Programme Specification

MComp Computer Science

With exit points at:

BSc(Hons) Computer Science Studies
Certificate of Higher Education
Diploma of Higher Education

March 2012

Marketing Summary

MComp Computer Science is a four-year, prestige, integrated Masters degree giving experience in the practical design and development of a range of computing and information systems. It provides a broad range of knowledge and skills in programming, software engineering, networks and databases. Graduates can seek careers in a wide range of IT professions such as programming, systems analysis, systems management and database development.

The programme builds upon and develops the study undertaken in the equivalent BSc(Hons) award. It includes an industrially-related project, some optional study modules at Masters level and a substantial final year project.

Contents

Section 1: Basic Programme Data

This document describes one of the University of Lincoln's programmes using the protocols required by the UK National Qualifications Framework as defined in the publication *QAA guidelines for preparing programme specifications*

Final award(s)	MComp
Programme	Computer Science
Other exit awards	BSc(Hons) Computer Science Studies
	Certificate of Higher Education
	Diploma of Higher Education
Mode of delivery	Full time/Part time
UCAS code	(Full-time variant)
	(Part-time variant)

Awarding body	University of Lincoln
Teaching institution	University of Lincoln
Owning school	Computer Science
Programme leader	John Murray
Relevant QAA Subject Benchmark Statements	Computing
Professional, Statutory or Regulatory Body accreditation	N/A

Programme start date	September 2012
Introduction of the programme to be phased?	No
	Level 1, first intake Sept 2012
	Level 2, first intake Sept 2012
	Level 3, first intake Sept 2012
	Level 4, first intake Sept 2012

Document publication date	Date of confirmation of approval by Faculty	March 2012
Revision 1	Date of confirmation of approval of revision by Faculty	Change affects another programme? Please specify
Revision 2	Date of confirmation of approval of revision by Faculty	Change affects another programme? Please specify
Revision 3	Date of confirmation of approval of revision by Faculty	Change affects another programme? Please specify

Subsequent minor modifications to modules within this programme		
Module(s)	**Date**	**Brief description of change including any affect on other programmes**
	Feb 2009	Minor changes to structure of Level 1. Additional optionality provided. Clarification of skills coverage.
Addition of Data Structures, Maths for Computing, Advanced Software Development and Mobile and Distributed Computing	Mar 2010	Level 1 – Replacement of Data Networks and the Web with 2 15 CATS modules, minor adjustments to skills Learning Outcomes Level 2 - removal of optionality Level 3 - minor adjustments to optionality Level 4 – minor adjustments to optionality
Professional Practice	June 2010	Changes to Assessment Strategy
Computer Systems	June 2010	Changes to Assessment Strategy
All	Mar 2011	Alignment with amended University Calendar
Software Development	Mar 2011	Removal of Learning Outcomes relating to Mathematics and associated curriculum mapping
Mobile and Distributed Computing	Mar 2011	Replacement with Mobile and Social Computing (also renamed to Social Applications Development)
Mobile and Distributed Computing (M)	Mar 2011	Replacement with Mobile and Social Computing (M) (also renamed to Social Applications Development (M))
Data Structures **Maths for Computing**	Mar 2012	Switch delivery sequence
Computer Science Group Project	Mar 2012	Rename to Group Project

Section 2: Programme Aims and Objectives

2.1 Educational aims of the programme

MComp Computer Science aims to provide students with an education and learning experience that will equip them to operate on graduation as autonomous computing professionals. The programme aims to instill knowledge and to develop critical and intellectual abilities applicable to problem solving and solution specifying in technologically and socially diverse environments. The programme also aims to develop professional and transferable skills in a wide range of methods, techniques and practices appropriate for the task domain of a professional software developer.

The MComp title is distinctive from an undergraduate award in that it provides students with additional opportunities to research and study their chosen discipline both in greater depth and breadth. In addition it provides a focus on industry and employability issues to better prepare students for their chosen career.

MComp Computer Science is distinctive in that provides a strong conceptual and methodological grounding and seeks to develop a rich and up-to-date set of practices and techniques which students can deploy in state-of-the-art software and hardware contexts. MComp Computer Science aims to provide students with an education and learning experience that will equip them to operate on graduation as autonomous computing professionals having developed a wide range of transferable skills and become fully conversant with the responsibilities such a role implies.

The programme aims to instil knowledge and to develop critical and intellectual abilities applicable to the fundamental task of problem solving using machines and specifying solutions in technologically and socially diverse environments. The term machine generally applies to an assembly of components performing a range of well-defined functions whose complex interactions endow it with the ability to process information. Configuring such a machine by programming enables a problem to be represented and automatically solved.

In summary MComp Computer Science focuses on the conceptual and methodological groundings underpinning a computer's architecture, configuration and deployment as a problem solving artefact and seeks to develop a rich and up-to-date set of practices and techniques which students can use in state-of-the-art software and hardware contexts.

2.2 QAA Subject Benchmark Statement(s)

The **MComp Computer Science** responds to the United Kingdom QAA benchmark statement(s) for the subject of Computing

Appendix III – Benchmarking analysis provides a detailed specification of the relationship between this programme's curriculum and the relevant QAA benchmark(s).

2.3 Internal contexts

The School of Computer Science offers programmes in three broad areas of study. These are: computing, computer games and the creative technologies. Programmes can be taken as three year BSc (Hons) awards or four year BSc (Hons) awards that include an optional sandwich work placement. Some programmes are also available as four year MComp (Master of Computing) awards or five year MComp awards if the optional sandwich placement is also taken.

The School is the home for research centres concerned with Visual Surveillance and Robotics and Social Computing. Study programmes have been structured to exploit this expertise and to ensure that wherever possible, teaching is informed by research. Opportunities for students to become familiar with and ultimately involved in research activity are actively promoted.

The School is located in the Faculty of Science and integrates with other Faculty Schools and Departments through the provision of collaborative awards at undergraduate and postgraduate level. This integration is further consolidated through the Faculty's committee structures and though Research seminar programmes.

2.4 External contexts

MComp Computer Science is part of an ongoing response to changes in the discipline of computer science and its emerging and volatile application contexts. The programme particularly seeks to acknowledge and formalise relationships between the maturing theory and practice of software development (primarily software engineering and the object-oriented approach) and the novel contextual opportunities provided by distributed computing environments and their societal application.

A range of successful I.T. focused companies, including HBS, Northcliff, PA Digital, Eon Media, HTBA, Linx Media and EMAP, operate within easy reach of the University and regularly engage with students of the Faculty of Science through project briefs, work experience and industrial liaison. Besides these local companies, the Faculty has been successful in engaging business from outside the region to work with staff and student groups. An example of this was the testing, evaluation and production of interactive solutions using the pioneering DVD authoring software developed by Zoo Digital. The Faculty is also growing its relationship with industry through Knowledge Transfer Partnerships and through its relationship with Sparkhouse Studios.

This MComp programme complies fully with the Bologna agreement in:

- its designation as an "Integrated Masters" programmes;
- the volume of study undertaken at M-Level;
- the distinction between the M-Level award made after four years of full-time study and the separate Bachelor's exit award that recognises three years of full-time study.

Section 3: Programme Outcomes

Programme-level learning outcomes are identified below.

Refer to *Appendix I – Curriculum Map* for details of how outcomes are deployed across the programme.

3.1 Knowledge and understanding

On successful completion of the MComp Computer Science a student will be able to:

- A 1 employ appropriate modelling and design of computer-based systems for the purposes of comprehension, communication, prediction and the understanding of trade-offs;
- A 2 recognise and analyse criteria, requirements, specifications and practical constraints appropriate to specific problems in computer systems, information systems, embedded systems and distributed systems, and plan strategies for their solution;
- A 3 analyse, through critical evaluation and testing, the extent to which a computer-based system meets the criteria defined for its current use and future development;
- A 4 deploy appropriate theory, methods, tools and practices for the specification, design, implementation and evaluation of computer-based systems;
- A 5 recognise the professional, moral and ethical issues and considerations involved in the exploitation of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices;
- A 7 evaluate problem solving strategies;
- A 9 evaluate tools and techniques in interface design;
- A 10 describe and abstract models of systems structure, behaviour and purpose;
- A 12 apply appropriate mathematical techniques in the design and development of software;
- A 21 apply industry-standard methods in human-computer interaction to inform the development of usable interfaces;
- A 25 demonstrate knowledge and understanding of the theoretical and practical capabilities of artificial intelligence;
- A 30 select and apply appropriate tools and techniques in the production of a games computing deliverable;
- A 34 characterise approaches to database management;
- A 35 examine and assess network security and address the risks;
- A 99 evidence a deep level of knowledge and understanding within the specified domain of the projects completed;

and students following the Sandwich variant of the award will, in addition, be able to:

- A 45 characterise an organization and evaluate its performance.

3.2 Subject specific skills and attributes

On successful completion of the MComp Computer Science a student will be able to:

B 1 specify, design and construct computer-based systems;
B 2 evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem;
B 3 evaluate any risks inherent in the operation of computer-based systems;
B 4 deploy the tools used for the construction and documentation of computer-based applications;

B 5 work as a member of a development team, recognising the different roles within a team and different ways of organising teams;
B 7 solve a range of different problems using appropriate strategies;
B 9 select and apply tools and tehniques appropriate to a range of interaction situations;
B 10 apply models of systems structure, behaviour and purpose to organisational systems;
B 21 select and apply standard user-centred tools and techniques in the development and evaluation of software systems and artefacts;
B 29 engage appropriately in the production of a games computing deliverable;
B 33 implement a database system solution for a given business problem;
B 34 assess and formulate the development of network services;
B 99 analyse, assess and integrate appropriate theoretical frameworks with industrial practice;

and students following the Sandwich variant of the award will, in addition, be able to:

B 52 adopt a professional approach in fulfilling work tasks.

3.3 Transferable skills and attributes

On successful completion of the MComp Computer Science a student will be able to:

C 1 research problem domains using appropriate methods and techniques;
C 2 identify material from multiple published sources relevant to a chosen topic, and from it synthesise theories, principles or designs relevant to a practical, problem-solving project;

C 3 deliver a presentation using appropriate professional standards;
C 4 manage one's own learning and development including time management and organisational skills;
C 5 evaluate the need for continuing professional development and lifelong learning;
C 6 communicate succinctly to a range of audiences (orally or in writing) rational and reasoned arguments;
C 7 work effectively as a member of a team;
C 9 conduct research appropriate to masters level and report on findings with suitable depth and perception;

and students following the Sandwich variant of the award will, in addition, be able to:

C 8 adopt a professional approach in fulfilling work tasks.

Section 4: Learning, Teaching and Assessment Strategies

4.1 Learning and Teaching strategy

MComp Computer Science is a four-year integrated Masters degree, comprising study modules from the undergraduate portfolio and study and project work at M-Level. The teaching and learning strategy adopted within MComp Computer Science follows those of the BSc programme and its MSc programmes.

Students follow the same diet of modules as the equivalent BSc(Hons) programme up to the end of Level 3. At Level 4, they conduct a significant large-scale individual project, investigate postgraduate research techniques and take an M-Level optional study module.

In the early stages of MComp Computer Science emphasis is placed on managed approaches to knowledge acquisition and the development of core understanding. The primary delivery vehicles at this stage are lectures. Plenary workshop activities provide an opportunity for review of material and practical application. These devices attempt to establish important conceptual frameworks; they instill an appropriate value set and provide a map of the discipline and those aspects that will be key foci for further study. Workshops and practical exercises more usually support skill development curricula and learning materials are used extensively to facilitate individually paced skill acquisition and development.

As the study programme progresses through Level 2 into Level 3, project-based and student-led/tutor directed approaches are introduced to encourage the notion of learner independence and to promote application of developing competencies. The tendency at this stage is for more modules to challenge student assimilation, ability to apply and critique.

Learning in project based modules is typically negotiated between supervisor and student in an effort to establish scope and to specify assessment requirements.

At Level 4 students are expected to demonstrate a large degree of learner autonomy and critical reflection.

Programme briefing documents, study and assessment materials for the majority of modules are delivered across the university intranet as part of a responsive, locally managed, service. The School operates its own learning advisory and technical support service which provides open access, topic-based, workshops closely linked to curriculum need. It manages the hardware and software platforms used within the school and provides a sophisticated, multi-channel, end-user support service. The service operates on a user-support model in which key service parameters are derived from the user community and used to inform ongoing development of service and is thus an integral element of the computing learning support strategy.

The MComp Project, taken at Level four, gives students the opportunity to undertake a significant scale M-Level individual project, with strong elements of research and implementation. The MComp Project enables students to demonstrate their ability to build upon and exploit knowledge and skills gained in earlier stages of the programme. Furthermore it provides the opportunity for students to exhibit critical and original thinking based on a period of independent study and learning. Students will meet regularly with their supervisor throughout the project preparation period, and during the project period itself. The research project is evaluated primarily through a dissertation; guidance on selecting the project and writing the dissertation is provided during the Research Methods and Project Preparation study module.

4.2 Assessment strategy

A wide range of assessment vehicles and styles are deployed; the assessment mode for each module is chosen to appropriately respond to subject content and learning outcomes and also to acknowledge the maturity and sophistication of the candidate group.

Throughout the programme, but particularly at the early stages of Level 1, students are introduced to formative in-class testing as a means of both self-assessment and rehearsal of assessment technique.

Examinations as tests of knowledge and understanding are deployed where appropriate. The curriculum also includes instances of multiple-choice, open book, closed book and practical/research-based time constrained assessment.

In-course assessment techniques are equally varied and are targeted at individuals and, where appropriate, group submissions. Coursework portfolios are widely used at Level 1 and in practical modules as a mechanism for managing breadth and complexity and as an instrument for providing ongoing feedback. At Level 3, students undertake a 45 CATS point combination of Project Preparation and Project activity that affords the opportunity for significant practical and research focused assessment. At Level 4, students are expected to increase signific ntly their focus on research. At this stage there are opportunities to work much more closely with the School's research centres and groups and with external clients. In particular they are expected throughout to connect theory to practice, to analyse and critique both established and leading-edge thought, and to carry out their studies in industrial and profession contexts.

Appendix II - Assessment Map gives a top-level indication of the scheduling and distribution of assessment modes within the programme. Details of module assessment strategy are included with each module specification.

Section 5: Programme Structure

The MComp Computer Science adopts the University's standard model for a 360 credit points, three-year undergraduate programme. Each Level must consist of 120 credit points.

Table 1 Programme structure

Level 1 (Certificate)	Software Development	Information Systems	Computer Systems	Maths for Computing
		Problem Solving	Operating Systems	Data Structures
Level 2 (Intermediate)	Group Project	Human Computer Interaction	Advanced Software Development	Database Systems
		Artificial Intelligence		Networks and Networks Systems
	Optional Sandwich Placement Year			
Level 3 (Honours)	Project Preparation	Professional Practice	Software Engineering	Option
	Project			
Level M (Masters)	MComp Project	Research Methods (M)	Industrial Project (M)	Option (M)

Table 1 Programme structure illustrates the module composition of the MComp Computer Science.

For details of each module contributing to the programme, please consult the individual module specifications.

5.1. Option Modules

At Level 3 students can select options to the total value of 30 CATs from the following modules:

TITLE	CREDITRATING
Computer Vision and Robotics	30
Social Applications Development	30

At level 4 students select one 30 CATs point M-level option module. A student is not permitted to take the M-level version of a module if the 30 CATS point H-level equivalent has already been taken at Level 3.

TITLE	CREDITRATING
Business Intelligence (M)	30
Computer Vision and Robotics (M)	30
Entrepreneurship and Innovation (M)	30
Social Applications Development (M)	30

All pre-requisite requirements must be observed when selecting option modules.

For details of each of module contributing to the programme, please consult the individual module specifications.

Section 6: Regulatory Framework

The MComp Computer Science is operated under the policy and regulatory frameworks of the University of Lincoln. The latest versions of all regulations and policies can be found on the Secretariat area of the Portal.

6.1 Admissions

University Regulations (University of Lincoln, current edition)
Admissions Policy (University of Lincoln, current edition)
Accreditation of Prior Learning Policy (University of Lincoln, current edition)

6.2 Assessment

MComp Progression Regulations (University of Lincoln, current edition)

6.3 Progression

Undergraduate Progression Regulations (University of Lincoln, current edition)

6.4 Placement

Placement Policy (University of Lincoln, current edition)

Students of MComp Computer Science may opt for a placement year between levels two and three as a supported variant of the programme. Placements are conducted under the regulatory framework of the University of Lincoln; details are provided in the corresponding placement handbook.

6.5 Study abroad

International Cooperation Policy (University of Lincoln, current edition)

6.6 Student support and guidance

Student Support and Tutoring Policy (University of Lincoln, current edition)

6.7 Off-campus delivery

Academic Partnerships Policy (University of Lincoln, current edition)

6.8 Ethical Issues

Ethical Guidelines (University of Lincoln, current edition)

6.9 Equal Opportunities

Equality and Diversity Policy (University of Lincoln, current edition)

Appendix I - Curriculum Map This table indicates which study modules assume responsibility for delivering and assessing (unshaded tick) or just delivering (shaded tick) particular programme learning outcomes concerned with Knowledge and Understanding.

	A1	A10	A12	A2	A21	A24	A25	A3	A30	A34	A35	A4	A5	A61
CORE: Advanced Software Development			✓									✓		
CORE: Artificial Intelligence				✓			✓	✓				✓		
CORE: Computer Systems	✓			✓								✓		
CORE: Data Structures	✓													
CORE: Database Systems								✓		✓				
CORE: Group Project	✓			✓				✓	✓			✓		
CORE: Human-Computer Interaction					✓									
CORE: Industrial Project (M)														
CORE: Information Systems		✓												
CORE: Maths for Computing			✓											
CORE: MComp Project														
CORE: Networks and Network Systems											✓			
CORE: Operating Systems								✓						
CORE: Problem Solving														
CORE: Professional Practice													✓	
CORE: Project				✓				✓				✓	✓	
CORE: Project Preparation				✓				✓				✓	✓	
CORE: Research Methods														
CORE: Software Development	✓		✓									✓		
CORE: Software Engineering			✓											
OPTION: Business Intelligence (M)				✓										✓
OPTION: Computer Vision and Robotics				✓				✓				✓		
OPTION: Computer Vision and Robotics (M)				✓				✓				✓		
OPTION: Entrepreneurship and Innovation (M)						✓								
OPTION: Social Applications Development				✓										
OPTION: Social Applications Development (M)				✓										

This table indicates which study modules assume responsibility for delivering and assessing (unshaded tick) or just delivering (shaded tick) particular programme learning outcomes concerned with subject specific skills and attributes, and transferable skills and attributes.

	B1	B10	B2	B21	B24	B29	B3	B33	B34	B4	B5	B61	B
CORE: Advanced Software Development				✓									
CORE: Artificial Intelligence	✓		✓							✓			
CORE: Computer Systems	✓		✓										
CORE: Data Structures	✓												
CORE: Database Systems	✓							✓					
CORE: Group Project	✓		✓			✓	✓			✓	✓		
CORE: Human-Computer Interaction				✓									
CORE: Industrial Project (M)													
CORE: Information Systems		✓											
CORE: Maths for Computing													
CORE: MComp Project													
CORE: Networks and Network Systems									✓				
CORE: Operating Systems													
CORE: Problem Solving													✓
CORE: Professional Practice													
CORE: Project	✓		✓				✓			✓			
CORE: Project Preparation	✓		✓				✓			✓			
CORE: Research Methods													
CORE: Software Development	✓												
CORE: Software Engineering				✓									
OPTION: Business Intelligence (M)			✓				✓					✓	
OPTION: Computer Vision and Robotics	✓		✓							✓			
OPTION: Computer Vision and Robotics (M)	✓		✓							✓			
OPTION: Entrepreneurship and Innovation (M)					✓								
OPTION: Social Applications Development (M)													

Appendix II - Assessment Map

This table indicates the modality of module assessment within MComp Computer Science. Percentages indicate assessment weighting. Where assessment is group based, the entry is shaded.

Level 1

MODULE		A02-A11	A08	A12	B01	B05	B10	B11-B12	B12	Exam Period
Computer Systems	CORE	40		60						
Data Structures	CORE								100	
Information Systems	CORE			100						
Maths for Computing	CORE		30	70						
Operating Systems	CORE					20	20			60
Problem Solving	CORE							75	25	
Software Development	CORE				30				70	

Level 2

MODULE		A08	A12	B01	B02-B10	B04-B12	B12	Exam Period
Advanced Software Development	CORE			50			50	
Artificial Intelligence	CORE				50			50
Database Systems	CORE		100					
Group Project	CORE	10		30			60	
Human-Computer Interaction	CORE	50	50					
Networks and Network Systems	CORE					30		70

Appendix II - Assessment Map (continued)

This table indicates the modality of module assessment within MComp Computer Science. Percentages indicate assessment weighting. Where assessment is group based, the entry is shaded.

Level 3

MODULE		A02-A10	A07	A11	A12	B02-B10	B05	B06	B11	Exam Period
Computer Vision and Robotics	OPTION	30				30				40
Professional Practice	CORE				30					70
Project	CORE								100	
Project Preparation	CORE		100							
Social Applications Development	OPTION						50			50
Software Engineering	CORE			15				35		50

Level 4

MODULE		A02-A10	A07	A08	A11	A12	B02	B02-B10	B05	B11	B12	Exam Period
Business Intelligence (M)	OPTION						40				20	40
Computer Vision and Robotics (M)	OPTION	20						20			20	40
Entrepreneurship and Innovation (M)	OPTION				15					65	20	
Industrial Project (M)	CORE		25			25					50	
MComp Project	CORE										100	
Research Methods	CORE			25							75	
Social Applications Development (M)	OPTION								40		20	40

Appendix III - Benchmarking Analysis

This table summarises the key features of MComp Computer Science, with the particular aim of demonstrating the mapping between programme learning outcomes and the QAA benchmark statement for the subject of Computing .

		1	2	3	5	6
A	1	✓		✓		✓
A	2	✓		✓		
A	3	✓		✓		
A	4	✓		✓		✓
A	5	✓		✓	✓	
A	21	✓				✓
A	25	✓				
A	30		✓	✓		

		2	3	4	5	6
B	1		✓			✓
B	2		✓			
B	3		✓			
B	4	✓	✓			
B	5			✓	✓	
B	21	✓				✓
B	29	✓	✓			
B	33	✓				✓
C	1			✓		
C	2			✓		
C	3			✓		
C	4			✓		
C	5			✓	✓	
C	6			✓		
C	7			✓	✓	

Appendix III - Benchmarking Analysis (continued)

MComp Threshold Performance - based on QAA Subject Benchmark for BSc(Hons) modal performance

- demonstrate a sound understanding of the main areas of the body of knowledge within their programme of study, with an ability to exercise critical judgement across a range of issues;
- critically analyse and apply a range of concepts, principles and practice of the subject in an appropriate manner in the context of loosely defined scenarios, showing effective judgement in the selection and use of tools and techniques;
- produce work involving problem identification, the analysis, the design or the development of a system, with accompanying documentation, recognising the important relationships between these. The work will show problem-solving and evaluation skills, draw upon supporting evidence and demonstrate a good understanding of the need for quality;
- demonstrate transferable skills with an ability to show organised work as an individual and as a team member and with minimum guidance;
- apply appropriate practices within a professional, legal and ethical framework and identify mechanisms for continuing professional development and lifelong learning;
- explain a wide range of applications based upon the body of knowledge.