PROGRAMME SPECIFICATION

Part 1: Basic Data	
Awarding Institution	University of the West of England, Bristol
Teaching Institution	University of the West of England, Bristol
Delivery Location	Frenchay Campus, University of the West of England, Bristol;
Study abroad / Exchange / Credit recognition	
Faculty responsible for programme	Environment and Technology
Department responsible for programme	Computer Science and Creative Technologies
Modular Scheme Title	
Professional Statutory or Regulatory Body Links	Confirmation of accreditation for this integrated programme is being sought.
Highest Award Title	BSc(Hons) Computer Science
Default Award Title	
Fall-back Award Title	
Interim Award Titles	BSc Computer Science Dip HE Computer Science Cert HE Computer Science
UWE Progression Route	
Mode(s) of Delivery	Full time and Sandwich with Foundation year
Codes	**ISIS2: G500** G40H(SW) G40H13 (FT)
For implementation from	September 2018

Part 2: Educational Aims of the Programme

The BSc in Computer Science has the following general aims:

1. To prepare students both for entry into the computing profession, and for the more general challenges of professional and personal life.
2. To inculcate in students problem-solving and other transferable skills that will be valuable to them in any career.
3. To prepare students for progression to study for higher degrees in Computer Science.
4. To continue the development of those general study skills that will enable students to become independent, lifelong learners.

The BSc in Computer Science has the following specific aims:

1. To enable a student to obtain employment in any area of computer science, such as artificial intelligence, systems development, algorithm design, or networking.
2. To provide a coherent and broad based coverage of the theory of computer science and its application to practical problems.
3. To enable students to appreciate the problems that can arise in computer science and to provide them with the appropriate skills to select and apply appropriate methods and technologies to solve them.
4. To encourage students to uphold professional, ethical and social standards and to keep up to date with recent technological and theoretical developments.

Programme requirements for the purposes of the Higher Education Achievement Record (HEAR)

Graduates will be able to demonstrate knowledge and understanding of object-oriented programming language concepts; other programming paradigms; syntax and semantics; top-down development and programming to satisfy designs. They will also understand program design concepts, methods, and notations; object-oriented design and other design paradigms; algorithms and design patterns.

Graduates will have knowledge and understanding of databases including logical and physical database design and database query languages. They will also understand the concepts underpinning distributed systems and networks, World-Wide Web technology and web-based application development.

Computer Science graduates will also have gained knowledge and understanding of the architecture and main components of computers and a range of software development methods, e.g.: OOA, OOD, and OOP and structured methods. Further subjects studied include; discrete mathematics, propositional logic, and predicate logic, the commercial context of software development; formal systems: syntax, semantics and translation between formal systems; Artificial intelligence concepts, notations, and methods including declarative languages; Deduction, and neural nets. Graduates will also have an awareness of professional, ethical and social values. These graduates will be able to design algorithms using standard techniques; evaluate and compare algorithms with regard to domain problems; use mathematical techniques to analyse algorithm complexity and apply algorithms appropriately to real-world tasks. They will be able to think critically, analyse and synthesise different types of information. They will possess skills in evaluation, solving problems and balancing conflicting objectives. They will also have the ability to construct a logical argument and discuss and debate about technical subjects with peers.

During their degree, graduates will have learnt to write programs that conform to designs, build web-based systems and create high-level and low-level designs that correspond to stated requirements. They will be able to design, build, and deploy databases to meet application requirements, perform adequate tests on programs and elicit and express requirements for software systems. Graduates will have the ability to employ a range of tools and notations to support editors/compliers, design workbenches, HTML, CGI, Java, etc. Furthermore, graduates will be effective communicators with the ability to manage their own time, meet deadlines and work with others. They will have been encouraged to learn independently of structured class work, for example; to use online facilities to further self-study.

Part 2: Educational Aims of the Programme

Computer Science graduates will be able to use software tools in the context of application development and undertake analysis and interpretation of information in the context of the Computing discipline. They will possess the skills to express problems in appropriate notations, use literature sources appropriate to the discipline to support learning activities, and understand basic techniques for structuring and thereby accessing information.

Part 3: Learning Outcomes of the Programme

The focus of the foundation year (level 0) is on the acquisition both of appropriate academic skills and relevant subject knowledge to allow students to develop and progress through levels 1, 2 and 3 in relation to knowledge and understanding, cognitive, subject specific and study skills

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A Knowledge and understanding of

1. Object-oriented programming language concepts; other programming paradigms; syntax and semantics; programming to satisfy designs.
2. Program design concepts, methods, and notations; object-oriented design and other design paradigms; algorithms; design patterns.
3. Databases; logical and physical database design; database query languages.
4. The concepts underpinning distributed systems and networks.
5. The concepts underpinning World-Wide Web technology and web-based application development.
6. Design and analysis of a variety of classes of algorithms.
7. The architecture and main components of computers.
8. A range of software development lifecycle methods, e.g.: OOA, OOD, and OOP.
9. Discrete mathematics, propositional logic, and predicate logic.
10. Professional, ethical, legal and social issues
11. The commercial context of software development
12. Formal systems: syntax and semantics
13. Artificial intelligence concepts, notations, and methods: for example, agents, machine learning and evolutionary algorithms

B Intellectual Skills

1. Critical Thinking
2. Analysis
3. Synthesis of different types of information
4. Evaluation
5. Problem Solving
6. Appreciate problem contexts
7. Balance conflicting objectives
8. Construction of logical arguments
9. Discussion and debate about technical subjects with peers

C Subject, Professional and Practical Skills

1. Write programs that conform to designs
2. Create high-level and low-level designs that correspond to stated requirements
3. Design, build, and deploy databases to meet application requirements
4. Perform adequate tests on programs
5. Elicit and express requirements for software systems
6. Build web-based systems
7. Employ a range of tools and notations to support the activities listed here: e.g. editors, compilers, software development environments, HTML, CGI, Java, etc.
8. Design algorithms using standard techniques; evaluate and compare algorithms with regard to domain problems; use mathematical techniques to analyse algorithm complexity; apply algorithms appropriately to real-world tasks.

Part 3: Learning Outcomes of the Programme

D Transferable Skills and other attributes

1. Communication skills: to communicate orally or in writing.
2. Self-management skills: to manage one's own time; to meet deadlines; to work with others.
3. IT skills in context: to use software tools in the context of application development.
4. Logical reasoning skills: to undertake analysis and interpretation of information in the context of the computer science discipline.
5. Problem formulation: to express problems in appropriate notations.
6. Progression to independent learning: to gain experience of, and to develop skills in, learning independently of structured class work. For example, to develop the ability to use on-line facilities to further self-study.
7. Comprehension of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities.

Part 4: Student Learning and Student Support

Teaching and learning strategies to enable learning outcomes to be achieved and demonstrated

At UWE, Bristol there is a policy for a minimum average requirement of 12 hours/week contact time over the course of the full undergraduate programme. This contact time encompasses a range of face-to-face activities as described below. In addition, a range of other learning activities will be embedded within the programme which, together with the contact time, will enable learning outcomes to be achieved and demonstrated.

On the BSc (Hons) Computer Science programme, teaching is a mix of scheduled, independent and placement learning.

Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes, external visits and field trips. Scheduled sessions may vary slightly depending on the module choices made

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc. These sessions constitute an average time per level as indicated in the table below. Scheduled sessions may vary slightly depending on the module choices made.

Placement learning may include a practice placement. If a student opts to take a placement year, they are required to take the level-three module, Professional Experience, while they are undertaking the placement. They may alternatively take a study year abroad, in which case they take the International Experience module.

Description of Distinctive Features and Support

The foundation year is common with a number of other Computer Science and Creative Technology programmes.

Class-based Activities Classes use a range of activities. The particular mode of delivery of a module is determined by its Module Leader, and typically involves a combination of one or more lectures, practical sessions, group activities and group project work. Modules on the programme that require laboratory classes are commonly delivered by means of a combination of lecture and practicals/tutorials.

Academic Support Academic advice and support is the responsibility of the staff delivering the module. Outside of normal timetabled hours, advice and guidance on matters relating to the material being taught and on its assessment can be obtained either by arranging an appointment with academic staff or during published "surgery" hours. Appointments are most commonly arranged by email.

Part 3: Learning Outcomes of the Programme

In addition, all students are allocated Academic Personal Tutor (APT) to whom they can turn for general academic advice related to their studies. From time to time students can expect their APT to invite them to meet to discuss their progress.

As a supplement to this formal academic support, all modules at level 1 (i.e. first year modules) include timetabled Peer-Assisted Learning (PAL) sessions. These classes are extra to the sessions timetabled with academics and provide new students with a significant additional resource, over and above the normal 12 hours contact time. PAL sessions are led by trained PAL leaders; second and final year students who are able to use their experience during the first year to help the newer students overcome barriers to success in their studies.

On-line Academic Support Extensive on-line support for this programme is provided through the University portal (myUWE). This provides access to the University's e-library, which allows students to read academic journals and study-skills material. Of particular interest to students of this programme is access to the ACM, IEEE and British Standards Online databases. The portal also gives entry to UWE's Virtual Learning Environment (Blackboard) which is used by academics to make available general information about the module delivery, handbooks, lecture notes and other materials. In addition, the portal publishes individual student timetables, marks and other aspects of the operation of the programme and University life.

Pastoral Support Pastoral care is provided through the University-wide Student Advisers, a team of staff who provide comprehensive, full-time student support service. Advisers are trained to provide advice on matters commonly of concern, including regulatory and other matters; the Adviser will, when necessary, direct the student to specialist professional services including the University's counselling service, careers, financial services etc.

Independent Study All modules require students to carry out independent study, such as preparation for classes, research for projects and completion of assignments. A full range of facilities are available at all sites to help students with these. The philosophy is accordingly to offer students both guided support and opportunities for independent study. Guided support is mainly in the form of timetabled sessions. Students are expected to attend all sessions on their timetable.

The habits and practice of independent study is then developed through the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Computing Facilities In 2012 the Faculty has undertaken a major new build of computing facilities in which it offers a specialised computing facility alongside the general University provisions. There are multiple computing laboratories of 20 plus seats running Windows, Linux and dual-boot systems required for this program. Computers within the specialist laboratories include the standard University build augmented by software resources and hardware equipment necessary for the delivery of the modules. For example, the specialist Forensic and Security laboratory runs virtual machine and industry-standard specialist software.

In addition, one of the most popular areas within the Faculty is the Open Access laboratory. This area is never timetabled and gives students the opportunity to access machines at all times during opening hours

Part 5: Assessment

Approved to University Regulations and Procedures

It is the Award Board's responsibility to determine whether the student's attainment at level 0 is sufficient to progress to level 1.

Part 6: Programme Structure

This structure diagram demonstrates the student journey from Entry through to Graduation for a typical **full time student**, including: level and credit requirements, interim award requirements, module diet, including compulsory and optional modules

<table>
<tr><td rowspan="6">ENTRY</td><td rowspan="2">Year 1 (Level 0)</td><td>Compulsory Modules</td><td>Optional Modules</td><td>Interim Awards</td></tr>
<tr><td>UFCFQN-30-0
Computational Thinking and Practice
UFCFPN-30-0
Information Practitioner Foundations
UFCFRN-30-0
Creative Technology Studies
UFCFTN-30-0
Web Foundations</td><td>None</td><td>120 credits at Level 0

Successful completion of all level 0 modules required to permit progression to level 1.</td></tr>
<tr><td rowspan="2">Year 2 (Level 1)</td><td>Compulsory Modules</td><td>Optional Modules</td><td>Interim Awards</td></tr>
<tr><td>UFCFC3-30-1
Introduction to OO Systems Development
UFCF93-30-1
Computer and Network Systems
UFCFD3-30-1
Introduction to Artificial Intelligence
UFCFA3-30-1
Principles of Computing</td><td>None</td><td>Cert HE in Computer Science

Credit Requirements: 240 credits

At least 100 credits at level 1 or above.
120 credits at level 0</td></tr>
<tr><td rowspan="2">Year 3 (Level 2)</td><td>Compulsory Modules</td><td>Optional Modules</td><td>Interim Awards</td></tr>
<tr><td>UFCFB6-30-2
OO Systems Development 2
UFCFB4-30-2
Intelligent Systems
UFCFW4-30-2
Design and Analysis of Data Structures and Algorithms</td><td>Options should be selected up to a value of 30 credits (subject to change and availability).

UFCFV4-30-2
Data, Schemas and Applications
UFCFK6-30-2
Software Engineering
UFCFVK-15-2
Internet of Things
UFCFWK-15-2
Operating Systems</td><td>Dip HE in Computer Science

Credit requirements: 360 credits

At least 100 credits at level 2 or above.
At least 120 credits at level 1 or above.
120 credits at level 0.</td></tr>
<tr><td colspan="4">Year Out: Students on the Sandwich route complete a placement year. Students on placement complete a professional experience or international experience module and are awarded 15 level 3 credits. These modules are shown in the option list for year 3 but are actually completed during the year out</td></tr>
</table>

	Compulsory Modules	Optional Modules	Interim Awards
Year 4 (Level 3)	**UFCF85-30-3** Enterprise Systems Development **UFCFY3-15-3** BioComputation **UFCFB5-15-3** Ethical and Professional Issues in Computing and Digital Media **New Level 0 students registered 2017/18 must take:** **UFCFXK-30-3** Digital Systems Project **Students registered before 2017/18 must take one of the following:** **UFCFXK-30-3** Digital Systems Project **OR** **UFCFR4-45-3** Computing Project	**Students must take 30 credits from the lists below, of which a maximum of 15 credits can be at Level 2** **Either one** from **List-one** and **one** from **List-two**, **OR two** from **List-two.** **List-one:** **UFCFE6-15-3** Professional Experience OR **UFCFWJ-15-3** International Experience (The above two modules are only available to students who have taken a placement year) OR **UFCFVJ-15-3** Professional Development **List-two:** **UFCFM6-15-3** Requirements Engineering **UFCFU3-15-3** Advanced Databases **UFCFT4-15-3** Cryptography **UFCF95-15-3** Entrepreneurial Skills **UFCF7H-15-3** Mobile Applications **UFCFR5-15-3** Advanced Topics in Web Development 2 **UFCFKJ-15-M** Cloud Computing **UFCFYK-15-3** Readings in Artificial Intelligence	BSc Computer Science Credit requirements: 420 credits At least 60 credits at level 3 or above. At least 100 credits at level 2 or above. At least 140 credits at level 1 or above. 120 credits at level 0 **Highest award** BSc(Hons) Computer Science Credit requirements: 480 credits At least 100 credits at level 3 or above. At least 100 credits at level 2 or above. At least 140 credits at level 1 or above. 120 credits at level 0.

GRADUATION

Part 7: Entry Requirements
The University's Standard Entry Requirements apply according to the year and point of entry. Tariff points as appropriate for the year of entry – up-to-date requirements are available through the courses database.

Part 8: Reference Points and Benchmarks

QAA subject benchmark statements

The QAA Subject Benchmark Statement for Computing was revised in 2007, and is applicable to this proposal. The design team has considered them in drawing up the structure of the proposed degree, and is of the view that the proposal falls clearly within the scope of the benchmarks, as regards curriculum, teaching and learning, and the benchmarking standards themselves.

The benchmarks (para. 2.7) recognise that HEIs are likely to offer a range of programmes in computing. In paragraph 2.8 they refer to programmes, at one extreme, which provide "*a wide range of topics spanning the entire area of computing*" providing great flexibility. At the other extreme, the benchmarks recognise that there will be programmes which "*take one very specific aspect of computing and cover it in great depth*". This proposal is in the middle of these extremes. Nevertheless it does allow students to recognise the importance of specialist areas, in particular through the choice of a Level 3 module.

The benchmarks (para. 3.1) expects students to develop a wide range of abilities and skills, divided into three broad categories:

1. Computing related cognitive abilities and skills relating to intellectual tasks.
2. Computing related practical tasks.
3. Transferable skills that may be developed in the context of computing but which are of general value.

This proposal extends these categories into extensively defined learning outcomes.

The benchmarks also contain (section 6) statements of the standards expected of graduates at threshold, typical and excellence levels. The team is of the view that graduates of the proposed programme will be able to meet the threshold standards and are given full opportunities to achieve excellence.

University strategies and policies

The development of this programme reflects institutional policies and is fully consistent with the University's commitment to 'make a positive difference to our students, business and society'.

Staff research projects

The thread of artificial intelligence modules in the programme has been informed and developed by a team of world-class researchers in this area. Much of the module material is based upon their actual research work.

The thread of object-oriented systems development modules in the programme has been informed and developed by members of staff who are members of the faculty's Software Engineering Research Group and active in the field of software engineering research for example in research automating business process with service oriented architectures and web services.

Employer interaction and feedback

The programme benefits from close collaboration with local companies. These liaisons influence the curriculum and also provide professional mentors, placement opportunities and guest speakers.

STUDENT AND ACADEMIC SERVICES

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First CAP Approval Date	June 2015			
Revision CAP Approval Date		Version	1	Link to RIA
	January 2017		2	Link to RIA (ID 4047)
	16 January 2018		3	Link to RIA (ID 4402)
	17 May 2018		4	Link to RIA (ID 4819)
Date of last Programme Enhancement Review	17 May 2018			