

**School of Computing and Mathematics**

**Masters, Postgraduate Diploma, Postgraduate Certificate in Advanced Computer Science**

**Programme Specification**

Information for students: the programme specification is the definitive document summarising the structure and content of your degree programme. It is reviewed and updated every year as part of Keele’s Curriculum Annual Review and Development process. The document aims to clarify to potential and current students what you can expect from the study of the subject over the course of your programme.

<b>Names of programme(s):</b>	Masters, Postgraduate Diploma, Postgraduate Certificate in Advanced Computer Science
<b>Mode of study:</b>	Full time / part time
<b>Framework of Higher Education Qualification (FHEQ) level of final award:</b>	FHEQ Level 7
<b>Duration:</b>	One year full time / two years part time

Details of professional, statutory and regulatory body: British Computer Society

<http://www.keele.ac.uk/qa/professionalstatutoryregulatorybodies/>

External Examiner(s): To Be Confirmed

<http://www.keele.ac.uk/qa/externalexaminers/>

**1. What is the philosophy of the Programme?**

The course is aimed at developing an advanced knowledge of underlying principles and concepts of Internet technologies, web based applications and Internet enabled enterprise systems. The course will also develop and extend the practical skills that are necessary for the designing, building, deployment and evaluation of distributed information systems and enterprise applications over the Internet.

Graduates from this programme should be able to undertake both development and management roles. The course recognises the wide variety of potential destinations for students after completion of their course and as such uses compulsory modules to deliver key skills and enable students to obtain the required knowledge.

The aims of the programme are:

- to deliver to the students knowledge which allows them to fully participate in the development of

modern Internet and Web based systems and to apply an approach to the management and control of such activities;

- provide students with the research and scholarship skills to undertake independent research and to develop software applications;
- to develop critical, analytical and problem based learning skills;
- to develop student – centred independent active learning;
- to develop student’s communication, numeracy, time management, self-management and professional development skills;
- to develop skills for team working needed in the creation of modern systems.

Engagement with this programme will enable you to further develop your intellectual, personal and professional capabilities. At Keele, we call these our ten Graduate Attributes and they include independent thinking, synthesizing information, creative problem solving, communicating clearly, and appreciating the social, environmental and global implications of your studies and activities. Whilst you will undoubtedly have already developed these skills and abilities to varying degrees, such existing capabilities can always be deepened and enriched. Our educational programme and learning environment is designed to help you to develop further as a well-rounded postgraduate who is capable of making a positive and valued contribution in a complex and rapidly changing world, whichever spheres of life you engage in during and after your studies at Keele.

Further information about how you can achieve the Keele Graduate Attributes can be found at:

<http://www.keele.ac.uk/distinctive/keelegraduateattributes/>

## **2. How is the Programme taught?**

You will use a variety of learning tools in studying for this course. The principle method for you to acquire knowledge is the use of formal lectures. These are supplemented by smaller group tutorials and practical sessions dependent on the topics being covered in the module. Self-study using material provided and that which you research for yourself will supplement the formal learning opportunities.

Formal lectures and self-study materials are used to introduce concepts to the student. The smaller group tutorials and practicals enable both consolidation of this material and an understanding of the practicalities of its application in a modern business environment. The tutorials and practicals achieve this aim by having the students apply the taught concepts to real world problems in a situation where individual progress can be monitored.

The Computer Science academic staff comprises three Professors, three Senior Lecturers, five Lecturers and five Teaching Fellows. More information about the Computer Science staff is available at

<http://www.keele.ac.uk/scm/staff/>

All first semester 15 – credit taught modules, with the exception of one module delivered over two semesters, will be delivered in block mode, i.e. each of these modules will be delivered over a period of six consecutive weeks. In any week at most two block mode modules will be scheduled to be delivered during the first semester. All taught modules in the second semester are delivered along the whole semester.

### 3. What is the Structure of the Programme?

An outline of the structure of the MSc Advanced Computer Science Programme is given in the tables below.

LEVEL 7			
Semester	Compulsory Modules		Credits
1	CSC-40043	User Interaction Design	15
1	CSC-40045	Distributed Intelligent Systems	15
1	CSC-40054	Data Analytics and Databases	15
2	CSC-40039	Cloud Computing	15
2	CSC-40031	Web Technologies and Security	15
2	CSC-40038	Collaborative Application Development	15
2	CSC-40050	Research and Consultancy Skills	15
	<b>Optional Modules</b>		
1	CSC-40044	System Design & Programming	15
1	CSC-40041	Research Horizons	15
3	CSC-40040	MSc Project	60
3	CSC-40035	Industrial Placement	60
	<p><b>Optional Modules:</b> Students must choose one of the two optional modules. Students who did not study computer science prior to their enrolment onto this programme must choose the System Design &amp; Programming module.</p> <p><b>MSc Project or Industrial Placement:</b> Students either do a project or an industrial placement. Students wishing to do an industrial placement will have to apply for this and satisfy the selection criteria of the relevant industrial placement.</p>		

The programme learning outcomes match the abilities specified in the QAA 2011 Subject Benchmark Statement for Master's degrees in Computing described under three headings below. These headings are: Subject knowledge and understanding, Subject-specific skills, and Generic (transferable) skills.

#### *Subject knowledge and understanding*

LO 1.1 An ability to evaluate the technical, societal and management dimensions of computer systems.

LO 1.2 A knowledge and understanding of advanced aspects of computer systems and their use.

LO 1.3 A combination of theory and practice, with practice being guided by theoretical considerations.

LO 1.4 A strong emphasis on the underlying discipline and/or applications.

LO 1.5 The mastery of the practical methodology of the relevant area of computing, whether for general application in software development or in specialised applications relating to the storing, processing and communication of information.

LO 1.6 An understanding of, and attention to, the many and varied aspects of quality.

LO 1.7 An understanding of professional, legal, social, cultural and ethical issues related to computing and an awareness of societal and environmental impact.

#### *Subject-specific skills*

LO 2.1 An ability to engage in a peer review process that involves the critical review of papers, software and proposals, coupled with positive advice for improvement and innovation.

LO 2.2 The ability to assess systems (which may include software, devices, people, and so on), to recognise the individual components and to understand their interaction, to improve systems, to replace them and to create them; this includes socio-technical systems such as those relevant to aspects of healthcare and also computing systems used in specialised applications such as bioinformatics, e-science, virtual environments, financial services, and transport.

LO 2.3 Familiarity with codes of ethics and codes of practice specific to the specialism of the degree programme, relevant industrial standards and principles underpinning the development of high integrity systems (for safety, security, trust, privacy, and so on), while keeping in focus the benefits of, approaches to and opportunities offered by innovation.

LO 2.4 Entrepreneurship, which tends to involve acquiring resources to ensure the success of some technically sound endeavour.

LO 2.5 Communication skills to address effectively technical and non-technical audiences.

#### *Generic (transferable) skills*

LO 3.1 Ability to set goals and identify resources for the purpose of learning.

LO 3.2 An ability to critically review the literature, which includes identifying all of the key developments in a particular area of study, critically analysing them and identifying limitations and avenues for further development or explanation.

LO 3.3 An ability to recognise and respond to opportunities for innovation.

LO 3.4 Leadership skills, which tend to be characterised by acquiring a vision (based on sound technical insights) coupled with the ability to encourage others to share in that vision and to ensure that this will not be to their detriment.

The tables below set out the modules that fulfil the learning outcomes for the programme and the forms of assessment used to demonstrate achievement of the learning outcomes.

<b>Learning Outcome</b>	<b>Module in which this is delivered</b>	<b>Principal forms of assessment (of the Learning Outcome) used</b>
LO 1.1 An ability to evaluate the technical, societal and management dimensions of computer systems.	All modules	Coursework, Examination, Dissertation
LO 1.2 A knowledge and understanding of advanced aspects of computer systems and their use.	Research Horizons; User Interaction Design; Distributed Intelligent Systems; Data Analytics and Databases; Cloud Computing; Web Technologies and Security; MSc Project or Industrial Placement	Coursework, Examination, Dissertation
LO 1.3 A combination of theory and practice, with practice being guided by theoretical considerations.	User Interaction Design; Distributed Intelligent Systems; Data Analytics and Databases; Cloud Computing; Web Technologies and Security; MSc Project or Industrial Placement	Coursework, Examination, Dissertation
LO 1.4 A strong emphasis on the underlying discipline and/or applications.	User Interaction Design; Distributed Intelligent Systems; Data Analytics and Databases; Cloud Computing; Web Technologies and Security; MSc Project or Industrial Placement	Coursework, Examination, Dissertation
LO 1.5 The mastery of the practical methodology of the relevant area of computing, whether for general application in software development or in specialised applications relating to the storing, processing and communication of information.	User Interaction Design; Distributed Intelligent Systems; Data Analytics and Databases; Cloud Computing; Web Technologies and Security; Collaborative Application Development; MSc Project or Industrial Placement	Coursework, Examination, Dissertation
LO 1.6 An understanding of, and attention to, the many and varied aspects of quality.	All modules	Coursework, Examination, Dissertation
LO 1.7 An understanding of professional, legal, social, cultural and ethical issues related to computing and an awareness of societal and environmental impact.	MSc Project or Industrial Placement; Collaborative Application Development; Research and Consultancy Skills	Coursework and Dissertation

LO 2.1 An ability to engage in a peer review process that involves the critical review of papers, software and proposals, coupled with positive advice for improvement and innovation.	MSc Project or Industrial Placement; Collaborative Application Development; Research and Consultancy Skills; Research Horizons	Coursework and Dissertation
LO 2.2 The ability to assess systems (which may include software, devices, people, and so on), to recognise the individual components and to understand their interaction, to improve systems, to replace them and to create them; this includes socio-technical systems such as those relevant to aspects of healthcare and also computing systems used in specialised applications such as bioinformatics, e-science, virtual environments, financial services, and transport.	All modules	Coursework, Examination, Dissertation
LO 2.3 Familiarity with codes of ethics and codes of practice specific to the specialism of the degree programme, relevant industrial standards and principles underpinning the development of high integrity systems (for safety, security, trust, privacy, and so on), while keeping in focus the benefits of, approaches to and opportunities offered by innovation.	All modules	Coursework, Examination, Dissertation
LO 2.4 Entrepreneurship, which tends to involve acquiring resources to ensure the success of some technically sound endeavour.	Collaborative Application Development; Research and Consultancy Skills	Coursework
LO 2.5 Communication skills to address effectively technical and non-technical audiences.	All modules	Coursework, Examination, Dissertation
LO 3.1 Ability to set goals and identify resources for the purpose of learning.	MSc Project or Industrial Placement; Collaborative Application Development; Research and Consultancy Skills; Research Horizons	Coursework and Dissertation

LO 3.2 An ability to critically review the literature, which includes identifying all of the key developments in a particular area of study, critically analysing them and identifying limitations and avenues for further development or explanation.	MSc Project or Industrial Placement; Collaborative Application Development; Research and Consultancy Skills; Research Horizons	Coursework and Dissertation
LO 3.3 An ability to recognise and respond to opportunities for innovation.	All modules	Coursework, Examination, Dissertation
LO 3.4 Leadership skills, which tend to be characterised by acquiring a vision (based on sound technical insights) coupled with the ability to encourage others to share in that vision and to ensure that this will not be to their detriment.	MSc Project or Industrial Placement; Collaborative Application Development; Research and Consultancy Skills	Coursework and Dissertation

### Levels of Award

There are three levels of award from the programme, these are:

- **Postgraduate certificate.** To be awarded a Postgraduate certificate a student normally requires a total of at least 60 credits to be accumulated during their year of study.
- **Postgraduate Diploma.** To be awarded a Postgraduate Diploma a student normally requires a total of at least 120 credits to be accumulated during their year of study.
- **MSc Degree.** To be awarded a MSc Degree a student requires a total of at least 180 credits to be accumulated during their year of study. In addition the award of the MSc Degree may be at merit or distinction level based on the marks achieved.

### 4. How is the Programme assessed?

The function of the assessments listed in the tables above is to test students' achievement of the learning outcomes of the MSc Advanced Computer Science Programme. Assessments take one of the following forms.

- **Unseen examinations:** test a student's knowledge and understanding of computer science topics. Such examinations are of two hours in length and contain compulsory and possibly also optional questions. Virtually all taught compulsory modules in Semester 1 have unseen examinations as part of the assessment profile.
- **Class tests:** these are taken during the course of a module, usually in a lecture slot. They are intended to assess a student's current understanding and subject knowledge in that module in a structured and focused manner. Some taught compulsory modules may have class tests as part of the

assessment profile.

- **Coursework:** normally consists of regular short assignments designed to assess, in more depth than class tests, a student's knowledge and understanding of the course material. . Some of these assignments may be computer based; others take the form of individual reports, essays or group projects. Virtually all taught optional modules in Semester 1 and all taught compulsory modules in Semester 2 are assessed exclusively through coursework.
- **Short reports:** for which students are required to write up their own account of small group studies and discussions on particular topics.
- **Tutorial Participation,** whereby students may be asked to make contributions based on the subject material, either orally or as a written solution, sometimes in consultation with their peers.
- **Dissertations** are formal reports of work carried out by students undertaking a project. Projects involve the integration and application of theoretical knowledge and problem-solving skills to an identified programming need and/or research problem within the discipline. Dissertations describe product and process in extended detail.
- **Oral presentations and reports** assess a student's ability to communicate their knowledge and understanding, both visually and orally, to both general and academic audiences.

Marks are awarded for all summative assessments designed to assess the student's achievement of learning outcomes. Students are also assessed formatively (no marks awarded) to enable them to monitor their own progress and reflect on their learning. Formative assessment encourages students to take ownership of their learning and simultaneously provides academic staff with information enabling them to identify any specific learning needs.

Feedback is also provided on regular summative assessments throughout the Programme.

## **5. What are the typical admission requirements for the programme?**

The typical admission requirement is a Second Class Honours or higher degree (overseas equivalent accepted) from an undergraduate or postgraduate programme of a university recognized as such by Keele University. Alternatively the applicant should have completed an approved pre-masters course. The candidate must demonstrate a level of English language capability in reading, speaking and writing in one of the following ways:

- have achieved IELTS 6.5 or higher;
- have successfully undertaken a previous degree level programme taught entirely in English;
- have successfully completed an approved pre-masters course;
- have successfully completed an approved pre-sessional English course of the designated level.

We will also consider relevant industrial experience for students who do not reach the required degree level and who are not suitable for a pre-masters course.

## **6. How are students supported on the programme?**

- Support for student learning and welfare is provided in a number of ways.

- Module leaders and demonstrators are responsible for providing learning support on the individual modules. They also give feedback on all summative and formative assessment, from individual feedback on coursework to more general feedback on examinations.
- The members of academic staff in Computer Science operate an open-door policy whereby lecturers and tutors are happy to see and advise students at any reasonable time or by mutually convenient appointment.
- Every student enrolled on the Programme will be allocated a Personal Tutor who is responsible for reviewing and advising on the student's academic progress throughout their time on the Programme. Students should approach their personal Tutor, in the first instance, if they are experiencing issues with any part of the Programme.
- Personal Tutors also act as a first point of contact on any non-academic issues that may be affecting their learning and can also refer students to a range of specialist health, welfare and financial services coordinated by the Student and Support Development Services.
- There is an Independent Support Tutor who is independent of the lecturing team delivering the modules for the Programme and available to all students on the Programme. The role of the Independent Support is to provide general support for students, though they will deal specifically with attendance monitoring and the extenuating circumstances procedure.

## **7. Learning Resources**

- There is a specialist teaching laboratory and associated workroom with equivalent configuration of machines, both of which are reserved for access by those studying postgraduate taught courses in the School. All the systems available have software appropriate to the modules included in this course, in addition to those provided as standard by the University.
- The relevant Course Handbook will provide you with key information and guidance on structure, content and assessment.
- You may contact the Course Director and the MSc Administrator, or their substitutes, via e-mail at all times on weekdays and you may expect a response to your communications within 3 working days.
- You will have access to the Course Director and tutors by appointment.
- You will have access to material in the courses' on-line learning resources.
- You will have access to Keele's Library Information Services on campus and via the Internet.

## **8. Continuing Professional Development (CPD)**

The modules on this course are available for CPD.

## **9. Quality management and enhancement**

The Postgraduate Programme Director (Computing) is responsible for the overall direction of learning and teaching on the MSc Advanced Computer Science Programme, supported by the Postgraduate Programme Committee (Computing) which comprises all members of the academic staff. The Postgraduate Programme Committee (Computing) reports directly to the School Learning and Teaching Committee (SLTC).

The quality and standards of learning and teaching in computer science are subject to a number of continuous monitoring and review processes.

- The SLTC is responsible for reviewing and monitoring the quality management, and enhancement procedures and activities, across the School.
- Individual modules, and the MSc Advanced Computer Science Programme as a whole, are reviewed and enhanced on an annual basis by module leaders and the Postgraduate Programme Committee (Computing) as part of the Curriculum Annual Review and Development (CARD) process.
- The School operates a process of peer observation of teaching, whereby members of academic staff critically evaluate the teaching of one another.
- Continuous Professional Development is available to all staff.
- The Programme is run in accordance with the standards set out in the University's relevant guidelines (see <http://www.keele.ac.uk/qa/>) and is subject to an internal quality audit every five years.

The evaluation of, and feedback on, the quality of learning and teaching in computer science by the students takes place in a number of ways.

- All modules are regularly evaluated by way of student completed questionnaires which are then reviewed by the Programme Director as part of the CARD process. A summary of findings is reported to the Postgraduate Programme Committee (Computing) and the SLTC.
- Findings relating to the Programme from the bi-annual Postgraduate Taught Experience Survey (PTES) and from surveys on the student experience conducted by the University are subjected to careful analysis and a planned response at Programme and School level.
- A student representative from the Programme sits on the Staff Student Liaison Committee (SSLC) and serves as a conduit of opinion and feedback from the student body to the academic staff. This feedback is then considered and, where appropriate, acted upon at the Postgraduate Programme Committee (Computing) meetings.

In addition to the above, the quality and standards of teaching are regularly discussed and monitored by the Postgraduate Programme Committee (Computing) and by the SLTC.

A senior member of academic staff from another university is appointed by Keele University's Senate to act as external examiner on the Programme. The external examiner is responsible for:

- approving examination questions;
- confirming all marks that contribute to a student's degree classification;
- reviewing and giving advice on the structure and content of the Programme and the associated assessment procedures.

All examination scripts are made available to the external examiners in accordance with the external examiners code of practice (<http://www.keele.ac.uk/qa/externalexaminers/>). External examiners also see a sample of student coursework.

The name of the current external examiner is given at the beginning of this document together with a link to

past external examiners reports and the responses.

## 10. The principles of programme design

The MSc Advanced Computer Science Programme described in this document has been drawn up with reference to, and in accordance with the guidance set out in, the following documents:

*UK Quality Code for Higher Education*, Quality Assurance Agency for Higher Education, 2018.

<https://www.qaa.ac.uk/quality-code>

*Higher Education Framework for England*, Quality Assurance Agency, 2021. <https://www.qaa.ac.uk/quality-code/higher-education-credit-framework-for-england>

*Accreditation criteria*, British Computer Society, 2010. <https://www.bcs.org/deliver-and-teach-qualifications/university-accreditation/>, <https://www.bcs.org/media/1209/accreditation-guidelines.pdf>

*Subject Benchmark Statement for Master's Degrees in Computing*, Quality Assurance Agency for Higher Education, 2019. <https://www.qaa.ac.uk/docs/qaa/subject-benchmark-statements/subject-benchmark-statement-computing-%28masters%29.pdf>

## 11. Programme Version History

Version History	Date	CHANGES / NOTES
Date first created (if known)	11 <sup>th</sup> August 2014	
Date last reviewed / revised	22 <sup>nd</sup> September 2015	Addition of module codes and separation of project and placement modules.
Date last reviewed / revised	20 <sup>th</sup> February 2017	Replaced CSC-40037 Problem Solving Skills for Consultants with replacement module CSC-40050 Research and Consultancy Skills
Date last reviewed / revised	5 <sup>th</sup> August 2021	CSC-40042 (Statistical Techniques for Data Analytics) replaced by CSC-40054 (Data Analytics and Databases)
Last reviewed by	Dr Ed de Quincey	
Date last approved at SEC		
Date last approved at FEC	17 <sup>th</sup> March 2017	