PROGRAMME SPECIFICATION

for the award of

BSc (Hons) Computer Science

Managed by the Faculty of Technology, Design and Environment

delivered by School of Engineering, Computing and Mathematics

Date approved:	Date approval confirmed, on recommendation of University validation panel or other authorised body.
Applies to students commencing study in:	September 2018

RECORD OF UPDATES

Date amended*	Nature of amendment**	Reason for amendment**
January 2018	**Change to module offering**	**To better focus the module offering and better align the programme with market expectations.**
July 2016	**Transferred to new template, update graduate attribute from global to active citizenship, Ordinary degree requirements.**	**CMA Compliance, Update to graduate attribute**
October 2016	**Checked for errors and amended by Subject Coordinator and Programme Lead.**	**Subject specialist knowledge.**
July 2017	**Amends to U08007 and addition of U08004**	**Major and minor changes**

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SECTION 1: GENERAL INFORMATION

Awarding body:	Oxford Brookes University
Teaching institution and location:	Oxford Brookes University, Wheatley Campus
Language of study:	English
Final award:	BSc (Hons)
Programme title:	Computer Science
Interim exit awards and award titles available:	CertHE, DipHE, BSc
Brookes course code:	SQ
UCAS code:	G403 BSc/SQ
JACS code:	I100
HECoS code:	100366
Mode of delivery:	Full-time (face to face/on-campus) Part-time (face to face/on-campus)
Mode/s and duration of study:	Full-Time 3 years Part Time 6 years Sandwich Mode (Full-Time) (placement in year 3) 4 years Sandwich Mode (Part-Time) (placement in year 3) 7 years In all cases the maximum length of registration is 8 years
QAA subject benchmark statement/s which apply to the programme:	Computing (2016) http://www.qaa.ac.uk/en/Publications/Documents/SBS-Computing-16.pdf
Professional accreditation attached to the programme:	BCS www.bcs.org CITP and CEng(partial fulfilment)
University Regulations:	The programme conforms to the University Regulations for the year of entry as published/archived at: http://www.brookes.ac.uk/regulations/

SECTION 2: WHY STUDY THIS PROGRAMME?

Computer Science is a fast paced and exciting discipline that thrives on innovation and has the potential to change the world. Computer scientists developed the world wide web twenty years ago and nothing has been the same since. Two decades later we are still coming to terms with its potential; recent developments include social media, smartphones and tablet computers. To be an effective practitioner in this area requires the ability to stay up to date with rapidly changing technologies and the competence to apply these technologies effectively. Studying Computer Science equips students with the professional skills, techniques and ways of thinking needed to be able to pursue a successful career. It also underpins this with the theoretical concepts necessary to give the solid conceptual foundations on which to build a lifetime of learning.

The design of our programmes is informed by state of the art research being undertaken in the department. For example, Prof. Hong Zhu and Dr Ian Bayley, are internationally renowned academics, outstanding in the fields of design patterns, requirements engineering and software testing. Students on our programmes have access to highly specialised computer laboratories where they learn the practical application of cutting edge theoretical skills and techniques.

Students completing the programme will have learned the fundamental principles of computer science such as the theoretical underpinnings of programming and been given numerous opportunities to apply these principles in relevant social and business contexts. The theoretical components will have been examined and the coursework will have given the students the opportunity to demonstrate competence in the practical application of the theoretical principles taught. The final year project will have provided an opportunity to put into practice the range of theory and practical skills that have been acquired by the creation of a substantial software artefact.

Please refer to the following link to view the staff profiles within the School of Engineering, Computing and Mathematics

https://www.brookes.ac.uk/ecm/about/staff/

SECTION 3: PROGRAMME LEARNING OUTCOMES

On successful completion of the programme, graduates will demonstrate the following Brookes Attributes:

3.1 ACADEMIC LITERACY

A1	Contribute to the creation of new software artefacts by applying the key concepts and ways of working derived from a deep understanding of the fundamental principles of Software Engineering as informed by an operational context.
A2	Incorporate risk management and an understanding of information security issues in the design, development, maintenance and use of information systems.
A3	Apply formal methods, finite state machines and other theoretical aspects of computer science to the analysis, construction and evaluation of software artefacts
A4	Create abstractions from observed patterns encountered across the whole spectrum of real world problem domains to facilitate the analysis and synthesis of relevant solutions

3.2 RESEARCH LITERACY

B1	Apply the scientific method and report findings using accepted formalisms.
B2	Identify and utilise trustworthy information sources, such as the ACM Digital Library to develop a coherent understanding of issues in the domain.
B3	Apply appropriate empirical methods, such as software metrics, to study the creation and use of software systems.

3.3 CRITICAL SELF-AWARENESS AND PERSONAL LITERACY

C1	Evaluate and reflect on the evolution of their strengths and weaknesses across the range of subject based competences involved in their chosen domain through the creation and implementation of a discipline based personal development plan.
C2	Apply self-awareness in evaluating their impact in team based work and utilise appropriate communication and problem resolution strategies.

3.4 DIGITAL AND INFORMATION LITERACY

D1	Use appropriate technologies such as online libraries and databases to find, critically evaluate and utilise both non specialist (e.g. reports) and technical (e.g. APIs and RFCs) information
D2	Demonstrate proficiency in a range of formal and informal modes of communication such as giving presentations to groups, writing reports and writing software documentation.

3.5 ACTIVE CITIZENSHIP

E1	Demonstrate an awareness of, and work in a manner guided by, the legal, professional, ethical and social issues relevant to the IT and telecommunications industry.
E2	Evaluate the impact of the development, use and maintenance of information systems in commercial, economic and social contexts in both national and international settings.

SECTION 4: CURRICULUM CONTENT & STRUCTURE

4.1 PROGRAMME STRUCTURE AND REQUIREMENTS:

Code	Module Title	Credits	Level	Status	Coursework: Exam ratio
U08007	Information Systems	15	4	Compulsory	100:00
U08008	Problem Solving and Programming	30	4	Compulsory	100:00
U08009	Object Oriented Programming	15	4	Compulsory	50:50
U08010	DevOps	15	4	Compulsory	100:00
U08011	Networking and Multimedia	15	4	Compulsory	30:70
U08013	Foundations of Computing Systems	15	4	Compulsory	100:00
U08606	Discrete Mathematics	15	4	Compulsory	50:50
U08049	Databases	15	5	Compulsory	50:50
U08025	Foundations of Computation	15	5	Compulsory	30:70
U08028	Software Development with C and C++	15	5	Compulsory	50:50
U08054	Web Application Development	15	5	Compulsory	50:50

U08056	Innovative Product Development	30	5	Compulsory	100:00
U08223	Data Structures	15	5	Compulsory	50:50
U08226	Foundations of Security	15	5	Compulsory	100:00
U08065	Work Experience Placement	0	5	Optional	100:00
U08868	Independent Study level 5	15	5	Optional	100:00
U08096	Project	30	6	Compulsory	100:00
U08173	Software Engineering	15	6	Compulsory	100:00
U08174	Cloud Computing and Internet of Things	15	6	Compulsory	100:00
U08175	Artificial Intelligence	15	6	Compulsory	100:00
U08171	Principles of Secure Operating Systems	15	6	Compulsory	50:50
U08186	Advanced Object Oriented Programming	15	6	Compulsory	50:50
U08085	Communicating and Teaching Computer Science	15	6	Optional	100:00
U08088	Independent Study level 6	15	6	Optional	100:00
U08089	Machine Learning	15	6	Optional	100:00
U08281	Game Development	15	6	Optional	50:50

4.2 PROGRESSION AND AWARD REQUIREMENTS

All awards must meet the usual university rules for undergraduate programmes. In addition to these the course and the possible interim exit awards have the following specific requirements.

For BSc (Hons): All compulsory modules and at least 1 level 5 alternative compulsory module and at least 1 level 6 alternative compulsory module must be passed.

For BSc Ordinary: All level 4 and level 5 compulsory modules must be passed. At least 60 level 6 credits must also be passed including at least one alternative compulsory module.

For Named DipHE: U08223 and U08226 must be passed.

For CertHE: All level 4 compulsory modules must be passed.

4.3 PROFESSIONAL REQUIREMENTS

Successful completion of the course meets the professional requirements.

SECTION 5: TEACHING AND ASSESSMENT

Formally scheduled teaching is generally in the form of lectures, tutorials, computer labs, robotics labs or apprentice mode sessions. Each 15 credit module has 150 learning hours associated with it, and of these, 36 (3 hrs x 12 weeks) are formally scheduled teaching. These figures are doubled for a double module, such as U08008. As students generally take 4 modules per semester, they are thus expected to attend 12 formally scheduled teaching hours per week.

The 3 contact hours per week on a module are broken down into either a 1 hour lecture and 2 hour practical session, or a 2 hour lecture and a 1 hour practical session, depending on the module. Lectures are attended by all the students on the module, and give students the opportunity to acquire knowledge and understanding of the key concepts in the subject. Practical sessions and tutorials are smaller groups of 1 tutor, with less than 20 students, and enable students to practice essential skills in a variety of contexts, as well as, build a wide set of experiences on which to reflect, and develop professional expertise. For more technical skills, including programming, the practical elements will be based around laboratory classes, allowing students to experiment with the technology in a controlled environment.

Some of our core programming modules are taught in an apprentice style. These use a different format which involves a 3 hour session where the time is made up of repeating a sequence of

- the lecturer giving a short presentation from slides,
- the lecturer working through examples where they use the technique or concept being taught
- the students carrying out exercises to practice the technique or concept for themselves with the lecturer providing help and feedback.

For programming, this style of teaching takes place mainly in computer labs with 1 tutor and less than 20 students but sometimes in a larger computer lab with 2 tutors and less than 35 students. For robotics, this style of teaching takes place in a robotics lab with 1 tutor and less than 20 students.

Outside of the 36 hours scheduled teaching, the remaining 114 hours associated with a module are split up roughly along the lines of a third of the module time being involved in directed work, or independent study, with the remainder used to prepare for assignments, background reading, research etc. The actual breakdown varies on a module by module basis.

In addition to formally scheduled teaching hours, all teaching staff provide 3 to 4 hours of “Office Hours”, which are times that they schedule each week for students to turn up without an appointment to get help and advice with their work when needed. Appointments can also be made if a student wants to see a tutor outside of their “Office Hours”, usually via email.

Coursework provides the majority of the assessment on this course in a ratio of approximately 80:20 coursework:exam though this can vary slightly depending on the optional modules chosen. It should be noted that timed computer based tests, such as ‘write a piece of software to solve this problem’, are regarded as coursework rather than exam, and these class tests take place on some of the programming related modules.

Several modules will include an element of team working, enabling students to collaborate with their peers, developing an awareness of their own abilities as reflected by feedback from others. Team work will also be used to assess the students’ acquisition of personal and inter-personal skills, so important for this degree, and equally important for most career paths in the industry.

Core modules provide a balance of assessments, appropriate to the learning outcomes of the programme. In particular, early core modules are assessed on the basis of key technical, professional and learning skills, most likely to enable and enhance a student’s aptitude for life-long learning. As students master core skills, the issues associated with quality products and processes will play an

increasingly important part of the module content. Assessment tasks will be specified in the context of the importance of quality assurance in the IT and telecommunications industry, and criteria for success in assessments will mirror those needed in the work place.

By paying due regard to the Oxford Brookes University Assessment Compact, the assessments on this programme have been designed to develop learning of technical skills, shaped by the underlying theory, and requirements of the industry. Assessment does not present students with a set of hurdles, but rather guides them through the staged acquisition of a complex set of professional skills, so that, by the time they graduate, they are ready to play an effective role in their chosen career. Feedback on the assessment tasks will be provided in a timely manner, emphasizing achievement of the learning outcomes of the modules and the programme. Students will be encouraged to relate the assessment tasks with professional activities, and to relate their achievements with professional standards. Where appropriate, self- and peer- assessment will be used to encourage students to involve themselves in their own professional development.

A year's industrial placement is an optional part of the programme and if chosen is taken in the third year of study before returning to Brookes for a final year to complete the degree.

The department is committed to inclusivity and diversity in its teaching. By the very nature of the discipline, virtually all of our teaching material is available in an accessible format and where possible we follow best practice guidelines and make our electronic material available before the lectures. We also use electronic references and ebooks to further enhance accessibility. Inclusivity and diversity is also embedded in what we teach. As such all new students have a lecture on inclusivity and diversity as part of their induction and important inclusivity and diversity topics such as the need for accessibility and internationalization and how to achieve them are taught on a variety of modules throughout the degree.

SECTION 6: ADMISSION TO THE PROGRAMME

6.1 ENTRY REQUIREMENTS

Prior qualifications necessary for entry to the programme, including English language requirements.

From 2017 entry, typical offers:

- A-LEVEL BBC or equivalent
- IB 30 points, preferably including a science
- BTEC DDM profile, preferably in a science subject
- UCAS 112 points

Points may be counted from qualifications equivalent to 3 A-levels only.

Please follow this link for details of the new UCAS Tariff: http://www.brookes.ac.uk/studying-at-brookes/how-to-apply/ucas-tariff---achieving-120-points/

Specific entry requirements

- GCSE: Mathematics at grade B minimum, and English Language at grade C minimum.

Students for whom English is not their main language also need to show that their English is at a high enough level to succeed in their studies. The minimum English language requirements are specified at http://www.brookes.ac.uk/international/apply/undergraduate/requirements. See also http://www.brookes.ac.uk/international/apply/english/.

SECTION 7: PREPARATION FOR EMPLOYMENT

Graduates from the programme will be ideally equipped for a career in the computing industry. Graduates are employed across a whole range of careers from development roles in small software houses, to the activities of IT departments in large, multinational corporations, to more specialist roles for

providers of IT and telecommunications services. These include technical roles, including software design and development, specialist product support, and infrastructure and security management roles.

According to research conducted by e-skills UK, the National Sector Skills Council for IT and Telecommunications, the IT professional workforce in the UK, has almost doubled since 1994, and is likely to continue growing at 5-8 times the average employment growth for the coming decade. Recent graduates from this programme have been employed by, for example, Sophos, Logica, Jaguar/Land Rover and IBM. Specific job titles include Software Developer, Threat Researcher, Project Manager, Business Analyst and Web Developer.

Many modules use guest speakers from industry to illustrate the practical application of the module material. U08049 Databases is managed by a full time academic but taught by two professional database developers..

All students may take a year out in industry. Employers are keen to promote their companies and the opportunities offered. Even for students who do not take a placement year, this can provide a good insight into the type of jobs available, and the skills employers are looking for. Students who do take a work placement may bring ideas for final year projects back with them, and are noticeably more able to contribute insights into industrial applications to the modules they take in their final year.

The department maintains close links with the university Careers Office. Themed ‘mini’ careers fairs are organised by this office – with technology being a common theme. Students are encouraged to use the facilities offered, including CV workshops, and practice interviews and assessment-centre activities.

An Industrial Advisory Board is run within the department, with senior employees of regional and representative organisations as members. The board is consulted on major initiatives within the department, including programme revalidations, possible research partnerships, future trends and directions, and the feasibility of new course offerings.

An alumni organisation has recently been formed in the department. The aim is to invite ex-students who are now in a variety of technical and managerial roles, to network with each other, and with our current students. It is anticipated that this organisation will be of great benefit to students starting out on their careers, as well as for more senior alumni looking to exploit the skills and expertise of the staff and students in the department.

Research centres within the department are actively involved with Knowledge Transfer Partnerships, and other links with employer organisations. For example, we have formed research links with Sony, Clearview Traffic, UKP World- wide, Nominet, WildKnowledge, Omnima and Engineer Arts Ltd. One of the spin-offs from these activities is the on-campus presence of industrial-based experts in fields closely related to our degree offerings.

Research within the department is strongly disseminated in the taught modules and students have been actively involved in research projects, via final year projects, live projects, and independent studies.