Skills and Personal Qualities

Students will be able to:

D1.	Work effectively as a team member (**<u>MSc, PG Diploma & PG Certificate)</u>**
D2.	Prepare and present seminars to a professional standard **<u>(MSc level only)</u>**
D3.	Write theses and reports to a professional standard **<u>(MSc and PG Diploma)</u>**
D4.	Perform independent and efficient time-management (**<u>MSc, PG Diploma & PG Certificate)</u>**

Learning & Teaching Processes	Assessment
D1. is evident in team practical project used in a number of course units	D1. is assessed through reports and marked presentations.
D2. is demonstrated during 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 through lab practical and mini-project reports and the research project dissertation.	D3. is assessed by 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. The research project internal examiners assess progress of the project at the project seminar.

4. THE STRUCTURE OF THE PROGRAMME(S)

Programme structure and credits	**Credits**
Please indicate both compulsory units and optional units (including Choice of _ from _) , as well as requirements for exit awards and any specified pathways. For more details about all course units available, please see web-page at: ***http://www.cs.man.ac.uk/Study_subweb/Postgrad/***	
September Introductory fortnight. Introductory talks for each course unit offered. Option of specialisation in one of the following topics: High Performance Computing, Formal Methods, Software Engineering, Advanced Applications, Artificial Intelligence. The allocation of course units to specialisations is shown in the Curriculum map and on the web-page cited above.	**0**
September – January Students usually take 60 credits-worth of course units in the 1st semester, e.g. four of the course units identified in the table at 6. below.	**60**
January – April Students usually take 30 credits-worth of course units in the first part of the 2nd semester e.g. two of the course units identified in the table below. To continue towards the research project for MSc award, students need to pass the taught component. Exit at this stage with PG Certificate or transfer to PG Diploma is determined by assessment regulations. MSc and Diploma students select their research project.	**30** **(PG Cert exit with 60 credits)**
April – September Research Project.	**90 (MSc)** **30 (PG Dip exit with 90+30 credits)**

5. STUDENT INDUCTION, SUPPORT AND DEVELOPMENT (in order to deliver the intended learning outcomes, including dissertation support and guidance)

Induction

Students introduced to a broad range of advanced topics in Computer Science. Opportunity to make informed choice of course units. Opportunity to plan a proposed specialism - students must take at least half their course units from their proposed specialism as well as a suitable research project.

September – January

Course units are taught in an intensive mode: 1 day a week for 5 weeks are 'taught' days consisting of lectures, supervised practicals etc., 2.5 days a week for 5 weeks are practical exercises and 2.5 days of a coursework completion week are also practical exercises. Some of the practical exercises may be assessed work. Most course units are assessed through coursework (66%) and end-of-semester examination (34%). However, flexibility is allowed in the delivery and assessment, allowing methods appropriate for each subject. Further information is available at:
http://www.cs.man.ac.uk/Study_subweb/Postgrad/

January – April

To continue towards the research project for MSc award, students need to pass the taught component. For PG Certificate exit award, students need to pass 60 credits of taught course units. For PG Diploma, students need to pass the taught component to progress to the research project. MSc and Diploma students select their research project from a wise range of proposed projects, and also by individual agreement with supervisors.

April – September

There is a presentation to supervisor, internal examiner & fellow students, 2-3 months after the start of the project. Feedback on presentation skills and a progress report are provided for the student at this point. The thesis is assessed by two internal examiners by report and moderated by one external examiner.

Students have access to the Programme Director throughout the programme. They are encouraged to contact the Director when problems arise and are informed of this during the introductory period. The Department also has a drop-in Advice Centre for lunch-time help-sessions. During the period of the research project, an individual assigned supervisor is also available. Relationship with the supervisor is outlined in the Programme Handbook and the Research Skills course unit COMP60992.

To add further columns, sit in A5, B5, C5, or D5. Select **Insert** from the **Table** menu, select **Columns to the Right.** To add more rows, before you've filled in the final row of the year, sit in the final row, select **Insert** from the **Table** menu**,** select **Rows above.** To delete a column, sit in the column you want to delete, select **Delete** from the **Tables** menu and select **Columns.** To delete a row sit in the row you want to delete, select **Delete** from the **Tables** menu and select **Rows.**

6. CURRICULUM MAP OF COURSE UNITS AGAINST INTENDED LEARNING OUTCOMES OF THE PROGRAMME

Course Unit Title and Code (including dissertations and other programme components)			**Knowledge & Understanding (A)**						**Intellectual Skills (B)**				**Practical Skills (C)**						**Transferable Skills & Personal Qualities (D)**			
Code	**Course Unit title**	**C/O**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**D1**	**D2**	**D3**	**D4**
COMP 60001	Introduction	C	D	D																		
COMP 60022	SE/HPC/AA – Grid Computing & e-Science	C/O	A D	A D							A D		A D		A D				A D			A D
COMP 60032	HPC/CPTL – High Performance Computing in Science & Engineering	C/O	A D	A D						A D	A D		A D		A D						A D	A D
COMP 60042	HPC – Low Power System Design	C/O	A D	A D						A D			A D								A D	A D
COMP 60051	HPC – Visualization for HPD	C/O	A D	A D							A D		A D		A D				A D			
COMP 60062	HPC – System-level Design	C/O	A D	A D						A D	A D		A D						A D	A D	A D	
COMP 60071	CPTL – Introduction to Computational Science	C/O	A D	A D						A D			A D		A D							
COMP 60081	HPC/CPTL – Fundamentals of High Performance Execution	C/O	A D	A D						A D			A D		A D							
COMP 60092	HPC/CPTL – Algorithms for Differential Equations	C/O	A D	A D						A D			A D		A D							
COMP 60121	FM/AI - Automated Reasoning	C/O	A D	A D							A D				A D							
COMP 60162	FM/AI/SE– Knowledge Representation & Reasoning	C/O	A D	A D						A D	A D				A D							
COMP 60171	FM/SE – Interactive System Design Methods	C/O	A D	A D						A D			A D		A D						A D	
COMP 60242	AA – Mobile Computing	C/O	A D	A D											A D							
COMP 60312	AA – Computational Biology	C/O	A D	A D						A D	A D		A D		A D	A D				A D		
COMP 60321	SE/AA Computer Animation	C/O	A D	A D					A D		A D		A D						A D			
COMP 60342	AA/SE/wICT – E-Commerce Technologies	C/O		A D							A D		A D			A D			A D	A D		A D

COMP 60362	SE/AA/wICT – Advanced Database Technologies	C/O		A D						A D	A D			A D							A D	A D
COMP 60391	AA/wICT – Computer Security	C/O	A D	A D						A D	A D		A D		A D				A D		A D	
COMP 60431	AI – Machine Learning	C/O	A D	A D									A D								A D	A D
COMP 60440	AI /AA– Advanced Machine Vision	C/O	A D	A D							A D			A D						A D		
COMP 60461	AA/FM/AI – The Semantic Web	C/O	A D	A D						A D	A D		A D		A D						A D	A D
COMP 60491	AI - Robotics	C/O	A D	A D						A D	A D		A D						A D			A D
COMP 70042	CEESI – Low Power System Design (DL)	C/O	A D	A D						A D			A D								A D	
COMP 70212	CEESI – Self-Timed Logic (DL)	C/O	A D	A D						A D			A D								A D	
BMAN 61051	wICT – IT Trends	C/O	A D	A D		A D	A D		A D		A D					A D			D	A D	A D	A D
BMAN 60112	wICT –IT Systems & Strategy	C/O	A D	A D		A D			A D		A D					A D			D	A D	A D	A D
BMAN 61102	AI/AA/SE /wICT– Decision Analysis	C/O		A D				A D		A D	A D			A D		A D			A D	A D	A D	A D
MSEC 40001	wICT – Entrepreneurial Commercialisation of Knowledge	C/O		A D							A D					A D			A D		A D	
COMP 60992	Research & Professional Skills	C			D				D		D			D					D		D	
COMP 60900	Research Project	C	A D	A D	A D				A D	A D	A D		A D	A D		A D				A D	A D	A D

Legend for cells

D = intended learning outcomes of the programme are taught or developed by students within this course unit
A = intended learning outcomes of the programme are assessed within this course unit

C = compulsory course unit

O = optional course unit

- **HPC = High Performance Computing, FM = Formal Methods, SE = Software Engineering, AA = Advanced Applications, AI = Artificial Intelligence (specialisations within MSc in Advanced Computer Science),**

For the MSc programmes indicated below, see the relevant MSc programme specification re additional learning outcomes for course units associated with that particular programme:

- **wICT = ACSwithICT Management,**
- **CPTL – Computational Science & Engineering,**
- **EIS = Electronic Instrumentation Systems,**
- **CEESI = Low Power System Integration**

7. CRITERIA FOR ADMISSION

Candidates must be able to satisfy the general admissions criteria of the University and of the School in at least one of the following ways:

Entry to the programme is by a 1st class or good 2nd class honours degree or its overseas equivalent in either Computer Science or a joint course with at least 50% Computer Science content. An honours degree in another subject together with sufficient relevant industrial experience is also acceptable. In exceptional circumstances, candidates without an honours degree but with considerable and relevant industrial and educational experience will be accepted.

In addition, all students are required to be proficient in spoken and written English. In order to be accepted on an MSc programme in the School of Computer Science, applicants need to achieve an IELTS score of 6.5 (minimum) or TOEFL 600+ (paper-based) 250+ (computer-based) or Cambridge Proficiency Grade 'C' (minimum) before the programme start date. In addition, overseas students who have attained the minimum IELTS score of 6.5, but less that 7.0 are required to attend the University's English classes during the MSc year of study. The final decision on the standard of English remains with the Admissions Tutor and other very strong evidence of proficiency may be acceptable.

Experience shows that even those students who have passed the required language test find it difficult sometimes to adjust to operating in English entirely. We therefore strongly recommend that all such students take additional measures, such as attending English language courses (the Language Centre at the University provides English Language programmes – see the website at http://www.langcent.manchester.ac.uk), reading English literature, speaking and writing English wherever possible.

8. PROGRESSION AND ASSESSMENT REGULATIONS

The assessment for the **MSc** consists of two parts: (1) an assessment of the **taught course units** undertaken and (2) an assessment of the **project dissertation**. In order to be allowed to progress to the research project, students must successfully pass the taught part of the programme. The award of an MSc is then dependent upon passing the assessment of the project dissertation.

(1) Each student will be assessed on 90 credits' worth of coursework and examination questions. Coursework is likely to include practical laboratory exercises (individually or in groups), written essays, seminar presentations, and/or other forms appropriate to each individual course unit; for each full course unit, this usually carries two-thirds of the mark. The examinations usually consist of a two-hour paper for each course unit, carrying one third of the marks, and take place after the teaching in each semester. The University regulations are at: http://www.campus.manchester.ac.uk/medialibrary/policies/ordinance-master-pg-diploma-pg-certificate.pdf

A candidate is required to register for 90 credits' worth of course units, and will normally be considered as passing the units if:

(i) the credit-weighted average is 50% or more on the course units, and

(ii) the credit-weighted average of the practical work is 40% or more, and the credit-weighted average of the examination results is 40% or more, and

(iii) course units whose results are below 50% amount to **no more than 45 credits**.
These can be re-sat once and the maximum mark to be awarded will normally be 50%.

Compensated passes:
(i) Students may be awarded a compensated pass for a **Masters degree** when they fail **no more than 30 credits** and receive a mark between 40 and 49% for those failed credits. The student must also have

gained an overall average for all taught credits of 50% or more in order to be granted a compensated pass.

(ii) Students may be awarded a compensated pass for a **Postgraduate Diploma** programme when they fail **no more than 30 credits** and receive a mark between 30 and 39% for those failed credits. The student must also have gained an overall average for all taught credits of 40% or more in order to be granted the compensated pass.

(iii) Students may be awarded a compensated pass for a **Postgraduate Certificate** programme when they fail **no more than 15 credits** and receive a mark between 30 and 39% for those failed credits. The student must also have gained an overall average for all taught credits of 40% or more in order to be granted the compensated pass.

Failed units*:*
The maximum allowable cumulative failure of course units in a Masters programme at the first attempt is 45 credits of the taught component of the programme. A student whose failures at the first attempt exceed 45 credits will be deemed to have failed the programme. They will then be judged against the requirements for a pass on the Postgraduate Diploma programme. If this results in their failing less than or equal to 45 credits at Postgraduate Diploma level, the student may resit those units failed at Postgraduate Diploma level to obtain the award of Postgraduate Diploma.

The final decision on whether a student passes is taken by the MSc Examination Board.

(2) The assessment of the **dissertation** is by two internal examiners, moderated by one external examiner. Details about dissertation format etc can be found on the University website and should be submitted in accordance with the information set out in the University's Guidance Notes for the Presentation of Dissertations at
http://www.campus.manchester.ac.uk/medialibrary/researchoffice/graduateeducation/guidance-presentation-of-dissertations-pgt-0705.pdf

All work must be original: students presenting work which is copied from any other source (unless explicitly allowed), including from other students, are breaking University regulations and will be dealt with under these regulations. Guidance on plagiarism is provided in the Programme handbook.

Students who achieve a dissertation mark of between 40-49% may accept the award of Postgraduate Diploma with no further work required or resubmit the dissertation on one occasion, at the discretion of the Board of Examiners.

A student achieving a mark below 50% for a resubmitted dissertation will be awarded a Postgraduate Diploma. The maximum mark to be awarded for resubmitted dissertations or projects will normally be 50% for the Masters degree and 40% for the Postgraduate Diploma.

Awards:

MSc with Distinction: An MSc with Distinction is awardable under the following circumstances:

1. The student must have passed the assessment for course units with an overall mark of at least 70% with no mark below 50% in any course unit.
2. the dissertation is submitted on-time and both the examiners award a mark of at least 70%. The recommendation is then passed to the External Examiner, who must agree to the recommendation for the award of a Distinction to be granted by the Faculty's MSc Panel
3. Students who have had to resit any unit(s) or have been granted a compensated pass will not be eligible for the award of distinction.

MSc with Merit: An MSc with Merit is awardable under the following circumstances:

1. The student must have passed the assessment for course units with an overall mark of at least 60% with no mark below 50% in any course unit
2. The dissertation is submitted on-time and both the examiners award a mark of at least 60%.
3. Students who have had to resit any unit(s) or who have been granted a compensated pass will not be eligible for the award of merit.

MSc (Pass): To obtain a pass for an MSc degree, the student is required to obtain both an average of 50% on the taught element and 50% on the project/dissertation element.

Postgraduate Diploma – The University regulations are at:
http://www.campus.manchester.ac.uk/medialibrary/policies/ordinance-master-pg-diploma-pg-certificate.pdf
It is awarded to a student who has been assessed on 90 credits' worth of coursework & examination questions, and will normally be considered as passing the units if, in addition to the University regulations:

(i) the credit weighted average is 40% or more on the course units, and

(ii) the credit weighted average of the practical work is 40% or more, and the credit weighted average of the examination results is 40% or more, and

(iii) course units whose overall results are below 40% amount to no more than 45 credits. These can be re-sat once and the maximum mark to be awarded will normally be 40%

In addition, for the Diploma, students are required to successfully complete a mini-project worth 30 credits and achieve a mark of 40% or more. This will consist of a report on work undertaken which is commensurate with one-third of a full 90-credit MSc project. It should have the same standards of literacy and presentation as an MSc dissertation.

Postgraduate Certificate – The University regulations are at:
http://www.campus.manchester.ac.uk/medialibrary/policies/ordinance-master-pg-diploma-pg-certificate.pdf
This is awarded to students who have successfully taken 60 credits' worth of coursework & examination questions with a result of 40% or more in each course unit.

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