Computer Science BSc (Hons) 2012-2013

Summary

UCAS code	Award	Title	Duration	Mode
G400	BSc	Computer Science BSc (Hons)	3 years	FT

Schools	Computer Science
Faculty	Engineering and Physical Sciences
Awarding Institution	Unversity of Manchester
Programme Accreditation	BCS, IET
Relevant QAA benchmark(s)	Computing

Aims and intended learning outcomes

Our Computer Science programmes, the most popular and most flexible of our offerings, offer students the opportunity to choose a study pathway which reflects their developing, possibly changing, interests. It aims to develop strengths in both the principles and practice of Computer Science, and includes extensive practical work.

Our programmes aim to:

1) enable graduates to exhibit a high level of practical and theoretical skills over a broad range of Computer Science together with a knowledge of currently available techniques and technologies.

2) explore the principles that support developments in a rapidly changing subject.

3) provide opportunities for students to understand the wide range of research challenges facing Computer Science, as well as the breadth and depth of research undertaken in this top-rated school, so they are prepared to embark on research here or elsewhere.

4) develop competent professionals able to play a leading part in many different commercial, industrial and academic activities and adapt rapidly to changing technology.

5) meet industry demand for high calibre graduates who will take a lead in continuing technological change.

6) prepare students for the social, organisational and professional context in which they will be working.

7) meet the educational requirements of the Engineering Council thus enabling graduates to progress to professional membership of the BCS and IET and attain the highest professional status of Chartered Engineer.

8) In addition, the with Industrial Experience programmes aim to: give extensive practical experience of an industrial or business environment where students are able to apply and develop their skills, both technical and personal.

9) In addition, the MEng programmes aim to: prepare high fliers for professional practice in Computer Science by enhanced depth and breadth of study together with increased emphasis on industrial relevance through industrially related group projects.

Intended learning outcomes

Knowledge & understanding

A1 Know and understand the essential mathematics relevant to computer science.

A2 Understand and apply a wide range of principles and tools available to the software engineer, such as design methodologies, choice of algorithm, language, software libraries and user interface techniques

A3 Demonstrate a grasp of the principles of computer systems, including architecture, networks and communication

A4 Recognise and appreciate the professional and ethical responsibilities of the practising computer professional, including understanding the need for quality

A5 Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, databases and computer graphics

A6 Apply their knowledge of computing in a commercial or industrial context

A7 Show a critical understanding of the broad context within which Computer Science resides, including issues such as quality, reliability, enterprise, employment law, accounting and health and safety

A8 Have a comprehensive knowledge and critical awareness of selected specialist fields at the forefront of computer science, studied at masters level

Intellectual (thinking) skills

B1 Solve a wide range of problems related to the analysis, design and construction of computer systems.

B2 Design and implement a software or hardware system of significant size

B3 Identify a range of solutions and critically evaluate and justify proposed design solutions

B4 Solve computer science problems with pressing commercial or industrial constraints

B5 Generate an innovative design to solve a problem containing a range of commercial and industrial constraints

Practical skills

C1 Plan and undertake a major individual project

C2 Prepare and deliver coherent and structured verbal and written technical reports

C3 Give technical presentations suitable for the time, place and audience

C4 Use the scientific literature effectively and make discriminating use of Web resources

C5 Design, write and debug computer programs in appropriate languages

C6 Use appropriate computer-based design support tools

C7 Apply computer science skills in a commercial or industrial environment

C8 Demonstrate initiative taking, innovation and self-management in an industrially related group project

C9 Integrate previously acquired skills and apply them to new, demanding situations

Transferable skills

D1 Display an integrated approach to the deployment of communication skills

D2 Use IT skills and display mature computer literacy

D3 Work effectively with and for others

D4 Strike the balance between self-reliance and seeking help when necessary in new situations

D5 Display personal responsibility by working to multiple deadlines in complex activities

D6 Employ discrete and continuous mathematical skills as appropriate

D7 Demonstrate significantly enhanced group working abilities

D8 Further develop career plans and personal objectives

D9 Communicate effectively with non-specialist as well as computer scientist professionals at a range of levels

D10 Undertake a range of technical roles within a team and be able to display leadership

Teaching, learning and assessment methods

Learning and Teaching on all our programmes aims to combine an understanding of fundamental CS principles, development of strong practical skills and the group-working, learning and communication skills that are essential for any computing professional.

Course units which involve practical elements all have associated laboratory exercises, usually in timetabled sessions with staff and demonstrator support. Most labs operate a system of face-to-face marking in the lab so that students receive immediate feedback on their work. Units without labs all have regular coursework exercises to support skills development and feedback.

Most units are lecture based, with lab or coursework exercises used to reinforce and enhance knowledge and skills first encountered in lectures. The first year team project deviates significantly from this model and takes an Enquiry Based Learning approach. This unit aims to encourage students to be more actively engaged with, and responsible for, their own learning, to develop skills in problem solving, communication, independent learning, and group work, and to signal the importance we attach to independent learning. This approach is followed up in the second year with the workshop based approach used in the compulsory Software Engineering unit, which also contains a major group working component.

The choice of units offered to students on our programmes is very broad, but they also require depth in particular subject areas. This is achieved using the notion ofThemes. . A theme is a group of related second and third year course units which form a coherent whole; usually one second year and two third year units. All single honours students are required to complete at least two themes; those on the Computer Science programme can choose any pair of themes, but those on specialist programmes must complete at least two themes associated with their specialism. It is the choice of these themes that characterises the specialist programmes.The Programme Structure section below indicates the Themes for this group of programmes and the tables in that section show the Theme for each course unit.

All students undertake an individual 3rd year project, supervised by a member of academic task, which usually involves the development of significant software or hardware product. Assessment of this unit involves presentations of plans and results and a major written report

Assessment in almost all units is a combination of lab/coursework and examination.

Learning, Teaching and Assessment of intended learning outcomes

Knowledge and Understanding

Learning and Teaching Processes		Assessment
Lectures (A1, A2, A3, A4, A5, A6, A7)		Unseen written examinations (A1, A2, A3, A4)
Laboratory sessions (A2, A3)		Marked tutorial exercises (A1, A2, A3, A4)
Personal tutorials (A1, A2, A3, A4, A7)		Laboratory reports (A2, A3)
Problem solving classes (A1, A2, A3, A4)		Project reports (individual and group) (A3, A4, A5,A6, A7)
Problem-based learning (A2, A3, A4, A5, A6, A7)		Oral presentations (individual and group) (A3, A4, A5, A6, A7)
Projects (A3, A4, A5, A6, A7)		
Industrial seminars (A4, A5, A6, A7)		

Intellectual Skills

Learning and Teaching Processes		Assessment
Lectures (B1, B2, B4, B5)		Unseen written examinations (B1, B2, B4)
Laboratory sessions (B1, B2)		Marked tutorial exercises (B1, B2)
Personal tutorials (B1, B2, B4)		Laboratory reports (B1, B2)
Problem solving classes (B1, B2, B4)		Project reports (individual and group) (B1, B2, B3,B4, B5)
Problem-based learning (B1, B2, B4)		Oral presentations (individual and group) (B1, B2, B3, B4, B5)
Projects (B1, B2, B3, B4, B5)		

Practical Skills

Learning and Teaching Processes		Assessment
Lectures (C4, C6)		Laboratory reports (C1, C2, C3, C4, C5, C6, C7)
Laboratory sessions (C1, C2, C3, C4, C5, C6, C7)		Project reports (individual and group) (C3, C4, C5,C6)
Projects (C3, C4, C5, C6,C9)		Oral presentations (individual and group) (C6, C8,C9)

Industrial placement (C8,C9)		Industrial placement reports (C8,C9)

Transferable skills

Learning and Teaching Processes		Assessment
Lectures (D3, D4, D5, D7)		Laboratory reports (D1, D3, D5, D6)
Laboratory sessions (D1, D3, D5, D6)		Essays (D2, D3)
Personal tutorials (D1,D2, D3, D4, D7)		Project reports (individual and group) (D1, D2, D3,D4, D5, D6, D7)
Problem solving classes (D4)		Oral presentations (individual and group) (D1, D3, D6, D7, D8)
Problem-based learning (D1, D2, D3, D4, D5, D6)		Industrial placement reports (D8)
Projects (D1, D2, D3, D4, D5, D6, D7)		
Industrial placement (D8)		

Programme structure

If you wish to take an external unit which is not listed on your programme course unit list (such as, for example, from University College)you must get permission from your Year Tutor. This applies for every year of your programme. If your choices do not meet the School?s course unit and theme requirements you will be
contacted and be required to change your choices.

Level 1 - compulsory units

All of the units in this pool are mandatory.

Code	Title	Credits
COMP10120	First Year Team Project	20
COMP11120	Mathematical Techniques for Computer Science	20
COMP11212	Fundamentals of Computation	10
COMP12111	Fundamentals of Computer Engineering	10
COMP14112	Fundamentals of Artificial Intelligence	10
COMP15111	Fundamentals of Computer Architecture	10
COMP16121	Object Oriented Programming with Java 1	20
COMP16212	Object Oriented Programming with Java 2	10
COMP18112	Fundamentals of Distributed Systems	10

Level 2 options

MANDATORY UNITS - 60 CREDITS
OPTIONAL UNITS - 60 CREDITS

From the optional lists you must choose 20 credits from semester one and 40 credits from semester two.

Level 2 - compulsory units

All of the units in this pool are mandatory.

Code	Title	Credits	Theme
COMP23111	Fundamentals of Databases	10	Enterprise Information Systems
COMP23420	Software Engineering	20	Software Engineering
COMP25111	Operating Systems	10	Computer Architecture
COMP26120	Algorithms and Imperative Programming	20	Programming and Algorithms

Level 2 - option pool 1

From this option pool choose a maximum of 20 credits
and a minimum of 10 credits.

Code	Title	Credits	Theme
COMP21111	Logic and Modelling	10	Rigorous Development
COMP22111	Processor Microarchitecture	10	System-on-Chip
COMP24111	Machine Learning and Optimisation	10	Learning and Search in Artificial Intelligence
COMP28411	Computer Networks	10	Mobile Computing and Networks

Level 2 - option pool 2

From this option pool choose a maximum of 40 credits
and a minimum of 30 credits.

Code	Title	Credits	Theme
COMP22712	Microcontrollers	10	None
COMP24412	Symbolic AI	10	Natural Language, Representation and Reasoning
COMP25212	System Architecture	10	Computer Architecture
COMP27112	Computer Graphics and Image Processing	10	Visual Computing
COMP28112	Distributed Computing	10	Web and Distributed Systems
COMP28512	Mobile Systems	10	Mobile Computing and Networks

Level 2 - option pool 3

From this option pool choose a maximum of 10 credits
and a minimum of 0 credits.

Code	Title	Credits	Theme
MLPX20021	Leadership in Action	10	None

Level 2 - option pool 4

From this option pool choose a maximum of 10 credits

and a minimum of 0 credits.

Code	Title	Credits	Theme
BIOL20882	An Introduction to Current Topics in Biology	10	None
HSTM20282	The Information Age	10	None
MLPX20022	Leadership in Action	10	None

Level 3 options

MANDATORY UNITS - 40 CREDITS
OPTIONAL UNITS - 80 CREDITS

From the optional lists you must choose 40 credits from semester one and 40 credits from semester two.

Level 3 - compulsory units

All of the units in this pool are mandatory.

Code	Title	Credits	Theme
COMP30040	3rd Year Project (Single Honours 40 Credits)	40	None

Level 3 - option pool 1

From this option pool choose a maximum of 40 credits
and a minimum of 20 credits.

Code	Title	Credits	Theme
COMP31111	Verified Development	10	Rigorous Development
COMP32111	System-on-chip Modelling with SystemC	10	System-on-Chip
COMP33111	Data Integration and Analysis	10	Enterprise Information Systems
COMP33411	Software Design using Patterns	10	Software Engineering
COMP33711	Agile Software Engineering	10	Agile Methods
COMP34411	Natural Language Systems	10	Natural Language, Representation and Reasoning
COMP36111	Advanced Algorithms 1	10	Programming and Algorithms
COMP36411	Understanding Programming Languages	10	Computer Languages
COMP37111	Advanced Computer Graphics	10	Visual Computing
COMP38411	Cryptography and Network Security	10	Mobile Computing and Networks

Level 3 - option pool 2

From this option pool choose a maximum of 40 credits
and a minimum of 20 credits.

Code	Title	Credits	Theme
COMP31212	Concurrency and Process Algebra	10	Rigorous Development
COMP32212	Implementing System-on-Chip Designs	10	System-on-Chip
COMP33212	Advanced Database Systems	10	Enterprise Information Systems
COMP33512	User Experience	10	Software Engineering
COMP33812	Software Evolution	10	Agile Methods
COMP34512	Knowledge Representation and Reasoning	10	Natural Language, Representation and Reasoning
COMP35112	Chip Multiprocessors	10	Computer Architecture
COMP36212	Advanced Algorithms II	10	Programming and Algorithms
COMP36512	Compilers	10	Computer Languages
COMP37212	Computer Vision	10	Visual Computing
COMP38212	Topics in Advanced Information Retrieval	10	Web and Distributed Systems
COMP38512	Digital Wireless Communication and Networks	10	Mobile Computing and Networks

Level 3 - option pool 3

From this option pool choose a maximum of 20 credits
and a minimum of 0 credits.

Code	Title	Credits	Theme
COMP34120	AI and Games	20	Learning and Search in Artificial Intelligence

Level 3 - option pool 4

From this option pool choose a maximum of 20 credits
and a minimum of 0 credits.

Code	Title	Credits	Theme
BIOL20882	An Introduction to Current Topics in Biology	10	None
HSTM20282	The Information Age	10	None
MLPX20021	Leadership in Action	10	None
MLPX20022	Leadership in Action	10	None

MSEC30052	Interdisciplinary Sustainable Development	10	None
MSEC30111	Tools and Techniques for Enterprise	10	None
MSEC30112	Tools and Techniques for Enterprise	10	None
MSEC31122	Managing Finance in Enterprises for Computer Scientists	10	None
MSEC31131	Enterprise Management for Computer Scientists	10	None

MSEC30111/2 - Please note that it is a pre-requisite for these units that they should not be studied with MSEC31131

Code	Title	C/O	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
BIOL20882	An Introduction to Current Topics in Biology	O																																
COMP10120	First Year Team Project	C																																
COMP11120	Mathematical Techniques for Computer Science	C	DA								DA																							
COMP11212	Fundamentals of Computation	C	DA								DA																							
COMP12111	Fundamentals of Computer Engineering	C		D	D						D	D	D								D													
COMP14112	Fundamentals of Artificial Intelligence	C	D	D		D	D				D		D							D							D	D	D					
COMP15111	Fundamentals of Computer Architecture	C			DA															D	D													
COMP16121	Object Oriented Programming with Java 1	C		DA																DA								DA	DA					
COMP16212	Object Oriented Programming with Java 2	C		DA							DA	DA	DA						D	DA							D	D	D					
COMP18112	Fundamentals of Distributed Systems	C		DA									DA																					
COMP21111	Logic and Modelling	O	D	D			D				D									D														
COMP22111	Processor Microarchitecture	O			DA						DA	DA	DA			DA	DA			DA	DA							DA	DA					
COMP22712	Microcontrollers	O		D	D							D	D							D	D							D	D					
COMP23111	Fundamentals of Databases	C				D	DA		D		DA		DA				DA								DA		DA		DA					
COMP23420	Software Engineering	C		D		D					D	D	D				D		D	D	D					D	D	D	D					
COMP24111	Machine Learning and Optimisation	O	DA		DA								DA						DA	DA										DA				
COMP24412	Symbolic AI	O	DA				DA				D									D						D				D				
COMP25111	Operating Systems	C		D	D						D	D	D			D				D					D			D	D					
COMP25212	System Architecture	O			DA						DA	DA	DA								DA													
COMP26120	Algorithms and Imperative Programming	C		DA	DA	DA					DA	DA	DA						DA	DA	DA					DA		DA	DA	DA				
COMP27112	Computer Graphics and Image Processing	O	DA																										DA					
COMP28112	Distributed Computing	O																																
COMP28411	Computer Networks	O			D						D									D	D							D	D	D				
COMP28512	Mobile Systems	O		DA	DA		DA				DA	DA	DA				DA	DA						DA			DA				DA			DA
COMP30040	3rd Year Project (Single Honours 40 Credits)	C									D	D	D			D	D	D							D	D	D	D	D					
COMP31111	Verified Development	O	DA		DA						DA																			DA				
COMP31212	Concurrency and Process Algebra	O	D	D			D				D		D							D										D				
COMP32111	System-on-chip Modelling with SystemC	O		DA	DA						DA	DA	DA				DA			DA	DA							DA	DA					
COMP32212	Implementing System-on-Chip Designs	O		DA	DA						DA	DA	DA			DA			D	DA	DA			DA				D	DA					
COMP33111	Data Integration and Analysis	O		DA			DA						DA																					
COMP33212	Advanced Database Systems	O		DA			DA						DA																					
COMP33411	Software Design using Patterns	O		D		D					D	D	D							D								D						
COMP33512	User Experience	O	DA	D	D		D				DA		D						D											DA				
COMP33711	Agile Software Engineering	O																																
COMP33812	Software Evolution	O		DA		DA					DA		DA																					
COMP34120	AI and Games	O																																
COMP34411	Natural Language Systems	O		DA			DA				DA		DA						DA									DA						
COMP34512	Knowledge Representation and Reasoning	O	DA				DA				DA		DA						DA															
COMP35112	Chip Multiprocessors	O																																
COMP36111	Advanced Algorithms 1	O		DA							DA	DA	DA							DA										DA				
COMP36212	Advanced Algorithms II	O		DA							DA	DA	DA							DA										DA				
COMP36411	Understanding Programming Languages	O	D								D																			D				
COMP36512	Compilers	O		D	D		D				D		D																					
COMP37111	Advanced Computer Graphics	O	DA	DA			DA				DA																							
COMP37212	Computer Vision	O	D	D			D				D																							
COMP38212	Topics in Advanced Information Retrieval	O																																
COMP38411	Cryptography and Network Security	O			D						D								D															
COMP38512	Digital Wireless Communication and Networks	O			D		D				D		D																					
HSTM20282	The Information Age	O																																
MLPX20021	Leadership in Action	O																																
MLPX20022	Leadership in Action	O																																
MSEC30052	Interdisciplinary Sustainable Development	O																																
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MSEC31122	Managing Finance in Enterprises for Computer Scientists	O																																
MSEC31131	Enterprise Management for Computer Scientists	O																																

Mechanisms for programme revision

Course units are reviewed annually by the Undergraduate Committee, as part of the Annual Review process, taking into account the results and comments from Course Unit Evaluation Questionnaires. Input is also received from the Teaching Assessment Panel, which has a responsibility for monitoring teaching quality in the School.

Programmes have been reviewed regularly by groups created specifically for this purpose; the last major review resulted in a new programme portfolio design which started in the first year in 2008-9. The responsibility for leadership of programme review is now the in the hands of the Director of Teaching Strategy (currently Dr Steve Pettifer) who chairs a School Teaching Strategy Committee.