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	Computational Methods & Imaging in Medicine	1 year	Full-time
MSc	Computational Methods & Imaging in Medicine	2 -4years	Part-time
MSc	Computational Methods & Imaging in Medicine	3-4 years	Modular
PG Diploma	Computational Methods & Imaging in Medicine	1 year	Full-time (exit award only)
PG Diploma	Computational Methods & Imaging in Medicine	2-3 years	Part-time
PG Diploma	Computational Methods & Imaging in Medicine	2-3 years	Modular
PG Certificate	Computational Methods & Imaging in Medicine	1 year	Full-time (exit award only)
PG Certificate	Computational Methods & Imaging in Medicine	2 years	Part-time (exit award only)
PG Certificate	Computational Methods & Imaging in Medicine	2 years	Modular (exit award only)

School	Computer Science
Faculty	Engineering & Physical Sciences
Awarding Institution	The University of Manchester
Programme Accreditation	None
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 high quality professionals & researchers who have the skills and knowledge to use computational systems across the wide range of applications to medical treatment
02.	Provide a vehicle for dissemination of leading-edge knowledge and skills, focusing on the research strengths of the ISBE division of the Medical Faculty and the Medical Applications research in the School of Computer Science
03.	Provide an interdisciplinary platform for training and research between the Medical School and the School of Computer Science
04.	Attract high quality students from the UK and overseas who wish to enhance their knowledge and skills in the medical applications of computing.
05.	Provide an opportunity to engage in a small research project in Computational Methods & Imaging in Medicine
06.	**At MSc level:** [Replace 05. above with] Provide high quality training and experience in research in Computational Methods & Imaging in Medicine

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

THE UNIVERSITY OF MANCHESTER
Postgraduate Programme Specification

A. Knowledge & Understanding

Students will be able to acquire knowledge & understanding of:

A1.	**(At all levels)** advanced applications of computing in the medical area
A2.	**(At all levels)** leading-edge technologies in one or more of: Health Informatics, Medical Imaging, Medical data analysis, Computational processing in Medicine
A3.	**(At all levels)** basic supporting knowledge in biomedicine

Learning & Teaching Processes (to allow students to achieve intended learning outcomes)	**Assessment** (of intended learning outcomes)
At MSc, PG Diploma & PG Certificate levels Each advanced course unit utilises methods appropriate to the subject matter.	Course units 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**	The research project includes an oral presentation of the research, and examination of the dissertation by two internal examiners and an external examiner

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 in a medical setting **(All)**
B3.	Perform problem-solving in healthcare and industrial environments **(All)**
B4.	Develop mathematical models of data and its applications in healthcare [**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 & B4. are mainly demonstrated during the research project, mini-projects and problem-based learning in teams.	B3 & B4. are 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
C5.	Analyse medical data

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 skills C4 & C5 are demonstrated in the preliminary preparation for each course unit		C4 and C5. are also assessed by a report or marked presentation in some course units.

D. Transferable Skills and Personal Qualities

Students will *(please delete as appropriate)* **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 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 by two internal examiners during the research project seminar, who provide 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 which is examined by two internal examiners and an external examiner.
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. Advice about what compulsory Semester 1 course units are required, depending on students' background & area of study	**0**
Part 1 Students usually take 45 credits-worth of course units in Part 1, depending on their background & area of study	**45**
Part 2 Students usually take 45 credits-worth of course units in the 2nd part one of which must be from the Health Informatics area. 15 credits' of flexibility is allowed to choose from course units in CS, ISBE or related disciplines. 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.	**45** **(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 course units available to them. Opportunity to make informed choice of course unit & to start to think about Research project.

Part 1

CS 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. ISBE course units are taught in long-thin format throughout each semester

Further information is available at: ***http://www.cs.man.ac.uk/Study_subweb/Postgrad/***

Part 2

To continue towards the research project for MSc award, students need to pass the taught component. MSc and Diploma students select their research project from a wide range of proposed projects, and by individual agreement with supervisors.

Part 3 (MSc only)

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.

At all levels, 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 School of Computer Science also has a drop-in Advice Centre for lunch-time help-sessions. During the period of the research project, an individually-assigned project supervisor is also available. Relationship with the supervisor is outlined in the Programme Handbook and the Research Skills course unit COMP60992.

THE UNIVERSITY OF MANCHESTER
Postgraduate Programme Specification

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)**

		C/O				**Intellectual Skills**				**Practical Skills**					**Transferable Skills**			
Code	**Course unit title**		**A1**	**A2**	**A3**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**C5**	**D1**	**D2**	**D3**	**D4**
MEDN 6051	CMIM - Introduction to Human Biology	**C/O**			**AD**			**AD**						**AD**				
MEDN 7991	CMIM/SE - Introduction to Health Informatics	**C/O**	**AD**		**AD**		**AD**	**AD**	**AD**	**AD**		**AD**		**AD**	**AD**			
MEDN 60001	CMIM – Introduction to Biostatistics & Epidemiology	**C/O**			**AD**			**AD**	**AD**				**AD**	**AD**				
MEDN 61182	CMIM - Medical Imaging	**C/O**	**AD**	**AD**			**AD**	AD	**AD**	**AD**			**AD**	**AD**				
MEDN 61082	CMIM - Nuclear Medicine	**C/O**	**AD**	**AD**			**AD**	**AD**	**AD**	**AD**				**AD**				
MEDN 60182	CMIM/ADA - Advanced Epidemiology	**C/O**		**AD**				AD	AD					**AD**			**AD**	
MEDN 60102	CMIM/ADA - Advanced Biostatistics	**C/O**		**AD**				**AD**	**AD**				**AD**	**AD**				
COMP 60440	CMIM/DA/AA/SE/AI – Advanced Machine Vision	**C/O**	AD	AD			AD			AD		AD	AD					
MEDN 60172	CMIM/AA/AI - Decision Analysis & Decision Support Systems	**C/O**	**AD**	**AD**			**AD**		**AD**	**AD**		**AD**	**AD**		**AD**	**AD**	**AD**	
BIOL 60081	CMIM - Introduction to JAVA	**C/O**					**AD**			**AD**								
COMP 60362	AA/AI/CMIM - Advanced Database Technologies	**O**	**AD**	**AD**			**AD**			**AD**		**AD**					**AD**	
COMP 60312	CMIM/AA – Computational Biology	**O**	**AD**	**AD**			**AD**		**AD**	**AD**		**AD**	**AD**			**AD**		
COMP 60431	CMIM/AI - Machine Learning	**O**	**AD**	**AD**			**AD**			**AD**		**AD**					**AD**	

COMP 60992	Research and Professional Skills	**C**				**D**		**D**			**D**				**D**		**D**	
COMP 60900	Research Project	**C**	**AD**	**AD**		**AD**	**AD**	**AD**		**AD**	**AD**	**AD**	**AD**			**AD**	**AD**	**AD**

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,**
- **CMIM - Computational Methods & Imaging in Medicine**
- **EIS = Electronic Instrumentation Systems,**
- **CEESI = Low Power Systems 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 a Computer Science or Biomedical discipline or joint programme with at least 50% Computer Science or Biomedical content. Other educational backgrounds, eg a mathematical science with sufficient computing content will be considered. All candidates will have to have computer programming experience sufficient for the programme. An honours degree in another subject together with sufficient relevant industrial experience is also acceptable. Applicants without a UK equivalent honours degree, but with sufficient relevant industrial and educational experience, will be considered for admission, but will have to demonstrate, possibly through interview, that they are sufficiently prepared in knowledge and skills to undertake this MSc degree programme.

Those applicants for whom English is not their first language must satisfy the language requirement of IELTS 7+ (or TOEFL 600, Cambridge Proficiency Grade C)

Further details are available at:

http://www.cs.man.ac.uk/Study_subweb/Postgrad/

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.

Date of original production:	30th July 2001
Date of current version:	17th August 2006