

# ***BSc / FD / Top-up Computing and Digital Technologies***

*Programme Quality Handbook*

*Academic Year: 2019 - 2020*

## Programme specification

### 1. Overview/ factual information

<b>Programme/award title(s)</b>	BSc (Hons) Computing and Digital Technologies
<b>Teaching Institution</b>	University Centre Somerset
<b>Awarding Institution</b>	The Open University (OU)
<b>Date of first OU validation</b>	March 2019
<b>Date of latest OU (re)validation</b>	March 2019
<b>Next revalidation</b>	N/A
<b>Credit points for the award</b>	120 credits Level 4 120 credits Level 5 120 credits Level 6 Total - 360 credit points – BSc (Hons)
<b>UCAS Code</b>	I160
<b>JACS Code</b>	TBC
<b>Programme start date</b>	September 2019
<b>Underpinning QAA subject benchmark(s)</b>	Honours degree subject benchmark statement – QAA Computing 2016
<b>Other external and internal reference points used to inform programme outcomes</b>	Framework for Higher Education Qualifications (FHEQ) 2014 Foundation Degree Characteristics Statements 2015 SEEC Credit Level Descriptors 2016
<b>Professional/statutory recognition</b>	
<b>Mode(s) of Study (PT, FT, DL, Mix of DL &amp; Face-to-Face)</b>	FT and PT, Face-to-face
<b>Duration of the programme for each mode of study</b>	3 years Full Time 5 years Part Time
<b>Dual accreditation (if applicable)</b>	
<b>Date of production/revision of this specification</b>	June 2019

**Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.**

**More detailed information on the learning outcomes, content, and teaching, learning and assessment methods of each module can be found in student module guide(s) and the students handbook.**

**The accuracy of the information contained in this document is reviewed by the University and may be verified by the Quality Assurance Agency for Higher Education.**

## 2.1 Educational aims and objectives

- To provide a rigorous study of the theory and principles underlying computing and digital technologies.
- To develop and challenge students by establishing a high degree of expertise in the application, integration and critical evaluation of a range of computer and digital technologies, principles and practices.
- To develop in students an ability to use, compare and critically evaluate a range of formal and informal techniques, theories and methods applied to the development of computing and digital technologies.
- To provide opportunities for understanding of the individual, social, ethical, organisational and economic implications of the application of computer and digital technologies in the computing sector.
- To provide opportunities to develop computing professional practice, appropriate experience of working in the computing and digital technologies industry and related industries via a work placement and/or by undertaking project work with clients in the region, nationally or internationally.
- To develop in students the ability to carry out a programme of work with minimal supervision and manage time and work load effectively.
- To develop strong interpersonal skills in students to be able to take responsibility for their own professional development
- To produce graduates who can make a significant contribution to their chosen profession.
- To develop a range of professional knowledge and skills to analyse problems, to synthesise solutions, to work effectively with others and to maintain their own expertise in a rapidly changing area.

## 2.2 Relationship to other programmes and awards

(Where the award is part of a hierarchy of awards/programmes, this section describes the articulation between them, opportunities for progression upon completion of the programme, and arrangements for bridging modules or induction)

The programme is accessible as a progression route to students with various relevant qualification pathways within the subject area, including: Access to HE courses, Level 3 Vocational/Technical Diplomas, A Levels, etc.

Similarly, on successful completion of the BSc (Hons) Computing and Digital Technologies students can elect to continue onto post-graduate study (subject to meeting course entry requirements at their chosen institution), seek employment in the computing industry or enter into teaching.

### 2.3 For Foundation Degrees, please list where the 60 credit work-related learning takes place

SCDT42 Web Application Development – 20 Credits (Live Project)  
SCDT46 Professional Skills and Industry Practices – 20 Credits  
SCDT56 Collaborative Team Project and Industry Experience – 20 Credits

### 2.4 List of all exit awards

Certificate of Higher Education (CertHE). Requires a minimum of 120 credits at Level 4.  
Foundation Degree (FD). Requires a total of 240 credits (minimum of 120 credit points must be at Level 5).  
BSc Ordinary Degree (without Honours) - Requires any 300 credit points (with a minimum of 60 credits at Level 6 from a combination of at least three 20 credit modules excluding SCGT65 Individual Project).

### 3. Programme structure and learning outcomes

Programme Structure - LEVEL 4 Full Time					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT41 Programming and Software Fundamentals	20			Yes	A, B
SCDT42 Web Application Development	20			No	A, B
SCDT43 Networking and Cyber Security Fundamentals	20			Yes	A, B
SCDT44 Databases and Information Systems	20			Yes	A, B
SCDT45 3D Visualisation and Interaction Design (IxD)	20			Yes	A, B
SCDT46 Professional Skills and Industry Practices	20			No	A, B

**Level 4 Exit Award: Certificate of Higher Education (CertHE). Requires a minimum of 120 credit points at Level 4.**

Programme Structure - LEVEL 5 Full Time					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT51 Advanced Programming and Software Engineering	20			Yes	A, B
SCDT52 User Experience (UX) and Full-Stack Development	20			Yes	A, B
SCDT53 Advanced Networking and Cyber Security	20			Yes	A, B
SCDT54 Big Data and Data Science	20			Yes	A, B
SCDT55 Virtual Reality and Immersive Technologies	20			Yes	A, B
SCDT56 Collaborative Team Project and Industry Experience	20			No	A, B

**Level 5 Exit Award: Foundation Degree (FD). Requires a total of 240 credit points (minimum of 120 credit points must be at Level 5).**

<b>Programme Structure - LEVEL 6 Full Time</b>					
<b>Compulsory modules</b>	<b>Credit points</b>	<b>Optional modules</b>	<b>Credit points</b>	<b>Is module compensatable?</b>	<b>Semester runs in</b>
SCGT61 Software Development and Quality Assurance	20			Yes	A, B
SCGT62 Smart Device Application Development	20			Yes	A, B
SCGT63 Penetration Testing and Ethical Hacking	20			Yes	A, B
SCGT64 Artificial Intelligence and Machine Learning	20			Yes	A, B
SCGT65 Individual Project	40			No	A, B

**Level 6 Awards:**

**BSc Degree with Honours - Requires 360 credit points (minimum of 120 credit points must be at Level 6).**

**Level 6 Exit Award Ordinary BSc Degree (without Honours) - Requires any 300 credit points (with a minimum of 60 credits at Level 6 from a combination of at least three 20 credit modules excluding SCGT65 Individual Project).**

<b>Programme Structure - LEVEL 4 Part-time Yr. 1</b>					
<b>Compulsory modules</b>	<b>Credit points</b>	<b>Optional modules</b>	<b>Credit points</b>	<b>Is module compensatable?</b>	<b>Semester runs in</b>
SCDT41 Programming and Software Fundamentals	20			Yes	A, B
SCDT43 Networking and Cyber Security Fundamentals	20			Yes	A, B
SCDT45 3D Visualisation and Interaction Design (IxD)	20			Yes	A, B
SCDT46 Professional Skills and Industry Practices	20			No	A, B

Programme Structure - LEVEL 4/5 Part-time Yr. 2					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT42 Web Application Development	20			Yes	A, B
SCDT44 Databases and Information Systems	20			Yes	A, B
SCDT53 Advanced Networking and Cyber Security	20			Yes	A, B
SCDT55 Virtual Reality and Immersive Technologies	20			Yes	A, B

Programme Structure - LEVEL 5 Part-time Yr. 3					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT51 Advanced Programming and Software Engineering	20			Yes	A, B
SCDT52 User Experience (UX) and Full-Stack Development	20			Yes	A, B
SCDT54 Big Data and Data Science	20			Yes	A, B
SCDT56 Collaborative Team Project and Industry Experience	20			No	A, B

Programme Structure - LEVEL 6 Part-time Yr. 4					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT61 Software Development and Quality Assurance	20			Yes	A, B
SCDT62 Smart Device Application Development	20			Yes	A, B
SCDT63 Penetration Testing and Ethical Hacking	20			Yes	A, B

Programme Structure - LEVEL 6 Part-time Yr. 5					
Compulsory modules	Credit points	Optional modules	Credit points	Is module compensatable?	Semester runs in
SCDT64 Artificial Intelligence and Machine Learning	20			Yes	A, B
SCDT65 Individual Project	40			No	A, B



Intended learning outcomes at Level 4 are listed below:

<b><u>Learning Outcomes – LEVEL 4</u></b>	
<b>3A. Knowledge and understanding</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>A1</b> A broad and critical understanding of the essential facts, concepts, principles and techniques relating to computing and digital technologies;</p> <p><b>A2</b> An understanding of a range of models, languages and approaches to support the analysis, design, development and evaluation of computing and digital technologies solutions.</p>	<p>The curriculum has been designed to offer the opportunity of an orderly academic progression between levels of study within identifiable computer related themes.</p> <p>At Level 4, modules address the conceptual, technical and scientific underpinnings of the study of computing and digital technologies.</p> <p>A1 and A2 are introduced in contexts relating to digital systems by means of lectures, workshops and laboratories. Students are helped to understand the relevance to the modelling, analysis and development approaches to support the analysis, design and evaluation of computing and digital technologies solutions. Set activities are used to engender confidence and proficiency within the particular topics addressed.</p> <p><b>Assessment</b>            Formal assessment of knowledge and understanding is through coursework which will include portfolio work and written reports. A1 is directly assessed within SCDT43 Networking and Cyber Security Fundamentals. A2 is directly assessed within SCDT41 Programming and Software Fundamentals..</p>

<b>3B. Cognitive skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>B1</b> Select, apply and appraise key computing concepts in a range of computing contexts, including specific businesses and the wider industry.</p> <p><b>B2</b> Identify, refine and analyse requirements, specifications and designs of computing and digital technologies solutions.</p>	<p>Cognitive skill development within this programme is intended to be progressive across all study levels.</p> <p>A variety of digital systems and programming laboratories and equipment will provide environments and tools for system design, modelling and testing.</p> <p>These are used to foster the development of cognitive skills through a range of laboratory and/or study-based tasks typically relying on learning-in-action.</p> <p><b>Assessment</b> Formal assessment of cognitive skills is through coursework which will include practical work and written reports. B1 is directly assessed in SCDT42 Web Application Development. B2 is directly assessed in SCDT45 3D Visualisation and Interaction Design (IxD).</p>
<b>3C. Practical and professional skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>C1</b> Use a range of tools and techniques effectively for designing, developing, testing and evaluating computing and digital technologies solutions.</p>	<p>Practical and professional skills are developed initially at Level 4 where communication skills, basic research skills and skills in using core principles and concepts are developed.</p>

<b>3C. Practical and professional skills</b>	
<p><b>C2</b> Demonstrate the development of professional capabilities and achievements in order to keep up to date with the computing and digital technologies industry.</p>	<p>At Level 4 students become involved in many different activities and are supported by regular and frequent formative feedback in laboratories and coursework.</p> <p><b>Assessment</b>            Formal assessment of practical and professional skills is through coursework which will include portfolio work, case study reports and presentations. C1 is directly assessed in SCDT44 Databases and Information Systems. C2 is directly assessed in SCDT46 Professional Skills and Industry Practices. Students will always be required to provide a demonstration of any practical work or software artefacts.</p>
<b>3D. Key/transferrable skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>D1</b> Apply logical thinking and a creative approach to tasks requiring problem solving.</p> <p><b>D2</b> Learn effectively for life-long personal and professional development and reflect and record progress of learning.</p>	<p>During the course of the programme, assessed and non-assessed work encourages the learner to develop a wide range of transferrable skills.</p> <p>Students acquire transferrable skills through presentations, lab-based tasks including independent and group project work.</p> <p>At Level 4, this starts with closely defined and directed assignments.</p> <p><b>Assessment</b>            Formal assessment of key transferrable skills will be undertaken via a combination of written coursework and presentations as well as practical</p>

<b>3D. Key/transferrable skills</b>	
	work and recorded verbal and written feedback and production of a professional portfolio. D1 is directly assessed in SCDT41 Programming and Software Fundamentals. D2 is directly assessed in SCDT46 Professional Skills and Industry Practices.

**Intended learning outcomes at Level 5 are listed below:**

<b><u>Learning Outcomes – LEVEL 5</u></b>	
<b>3A. Knowledge and understanding</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>A3</b> Critical understanding of the core principles, processes and methods of development and how to apply these in the production of specific computing and digital technologies solutions.</p> <p><b>A4</b> Critical understanding of the use, management and deployment of computing and digital technologies solutions within specific businesses and the wider industry, and the limitations of such solutions.</p>	<p>The curriculum has been designed to offer the opportunity of an orderly academic progression between levels of study within identifiable computer related themes.</p> <p>At Level 5, there is significant horizontal integration of learning materials; for example advanced programming concepts and terminology are introduced in one module, and in another real life scenarios (such as cyber security case studies) are used to deepen and refine understanding.</p> <p>Progressively increasing levels of appreciation of quality (A3) and performance aspects of products and processes is also encouraged and expected in practical work and coursework at Level 5.</p>

<b><u>Learning Outcomes – LEVEL 5</u></b>	
<b>3A. Knowledge and understanding</b>	
	<p><b>Assessment</b></p> <p>Formal assessment of knowledge and understanding is through coursework which will include case study reports and project work. A3 is directly assessed within SCDT51 Advanced Programming and Software Engineering. A4 is directly assessed within SCDT56 Collaborative Team Project and Industry Experience</p>

<b>3B. Cognitive skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>B3</b> Select and critically evaluate a range of tools, methods and techniques for modelling, solving, designing and testing computer-related problems.</p> <p><b>B4</b> Critically analyse the extent to which a computing and digital technologies solution meets the criteria defined for its current use and future development.</p>	<p>Cognitive skill development within this programme is intended to be progressive across all study levels.</p> <p>At Level 5 a new range of topics are introduced which typically involve an increasingly systems-level content and orientation as modules progress and there is an increasing emphasis on design, problem solving and analysis.</p> <p>A variety of networking and programming laboratories and equipment will continue to provide environments and tools for system design, simulation and testing.</p> <p><b>Assessment</b></p>

<b>3B. Cognitive skills</b>	
	Formal assessment of cognitive skills is through coursework which will include practical work, case study and written reports. B3 is directly assessed in SCDT54 Big Data and Data Science. B4 is directly assessed in SCDT55 Virtual Reality and Immersive Technologies.
<b>3C. Practical and professional skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>C3</b> Analyse, design, test and evaluate a computing and digital technologies solutions, using simulation and modelling tasks.</p> <p><b>C4</b> Employ professional, ethical and industry practices to plan and manage a computing and digital technologies project within the constraints of requirements, timescale and budget.</p>	<p>At Level 5 the development of practical and professional skills is progressed, especially in the contexts of group project work and coursework where the emphasis is placed on autonomous application of digital systems analysis, modelling and design skills as well as reflection on such practices.</p> <p><b>Assessment</b> Formal assessment of practical and professional skills is through coursework which will include practical work, work placement and team project work. C3 is directly assessed in SCDT53 Advanced Networking and Cyber Security. C4 is directly assessed SCDT56 Collaborative Team Project and Industry Experience. Students will always be required to provide a demonstration of any practical work or software artefacts.</p>

<b>3D. Key/transferrable skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>D3</b> Work effectively both autonomously in independent activity, and co-operatively as a member of a group or project-team and manage time and other resources.</p> <p><b>D4</b> Communicate information, arguments, ideas and issues effectively using a variety of media, and a range of methods appropriate to a given type of audience and the communication objective.</p>	<p>At Level 5 students will continue to acquire key transferrable skills through presentations, lab-based tasks including independent and group project work. However, the amount of instructional material will decrease as the programme progresses, with students being expected to take an increasing responsibility for developing their own skills and identifying resources to support this development.</p> <p>During Level 5 this support will be reduced and far more open tasks will be set. Students will be exposed to, and expected to utilise, a variety of technologies such as operating environments, programming languages, applications and specific design techniques. Students will be expected to follow appropriate ethical, professional and legal principles applicable within the computing and digital technologies domain.</p> <p><b>Assessment</b>  Formal assessment of key transferable skills will be undertaken via a combination of presentations as well as practical work and working as part of a team. D3 is directly assessed in SCDT55 Virtual Reality and Immersive Technologies. D4 is directly assessed in SCDT52 User Experience (UX) and Full-Stack Development.</p>

**Intended learning outcomes at Level 6 are listed below:**

## Learning Outcomes – LEVEL 6

### 3A. Knowledge and understanding

#### **Learning outcomes:**

**A5** A comprehensive understanding of the core techniques, tools and methods of management, testing and quality assurance of computing and digital technologies solutions.

**A6** Comprehensive understanding of the professional, economic, social, environmental, moral and ethical issues involved in the design, development and deployment of computing and digital technologies solutions.

#### **Learning and teaching strategy/ assessment methods**

At Level 6, students are expected to consolidate their critical knowledge and understanding of new material and to take greater responsibility for the selection of concepts, principles and methodology needed to analyse, synthesise and evaluate particular systems, processes and products in a range of contexts.

Students undertake major individual project addressing the development of A5 and A6 in focussing on aspects of the project life cycle of a specific computer system. The project is designed to allow students to integrate and contextualise their understanding skills and abilities in a supportive and semi-structured environment.

#### **Assessment**

Formal assessment of knowledge and understanding is through coursework which will include practical work, case study reports and project work and documentation. A5 is directly assessed within SCDT61 Software Development and Quality Assurance. A6 is directly assessed within SCDT63 Penetration Testing and Ethical Hacking.

In addition, all Level 6 learning outcomes are assessed within the major computing project SCDT65 Individual Project.



<b>3B. Cognitive skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>B5</b> Creatively solve complex problems through deploying appropriate theory, practices and tools for the specification, design, implementation and evaluation of a computing and digital technologies solution.</p> <p><b>B6</b> Critically evaluate technical information, concepts, arguments, assumptions and evidence derived from a wide variety of sources to devise a computing and digital technologies solution to a complex problem.</p>	<p>At Level 6 individual project work addresses B5 and B6, in which student learning includes an appreciation of the open-endedness and incompleteness of knowledge in practical computer problems.</p> <p>Throughout Level 6, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual cognitive skills and understanding of the subject.</p> <p>Some material will be presented via lectures and tutorials, but a significant component will be gained through self-study, some of it unguided.</p> <p><b>Assessment</b>  Formal assessment of cognitive skills is through coursework which will include presentations, case study reports, practical and project work. B5 is directly assessed in SCDT62 Smart Device Application Development. B6 is directly assessed in SCDT63 Penetration Testing and Ethical Hacking.</p> <p>In addition, all Level 6 learning outcomes are assessed within the major computing project SCDT65 Individual Project.</p>

<b>3C. Practical and professional skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>C5</b> Manage own learning with confidence adhering to professional codes of conduct and industry standard practices required in the computing sector.</p> <p><b>C6</b> Propose, research, and undertake individual project activity. Report a devised solution for a complex computer-related problem in a structured manner, relying on minimal supervision.</p>	<p>At Level 6 practical and professional skills are acquired mainly through the implementation of a major computing project, in which the students will need to independently undertake technical research conducted professionally and following the scientific method. Coursework and practical laboratories are also used to deliver practical and professional skills.</p> <p>The self-defined and individually managed major project offers enhanced opportunities for developing either a wider range of professional skills, or developing specific practical skills to higher levels of proficiency.</p> <p>Throughout Level 6, the learner is encouraged to develop practical skills further by undertaking independent study.</p> <p><b>Assessment</b>  Formal assessment of practical and professional skills is through coursework which will include practical work, written reports and team project work. C5 is directly assessed in SCDT61 Software Development and Quality Assurance. C6 is directly assessed SCDT64 Artificial Intelligence and Machine Learning. Students will always be required to provide a demonstration of any practical work or software artefacts.</p> <p>In addition, all Level 6 learning outcomes are assessed within the major computing project SCDT65 Individual Project.</p>

<b>3D. Key/transferrable skills</b>	
<b>Learning outcomes:</b>	<b>Learning and teaching strategy/ assessment methods</b>
<p><b>D5</b> Conduct research effectively, drawing on a wide variety of sources under minimal direction, and be proficient in the use of referencing sources of information;</p> <p><b>D6</b> Apply critical thinking skills and an analytical and scientific approach to problem solving to complex systems and situations.</p>	<p>At Level 6 transferrable skills will be addressed using lectures and tutorials for the presentation of instructional material, with practical, independent study and project work offering the opportunity to practice the skills in a supportive environment.</p> <p>The students are being expected to take an increased responsibility for developing their own transferable skills and identifying resources to support this development. Throughout, the learner is encouraged to develop key transferable skills further by undertaking independent study and research.</p> <p><b>Assessment</b>  Formal assessment of key transferable skills will be undertaken via a combination of presentations, case studies reports, practical and project work. D5 is directly assessed in SCDT62 Smart Device Application Development. D6 is directly assessed in SCDT64 Artificial Intelligence and Machine Learning.</p> <p>In addition, all Level 6 learning outcomes are assessed within the major computing project SCDT65 Individual Project.</p>

#### **4. Distinctive features of the programme structure**

- **Where applicable, this section provides details on distinctive features such as:**
  - **where in the structure above a professional/placement year fits in and how it may affect progression**
  - **any restrictions regarding the availability of elective modules**
- where in the programme structure students must make a choice of pathway/route**

- The programme covers a wide variety of progressive computing topics throughout the three years for example software engineering, web application development, network engineering, cyber security, creative industries and data science. Knowledge and practical skills will be developed in advanced programming, 3D modelling, virtual reality and penetration testing.
- The programme equips graduates with a range of valuable skills securely underpinned by relevant and up-to-date knowledge of the principles of computing and modern digital technologies throughout each level of study of the programme.
- The learners have access to a well-resourced and specialised cyber security and networking laboratory where they will have the opportunity to practice the skills and knowledge gained in the theoretical sessions.
- The programme fosters autonomy within the student body in their professional development and a professional approach, bound by professional codes of conduct appropriate to employment within the computing sector.
- The programme provides opportunities for learners to develop products and/or relationships with regional, national and international companies involved with Computing and Digital Technologies as well as foster own professional skills to support the South West.
- The programme incorporates various modes of delivery for flexibility and diversity, helping to support the student learning by tools such as, Smartboards, Virtual Learning Environments, Forums, etc., and making available to students resources such as online tutorials and learning materials.

#### **At Level 4, the programme:**

- Is designed to help the learner develop and formalise strategies and problem-solving skills, alongside other general transferable skills appropriate to employment;

#### **At Level 5, the programme:**

- Incorporates substantial work based learning which encourages learners to deliver computer-based solutions to business problems and gives opportunities to gain valuable industry experience by working on 'live' projects;

- Offers links with local employers, live project opportunities and links with the computing industry and visiting guest speakers to enhance further the learning experience of its students.

**At Level 6, the programme:**

- Provides skills and knowledge to enter a range of computing professions, which have seen increased demand for employees at graduate level, and will equip learners with the necessary skills and academic standing to enter postgraduate study.
- Enhances employability of students by providing training with industry-standard software and access to specialised resources such as the Cyber Security and Networking Laboratory, graphics tablets, programmable robotics, 3D additive printer and VR hardware.
- Incorporate substantial practical and theoretical work by undertaking a major computing project in which the learner will have the opportunity to independently conduct technical research conducted professionally, ethically and following scientific methodologies, thus preparing them for the workplace.

5. Support for students and their learning

**Seminars/Tutorials/Workshops**

Seminars, tutorials and workshops are a crucial part of the learning process, as students have the opportunity to analyse problems and discuss issues in depth. Students should come to these sessions prepared to participate fully as these are a key means of facilitating active learning. These sessions are invaluable in developing independent learning; critical thinking and stronger analytical skills facilitating a process that encourages students to develop many of the key skills employers look for in the creative media industries. Students receive tutorial sessions and full-time first year learners also have enrichment sessions. Tutorials focus on the development of academic and professional skills including the development of a professional digital portfolio. Enrichment is focused on further developing technical skills on a chosen area of computing. These sessions allow students to have one-to-one tutorials with their personal tutor to discuss any personal, professional or academic issues.

**Other Academic Support**

Some modules may have relatively little formally timetabled teaching. This is part of a deliberate strategy to help develop and manage students' own learning. Where this is the case, there will be other academic support such as:

- Formative and summative feedback on assessed work – to help develop knowledge, understanding and skills through undertaking assessments and practical projects;

- Tutorials – many subjects have timetabled tutorials where work can be discussed with subject tutors. Students can also arrange to meet tutors to discuss work;
- HE Study Centre is available for study skills session. Students will also undergo the HEAD Start study skills programme as part of their Tutorial provision. This programme covers academic skills including researching, referencing and academic writing.
- Additional learning support – many of our students benefit from the additional learning support by our dedicated Additional Learning Support team. This support is tailored to each student's individual support need to support students with general study skills as well as specialist additional support in close collaboration with the course programme team;
- College Virtual Learning Environment, Student Portal and email. Some staff use these to initiate discussions and set up learning support groups for their modules;
- Electronic learning – Access to eBooks, electronic journals and research papers as well as resources such as eBook readers and laptop computers all serve to facilitate and support student learning and research practice;
- Learning packs. Some modules use learning packs for students to work through in their own time. These may involve exercises to help develop understanding of the materials.

6. Criteria for admission	
GCSEs required at Grade C or above	4 GCSE subjects at 9 - 4 (or grades A* - C) including English and Maths.
A Levels required: AS/A2/UCAS Points Tariff	80 UCAS Points - AS/A2 (minimum 32 points at A2 level)
BTEC Qualifications (QCF)	80 UCAS Points - MMP (Extended Diploma), DM (Diploma); or Pre-degree Access Diploma.
HNC/D	N/A
VDA: AGNVQ, AVCE, AVS	Relevant AVCE (min 80 points)
International Baccalaureate	Accepted at Grade 4 (at higher level) and Interview
Irish/Scottish Highers/Advanced Highers	2 Grade C or above – Scottish Higher/Advanced Higher. 2 Grade A to C's – Irish Leaving Certificate.
Other non-standard awards or experiences / mature students	Mature students who do not meet these formal entry requirements are welcome to apply, if they can evidence their commitment to the subject through previous experience.
Interview/portfolio requirements	Interview
Disclosure and Barring Services (DBS) Check – (formerly CRB check)	No

7. Language of study
<p>All classes are conducted in English.            If English is not your first language you will be asked to provide evidence of your English language ability in order to apply and start the course.            The standard English language requirement for entry is IELTS 6.0 with a minimum of 5.5 in any one paper, or equivalent.</p>
8. Information about non-OU standard assessment regulations (including PSRB requirements)
<p>There will be no exceptions to the academic regulations of The Open University.</p>

The Open University Academic Regulations are available on the VLE and the college website at <http://somerset.ac.uk>.

#### 9. Methods for evaluating and improving the quality and standards of teaching and learning.

All programme teams participate in Annual Programme Monitoring during their Programme Committee Meeting every Autumn. This process involves obtaining student views as well as the views of the staff that delivered each module and where appropriate may consider the views of employers who have been involved with the programme. In order to ensure robust evaluation of the programme, the programme team also consider student opinion, programme statistics, (including retention, achievement, gender and ethnicity), and student survey results, in addition to the External Examiner report.

The programme team produces an action plan based on their evaluation to assist in bringing about the developments they have identified. Each Spring the Programme Committee Meeting is held again to review progress with the action plan and to canvas opinions from staff, students and employers connected to the programme. This evaluation process is overseen by the cross-college HE Senate, the Senate receives summary reports of all HE matters each term and produces and monitors a top level cross-college HE Enhancement Action Plan as a result.

Frequent Continuing Professional Development (CPD) sessions are run at the College for academic staff, to share good practice and to support effective teaching, learning and assessment. Peer Review is used at UCS. It is a supportive and productive developmental tool where staff observe each other.

University Centre Somerset has a formal structure for hearing the student voice. Student representatives from each group gather views that are widely felt, strongly felt and achievable and report these to the twice yearly Programme Committee Meetings. In addition to programme level activities designed for students to feedback comments to their teaching team, UCS also appoints a student representative for each Curriculum Area. This representative collates comments from the Programme Committee Meetings and feeds this back to the HE Student Executive meeting. The focus of this meeting is to obtain feedback about any cross College matters, or unresolved issues as well as highlighting matters to celebrate from across the curriculum areas. In addition to this the Learning Resource Centre hold regular student forums to gain feedback, which helps them to improve their service to learners. Students are requested to complete written surveys: the Student Perception Questionnaire/National Student Survey (NSS) in order to formally record their impressions of the programmes. The HE Student Governor provides the student voice at Senate meetings which oversee HE provision at UCS, and also at the Standards Committee of the Board of Governors.

These mechanisms are all designed to evaluate and improve the quality and standards of teaching and learning.

#### 10. Changes made to the programme since last (re)validation



None.

Annexe 1: Curriculum map

Annexe 2: Notes on completing the OU programme specification template

## Annexe 1 - Curriculum map

This table indicates which study units assume responsibility for delivering (shaded) and assessing (✓) particular programme learning outcomes.

Level	Study module/unit	Programme outcomes							
		A1	A2	B1	B2	C1	C2	D1	D2
4	SCDT41 Programming and Software Fundamentals		✓					✓	
	SCDT42 Web Application Development			✓					
	SCDT43 Networking and Cyber Security Fundamentals	✓							
	SCDT44 Databases and Information Systems					✓			
	SCDT45 3D Visualisation and Interaction Design (IxD)				✓				
	SCDT46 Professional Skills and Industry Practices						✓		✓

Level	Study module/unit	Programme outcomes							
		A3	A4	B3	B4	C3	C4	D3	D4
5	SCDT51 Advanced Programming and Software Engineering	✓							
	SCDT52 User Experience (UX) and Full-Stack Development								✓
	SCDT53 Advanced Networking and Cyber Security					✓			
	SCDT54 Big Data and Data Science			✓					
	SCDT55 Virtual Reality and Immersive Technologies				✓			✓	
	SCDT56 Collaborative Team Project and Industry Experience		✓				✓		

Level	Study module/unit	Programme outcomes							
		A5	A6	B5	B6	C5	C6	D5	D6
6	SCDT61 Software Development and Quality Assurance	✓				✓			
	SCDT62 Smart Device Application Development			✓				✓	
	SCDT63 Penetration Testing and Ethical Hacking		✓		✓				
	SCDT64 Artificial Intelligence and Machine Learning						✓		✓
	SCDT65 Individual Project	✓	✓	✓	✓	✓	✓	✓	✓

## Annexe 2: Notes on completing programme specification templates

- 1 - This programme specification should be mapped against the learning outcomes detailed in module specifications.
- 2 – The expectations regarding student achievement and attributes described by the learning outcome in section 3 must be appropriate to the level of the award within the **QAA frameworks for HE qualifications**: <http://www.qaa.ac.uk/AssuringStandardsAndQuality/Pages/default.aspx>
- 3 – Learning outcomes must also reflect the detailed statements of graduate attributes set out in **QAA subject benchmark statements** that are relevant to the programme/award: <http://www.qaa.ac.uk/AssuringStandardsAndQuality/subject-guidance/Pages/Subject-benchmark-statements.aspx>
- 4 – In section 3, the learning and teaching methods deployed should enable the achievement of the full range of intended learning outcomes. Similarly, the choice of assessment methods in section 3 should enable students to demonstrate the achievement of related learning outcomes. Overall, assessment should cover the full range of learning outcomes.
- 5 - Where the programme contains validated **exit awards** (e.g. CertHE, DipHE, PGDip), learning outcomes must be clearly specified for each award.
- 6 - For programmes with distinctive study **routes or pathways** the specific rationale and learning outcomes for each route must be provided.
- 7 – Validated programmes delivered in **languages other than English** must have programme specifications both in English and the language of delivery.

**SCDT41 Programming and Software Fundamentals**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT41 Programming and Software Fundamentals		
<b>Module tutor</b>	James Shaun	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules	
<p>This module introduces the subject of programming and software engineering. It will cover areas of software design and implementation using modern design techniques, languages and environments. The student will gain the practical skill and knowledge to be able to design and implement software programs using object orientated programming.</p>	

3. Aims of the module	
<ul style="list-style-type: none"> <li>• To introduce students to a range of contemporary techniques in the development of software solutions including design, development, testing and documentation.</li> <li>• To provide opportunities to respond to practical problems and develop solutions.</li> <li>• To enable students to solve problems using industry standard practices in software solutions.</li> <li>• To develop students' creative problem solving for solutions to problems using a range of tools and techniques.</li> </ul>	

4. Pre-requisite modules or specified entry requirements	
No	

5. Is the module compensatable?	
No	

6. Are there any PSRB requirements regarding the module?	
No	

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand the contemporary techniques for design, developing testing, correcting, deploying and documenting software systems from specifications, using agreed standards and tools.</p>	A2	<p>Lectures Practical workshops Case studies Digital learning</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse and evaluate practical problems and provide logical solutions.</p>	B2	<p>Lectures Practical workshops Case studies</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Produce programming solutions to solve problems, using high quality code and industry standard practices.</p>	C1	<p>Lectures Practical workshops Case studies</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Apply logical thinking and a creative approach to problem solving.</p>	D1	<p>Lectures Practical workshops Case studies Digital learning</p>

<b>8. Indicative content.</b>
<p>Software development methodologies.</p> <p>Software analysis and design.</p> <p>Programming principles including data types; data type conversions; operators (mathematical and logical); strings/string handling; programming concepts/structures (sequence, selection and iteration); arrays (single and two dimensional) and data structures; validation and error handling; classes; objects; methods and overloading methods; inheritance; encapsulation; polymorphism.</p> <p>Testing strategies including white and black box testing.</p> <p>Deployment and documentation.</p>

9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
Assessment Strategy: 100% Coursework				
Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Programming Portfolio	50%		%	C1, D1
Coursework Two – Software Artefact and Documentation	50%		%	A1, B1

10. Teaching staff associated with the module
Name and contact details
James Shaun shaunj@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Greene, J and Stellman, A.	2013	Head First C#	O'Reilly Media	
McGrath, M.	2016	C# Programming in Easy Steps	In Easy Steps Limited	
Clark, N	2017	C#: A Detailed Approach to Practical Coding	CreateSpace Independent	
Haunts, S.	2017	A Gentle Introduction to Agile Software Development	Stephen Haunts Limited	

12. Other indicative text (e.g. websites)



<https://www.tutorialspoint.com/csharp/>  
<https://docs.microsoft.com/en-us/dotnet/csharp/tutorials/intro-to-csharp/>  
<https://csharp-station.com/>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT42 Web Application Development**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT42 Web Application Development		
<b>Module tutor</b>	Simon West	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>This module will facilitate the development of an awareness and understanding of the professional, technical and creative skills required to design and construct effective web applications to a client specification. In this module students will not only develop professional front-end web development skills, but also essential professional skills. Students will work on a live brief with a real-life client developing their industry practices and professional skills.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To introduce students to the business environment and competitive advantage and how to communicate professionally with clients.</li> <li>• To enable students to manage client requirements and fully evaluate the performance and suitability of web applications.</li> <li>• To provide an opportunity for students to plan, design, develop and evaluate a web application.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Comprehensively understand of the use of digital solutions for competitive advantage within business.</p>	A1	Lectures Practical workshops Case studies Digital learning

<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Select contemporary web development tools and frameworks for use in the design and development of a web-based solution.</p> <p>B2 Critically analyse and contrast the performance and extent to which a website design meets its requirements against competitors.</p>	B1  B2	Lectures Practical workshops Case studies

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Use technical process improvement tasks to inform solutions to a web-based problem and present recommendations.</p> <p>C2 Design, develop and evaluate a solution to a complex web based problem.</p>	<p>C1</p> <p>C1</p>	<p>Lectures</p> <p>Practical workshops</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Deliver concise, engaging and well-structured verbal presentations, arguments and explanations.</p>	<p>D2</p>	<p>Lectures</p> <p>Practical workshops</p> <p>Tutorial</p> <p>Digital learning</p>

<b>8. Indicative content.</b>
<p><b>Analysis and Requirements</b></p> <p>Website analysis tools and techniques; requirements analysis and process improvement tasks.</p> <p><b>Requirements and Design</b></p> <p>Web application design principles and web application design tools and methods;</p> <p><b>Website Application Development</b></p> <p>HTML, CSS, client-side scripting, server-side scripting, CSS frameworks.</p>

<b>8. Indicative content.</b>
<p><b>Performance and Evaluation</b>  Measuring web application performance; testing web applications and evaluating a web application</p> <p><b>Professional and Business Skills</b>  The internal and external business environment; business and client communication; meeting business and client needs; client management and professional presentation skills.</p>

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>				
<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Presentation	50%		%	B1, C1, D1
Coursework Two – Website and Documentation	50%		%	A1, B2, C2

<b>10. Teaching staff associated with the module</b>
<b>Name and contact details</b>
Simon West wests@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Duckett, J.	2011	HTML and CSS: Design and Build Websites	Wiley	
Duckett, J.	2014	JavaScript and JQuery: Interactive Front-End Web Development	Wiley	
Kermode, R.	2017	Speak So Your Audience Will Listen	Pendle	

12. Other indicative text (e.g. websites)
<a href="https://www.w3schools.com/">https://www.w3schools.com/</a> <a href="https://www.coursera.org">https://www.coursera.org</a> <a href="https://www.html5rocks.com/en/">https://www.html5rocks.com/en/</a> <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://www.lynda.com/">https://www.lynda.com/</a> <a href="https://ocw.mit.edu/index.html">https://ocw.mit.edu/index.html</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT43 Networking and Cyber Security Fundamentals**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT43 Networking and Cyber Security Fundamentals		
<b>Module tutor</b>	Ben Pople	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>This module is designed to introduce networking and cyber security fundamentals, by working from the fundamentals of networking and cyber security, through to their implementation within the internet and industry. Students will develop their skills through written and practical assessment, where they will explore contemporary network design, alongside current vulnerabilities and weaknesses.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To introduce students to the fundamental building blocks and typical architectures of computers, networks and the Internet.</li> <li>• To develop an awareness of common vulnerabilities in computer networks including unsecure coding and unprotected networks.</li> <li>• To develop an understanding the main features of routing and Internet network protocols.</li> <li>• To provide opportunities for students to plan, design, build and test a simple network and undertake a security risk assessment.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand the fundamental building blocks and typical architectures of computers, networks and the Internet.</p> <p>A2 Understand the purpose of cyber security and common vulnerabilities in computer networks including unsecure coding and unprotected networks and other security threats.</p>	<p>A1</p> <p>A1</p>	<p>Lectures</p> <p>Practical workshops</p> <p>Seminars</p> <p>Case studies</p> <p>Digital learning</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse the main features of routing and Internet network protocols in use, their purpose and relationship to each other, including the physical and data link layer.</p>	<p>B1</p>	<p>Lectures</p> <p>Practical workshops</p> <p>Seminars</p> <p>Case studies</p> <p>Digital learning</p>



<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Plan, design, build and test a simple network to a requirement specification and determine the minimum network capacity to meet these requirements.</p> <p>C2 Undertake a security assessment of for a simple IT system and propose resolution advice.</p>	<p>C1</p> <p>C2</p>	<p>Lectures Practical workshops Seminars Case studies Digital learning</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		

<b>8. Indicative content.</b>
<p>The OSI and TCP/IP network models including the data link layer.</p> <p>Physical and Logical topologies.</p> <p>IP-based networks, including network convergence, addressing (DHCP) and address versioning.</p> <p>Static and dynamic routing, including OSPF and basic switching concepts and configuration.</p> <p>Widely used network protocols – their features, purposes, benefits and potential vulnerabilities.</p>

**8. Indicative content.**

Securing against general protocol and network vulnerabilities.  
 Analysis of contemporary home, business, national and international network threats.  
 Efficient network design, implementation and maintenance.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

**Assessment Strategy:** 100% Coursework

Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Written Report	50%		%	A1, A2, B1
Coursework Two – Practical and Documentation	50%		%	C1, C2

**10. Teaching staff associated with the module**

Name and contact details

Ben Pople popleb@btc.ac.uk

**11. Key reading list**

Author	Year	Title	Publisher	Location
Severance, C.	2015	Introduction to Networking: How the Internet Works	CreateSpace	
Stallings, W.	2015	Computer Organisation and Architecture (10 <sup>th</sup> Edition)	Pearson	
Comer, D.	2015	Computer Networks and Internets (6 <sup>th</sup> Edition)	Pearson	
Kurose, J and Ross, K.	2016	Computer Networking: a Top-Down Approach (7 <sup>th</sup> Edition)	Pearson	

12. Other indicative text (e.g. websites)

<https://www.netacad.com/>

13. List of amendments since last (re)validation

Area amended	Details	Date Central Quality informed

**SCDT44 Databases and Information Systems**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT44 Databases and Information Systems		
<b>Module tutor</b>	Bradley Chinn	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
An introduction to the requirements, capture, analysis and design of information systems including the technical and interpersonal skills; the principles of data organisation and analysis, tools and database management systems. This module will develop students' skills in database design and development.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To impart an appreciation of the ways in which computerised information systems serve the needs of business organisations.</li> <li>• To develop knowledge of the analysis, design and development of database and information systems.</li> <li>• To provide opportunities for students to develop interpersonal skills required by a computing professional.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand the role of data management systems in managing organisational data and information.</p> <p>A2 Understand the importance of data quality and security.</p>	<p>A1</p> <p>A1</p>	<p>Lectures</p> <p>Seminars</p> <p>Case studies</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Critically analyse and evaluate the role, suitability and effectiveness of information systems within a business domain and highlight issues and identify opportunities for improvement.</p>	<p>B1</p>	<p>Lectures</p> <p>Practical workshops</p> <p>Seminars</p> <p>Case studies</p>



**8. Indicative content.**

The use and impact of information systems; characteristics of data and information; the systems development process; database management systems; relational databases; structured query language; systems analysis; process modelling; data modelling; design and implementation of a relational database.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

**Assessment Strategy:** 100% Coursework

Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Case Study Report	50%		%	A1, A2, B1
Coursework Two – Database System and Presentation	50%		%	C1, C2, D1, D2

**10. Teaching staff associated with the module**

Name and contact details

Bradley Chinn [chinn@btc.ac.uk](mailto:chinn@btc.ac.uk)

**11. Key reading list**

Author	Year	Title	Publisher	Location
Elmars, R.	2016	Fundamentals of Database Systems	Pearson	
Connolly, T., Begg, C.	2015	Database Systems, a practical approach to	Pearson	

11. Key reading list				
Author	Year	Title	Publisher	Location
		Design, Implementation and Management		

12. Other indicative text (e.g. websites)
<a href="https://www.coursera.org">https://www.coursera.org</a> <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://www.lynda.com/">https://www.lynda.com/</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed



**SCDT45 3D Visualisation and Interaction Design (IxD)**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT45 3D Visualisation and Interaction Design (IxD)		
<b>Module tutor</b>	David Matravers	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module introduces 3D Visualisation and Interaction Design (IxD); during this module students will understand how different 3D techniques are used and implemented into different 3D designs. Students will also explore the purpose of interaction design in computing and digital technologies.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To introduce students to the methods and techniques used in 3D visualisation and interaction design.</li> <li>• To develop students' technical skills in using contemporary tools and techniques to develop an interactive 3D visualisation.</li> <li>• To provide opportunities for logical thinking and creativity.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand contemporary methods and techniques used in 3D visualisation and interaction design</p>	A2	Lectures Case Studies Practical Workshops

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse requirements to identify and refine specifications for a 3D visualisation and interaction design.</p> <p>B2 Critically evaluate an interactive 3D visualisation using interaction design methods and techniques.</p>	B2	Lectures Case Studies Practical Workshops

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Use contemporary tools and techniques to develop an interactive 3D visualisation.</p>	C2	Lectures Case Studies Practical Workshops

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Apply logical thinking and creativity to solve an interactive 3D visualisation design problem.</p>	D1	Lectures Case Studies Practical Workshops

<b>8. Indicative content.</b>
<p><b>Interaction Design</b></p> <p>Good and poor design; interaction design and user experience; conceptual models; paradigms, vision, theories, models and frameworks; emotional interaction; interfaces; interaction design and construction.</p> <p><b>3D Modelling</b></p> <p>An analysis of a variety of different methods and techniques used in 3D visualisation; analysing the most prudent method to use within specific situations. This will analyse in more detail modelling, texturing, lighting and animation.</p> <p>A practical demonstration into creating an interactive 3D visualisation; implementing tools such as modelling, texturing, lighting and animating.</p>

<b>8. Indicative content.</b>
Evaluating which techniques are best use for specific aspects of the 3D visualisation.

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>				
<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Case Study Report	50%		%	A1, B1, D1
Coursework Two – Interactive 3D Visualisation and Documentation	50%		%	B2, C1

<b>10. Teaching staff associated with the module</b>
Name and contact details
David Matravers matraversd@btc.ac.uk

<b>11. Key reading list</b>				
<b>Author</b>	<b>Year</b>	<b>Title</b>	<b>Publisher</b>	<b>Location</b>
Cardoso, J.	2017	Realistic Architectural Rendering with 3ds Max and V-Ray	Focal Press	

11. Key reading list				
Author	Year	Title	Publisher	Location
Murdock, K.	2017	Autodesk 3ds Max 2018 Complete Reference Guide	SDC Publications	
Smith, B.L.	2011	3D art essentials: the fundamentals of 3D modelling, texturing, and animation	Focal Press	
Preece, J	2019	Interaction Design: Beyond Human-Computer Interaction	Wiley	

12. Other indicative text (e.g. websites)
<a href="https://knowledge.autodesk.com/support">https://knowledge.autodesk.com/support</a> <a href="https://answers.unity.com/">https://answers.unity.com/</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT46 Professional Skills and Industry Practices**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT46 Professional Skills and Industry Practices		
<b>Module tutor</b>	Simon West	<b>Level</b>	4
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module introduces professional skills and industry practices including computing and IT business practices and ethics. The module is also intended as an introduction to professional and academic expectations including academic writing, research and referencing.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To develop student's awareness of computing and IT industry practices.</li> <li>• To develop and maintain a digital portfolio to demonstrate professional capabilities and achievements.</li> <li>• To develop life-long professional and academic skills.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understanding of how teams work and are managed efficiently within the computing and digital technologies industry.</p> <p>A2 Understand the purpose project management, business analysis and business management when consulting in the computing and digital technology industries.</p>	<p>A2</p> <p>A2</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p>
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Appraise industry and business practices that support the analysis, design, development, testing and evaluation of computing and digital technologies solutions.</p>	<p>B1</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Develop and maintain a digital portfolio to demonstrate professional capabilities and achievements.</p>	<b>C2</b>	<p>Lectures</p> <p>Practical workshops</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Develop and apply appropriate life-long professional skills through reflection and recording professional capabilities and achievements.</p>	<b>D2</b>	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p> <p>Practical workshops</p> <p>Digital learning</p>

<b>8. Indicative content.</b>
<p><b>Industry Practices</b></p> <p>Working within the computing industry including common development methodologies and frameworks; computing and IT business practices and project management; professional practice and codes of conduct; legal, social, ethical and professional issues in computing.</p> <p><b>Professional Skills</b></p> <p>Teamwork and collaboration; maintain a portfolio to demonstrate, reflect on and record professional capabilities and achievements; time management; online image and social media.</p>



<b>8. Indicative content.</b>
<b>Academic Skills</b>
Literature searching and research skills; academic report writing skills; referencing.

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>				
<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Written Report	60%		%	A1, A2, B1
Coursework Two – Portfolio	40%		%	C1, D1

<b>10. Teaching staff associated with the module</b>
<b>Name and contact details</b>
Simon West wests@btc.ac.uk

<b>11. Key reading list</b>				
<b>Author</b>	<b>Year</b>	<b>Title</b>	<b>Publisher</b>	<b>Location</b>
Cottrell, S.	2015	Skills for success: personal development and employability	Houndmills	

12. Other indicative text (e.g. websites)

<https://www.bcs.org/>

13. List of amendments since last (re)validation

Area amended	Details	Date Central Quality informed

**SCDT51 Advanced Programming and Software Engineering**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT51 Advanced Programming and Software Engineering		
<b>Module tutor</b>	Simon West	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module builds on SCDT41 Programming and Software Fundamentals. The module is intended to further develop programming and software engineering skills.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To provide opportunities for students to operate at all stages of the software development lifecycle</li> <li>• To develop students' awareness of business and technical requirements when developing software solutions.</li> <li>• To develop students' technical skills in advanced programming principles including design patterns and algorithms.</li> <li>• To develop students understanding of secure software solutions and coding standards.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Critical understanding of how to operate at all stages of the software development lifecycle and how teams work efficiently to develop software solutions embracing agile and other development approaches.</p>	<b>A3</b>	<p>Lectures Seminar discussions Case studies</p>
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse business and technical requirements to select and specify appropriate software solutions.</p>	<b>B3</b>	<p>Lectures Seminar discussions Case studies Practical workshops</p>
<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		<p>Lectures Seminar discussions</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p>C1 Design, implement, test, and debug effective and secure software to meet requirements using contemporary methods including agile development and contemporary software development languages.</p> <p>C2 Manage the development and assurance of software artefacts applying secure development practises to ensure system resilience.</p> <p>C3 Configure and deploy software solutions to end users.</p>	<p>C3</p> <p>C4</p> <p>C3</p>	<p>Case studies</p> <p>Practical workshops</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		

<b>8. Indicative content.</b>
<p>Principles and practices of software engineering.</p> <p>Operating all stages of the system development lifecycle.</p> <p>Implementation, evaluation and selection of advanced data structures including vectors, maps and binary trees.</p> <p>Algorithm fundamentals, including searching and sorting.</p>

**8. Indicative content.**

Evaluating the space and time complexity of algorithms and data structures using Big O.  
 OOP software development using multiple classes and design/architecture patterns including MVC.  
 Secure coding principles and industry practices.  
 Version control and management.  
 Configuring and deploying software solutions.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

**Assessment Strategy:** 100% Coursework

Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Case Study Report	50%		%	A1, B1
Coursework Two – Software Artefact and Documentation	50%		%	C1, C2, C3

**10. Teaching staff associated with the module**

Name and contact details  
 Simon West wests@btc.ac.uk

**11. Key reading list**

Author	Year	Title	Publisher	Location
Heineman, T. Pollice, G.	2015	Algorithms in a Nutshell	O'Reilly	

11. Key reading list				
Author	Year	Title	Publisher	Location
Stephens, R.	2015	Beginning Software Engineering	Wiley	

12. Other indicative text (e.g. websites)

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT52 User Experience (UX) and Full Stack Development**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT52 User Experience (UX) and Full Stack Development		
<b>Module tutor</b>	Simon West	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
The module builds on SCDT42 Web Application Development.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To develop students' understanding of user experience design and requirements engineering.</li> <li>• To develop students' understanding of the principles of requirements engineering and the importance of managing requirements.</li> <li>• To develop students modelling and analysis techniques.</li> <li>• To provide opportunities to develop a full-stack web application from user driven requirements.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No



7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand and appraise the tools and techniques used in user experience (UX) design and requirements engineering.</p>	A3	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse business problem scenarios and define requirements through the application of modelling and analysis techniques.</p> <p>B2 Develop a clear, complete, unambiguous and testable requirements specification.</p>	<p>B3</p> <p>B4</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Design and develop a suitable full stack web application for a required specification using contemporary frameworks.</p> <p>C2 Fully test and evaluate a full stack web application using user experience (UX) assessment methods.</p>	<p>C3</p> <p>C3</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Practical workshops</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Communicate designs and requirements using a variety of media and a range of methods, appropriate to a given type of audience.</p>	<p>D4</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Practical workshops</p>

<b>8. Indicative content.</b>
<p>Front end development, HTML, CSS, Web Standards, CSS compression and optimisation. Web-based scripting languages. Short introduction to languages such as PHP, ASP, etc. Processing of HTML forms using server-side scripts. Connecting web pages to databases. Dynamic web content, database-driven. Typical web-based server-side applications, e.g. online shopping, content management and the integration of online APIs. UX design; information architecture; interaction design; visual design; usability; building and testing; determining users; UX modelling; content strategies; measuring UX.</p>

9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
<b>Assessment Strategy:</b> 100% Coursework				
Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Case Study Presentation	50%		%	A1, B1, B2, D1
Coursework Two – Web Application and Documentation	50%		%	C1, C2

10. Teaching staff associated with the module
Name and contact details
Simon West wests@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Duckett, J.	2011	HTML and CSS: Design and Build Websites	Wiley	
Duckett, J.	2014	JavaScript and JQuery: Interactive Front-End Web Development	Wiley	
Soegaard, M.	2018	The Basics of User Experience Design: A UX Design Book by the Interaction Design Foundation	Soegaard	
Duckett, J.	2019	PHP & MySQL: Server-side Web Development	Wiley	

12. Other indicative text (e.g. websites)
<a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://www.lynda.com/">https://www.lynda.com/</a>

<https://ocw.mit.edu/index.html>  
<https://www.w3schools.com/>  
<https://www.html5rocks.com/en/>

13. List of amendments since last (re)validation

Area amended	Details	Date Central Quality informed

**SCDT53 Advanced Networking and Cyber Security**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT53 Advanced Networking and Cyber Security		
<b>Module tutor</b>	Ben Pople	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>This module builds on SCDT43 Networking and Cyber Security Fundamentals and supports students to gain a more advanced understanding of computer networks and cyber security. Previous knowledge is expanded and applied to more complex examples within industry, students will also creatively evaluate threats and vulnerabilities in order to effectively mitigate cyber security threats.</p>

3. Aims of the module
<p>To develop an understanding of types of security and the security big picture, and common attack techniques in cyber security.</p> <p>To provide opportunities to plan, design and manage advanced computer networks.</p> <p>To develop student skills in producing a security case against recognised security threats and recommend mitigation.</p>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Critically understand the types of security (confidentiality, authentication; non-repudiation; service integrity) and security big picture (network security; host OS security; physical security).</p> <p>A2 Comprehensively understand the main types of common cyber-attack techniques.</p>	<p>A4</p> <p>A4</p>	<p>Lectures</p> <p>Seminars</p> <p>Case Studies</p>
B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Analyse and evaluate security threats and vulnerabilities to planned and installed networks or systems and identify potential resolutions or how they can be mitigated against.</p>	<p>B3</p>	<p>Lectures</p> <p>Seminars</p> <p>Case Studies</p> <p>Practical Work</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Plan, design, test and manage computer networks with an overall focus on the services and capabilities that network infrastructure solutions enable in an organisational context.</p> <p>C2 Simulate recognised network security threats and risks.</p> <p>C3 Develop a strategy against recognised network security threats and risks, and recommend mitigation, security controls and appropriate processes.</p>	<p>C3</p> <p>C3</p> <p>C3</p>	<p>Lectures</p> <p>Seminars</p> <p>Case Studies</p> <p>Practical Work</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Work effectively and autonomously when undertaking independent activity.</p>	<p>D3</p>	<p>Case Studies</p> <p>Practical Work</p>

<b>8. Indicative content.</b>
<p>Key security terms, such as confidentiality, authentication and non-repudiation. What these mean within the home environment, as well as organisational-level, and their implications on software and hardware security requirements.</p> <p>Network vulnerabilities and threats, such as phishing, social-engineering, malware, networking interception, denial of service attacks and theft.</p>

**8. Indicative content.**

Key services provided by networks within the organisation, including a comparison of networked operation systems, as well as Software as a Service and Cloud architectures.

Planning, controlling and mitigating network threats within the Internet of Things architecture, including an investigation of the unique benefits and threats parcelled with this evolving area of computer networking.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

**Assessment Strategy:** 100% Coursework

<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Practical and Presentation	50%	%		A1, A2, C2, D1
Coursework Two – Practical and Written Report	50%	%		B1, C1, C3, D1

**10. Teaching staff associated with the module**

Name and contact details

Ben Pople [popleb@btc.ac.uk](mailto:popleb@btc.ac.uk)



11. Key reading list				
Author	Year	Title	Publisher	Location
Beasley, J and Nikaew, P	2012	A Practical Guide to Advanced Networking	Pearson	
Singh, I	2015	Network Operating Systems	Khanna	
Hadnagy, C	2010	Social Engineering: The Art of Human Hacking	Wiley	

12. Other indicative text (e.g. websites)
<a href="http://www.netacad.co.uk">http://www.netacad.co.uk</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT54 Big Data and Data Science**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT54 Big Data and Data Science		
<b>Module tutor</b>	Bradley Chinn	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module builds on SCDT44 Databases and Information Systems. The module combines both theory and practice, covering the concepts underpinning Big data and data science and the practical experience of applying data analysis in different situations.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To introduce students to the concept of Big Data.</li> <li>• To develop students understanding the processes involved in carrying out data analysis projects and data quality.</li> <li>• To provide opportunities for students to select and evaluate statistical methods.</li> <li>• To enable students to analysis data for business decision making purposes using statistical analyses.</li> <li>• To provide opportunities for students to work effectively and autonomously when undertaking independent activity.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Critically understand quality issues that can arise with data and how to avoid and/or resolve these.</p> <p>A2 Understand the processes used in data analysis and strategies for dealing with big data.</p>	<p>A4</p> <p>A4</p>	<p>Lectures</p> <p>Seminar discussions</p> <p>Case studies</p>
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Select and evaluate statistical methods from which to draw conclusions and extract knowledge from data for business decision making purposes.</p>	<p><b>B3</b></p>	<p>Lectures</p> <p>Case studies</p> <p>Practical workshops</p>
<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		<p>Lectures</p> <p>Practical workshops</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
C1 Import, cleanse, transform, and validate types of data. C2 Perform routine statistical analyses and ad-hoc queries on data, including big data, to identify trends and extract knowledge.	C3  C3	

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<i>At the end of the module, students will be expected to:</i> D1 Communicate written models and complex solutions effectively and fluently.	D3	Lectures Seminar discussions Practical workshops

<b>8. Indicative content.</b>
Introduction to big data: Big data types, importing structured and unstructured data, manipulating big data, producing reports, anomaly detection and data visualisation. Basics of statistical inference: Confidence limits; Null and alternative hypotheses; significance level and a range of inference tests. Correlation and Regression: Bivariate correlation, Multivariate Linear Regression; Ethical considerations of Big data and data science.

9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
Assessment Strategy: 100% Coursework				
Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Written Assessment	50%		%	A1, A2
Coursework Two – Practical and Case Study Report.	50%		%	B1, C1, C2, D1

10. Teaching staff associated with the module
Name and contact details
Bradley Chinn chinn@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
EMC Education Services	2015	Data science & big data analytics : discovering, analyzing, visualizing and presenting data	EMC	
Kelleher, J. Tierney, B.	2018	Data Science	MIT	
McKinney, W.	2017	Python for Data Analysis	O’Rielly	

12. Other indicative text (e.g. websites)
<a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://www.lynda.com/">https://www.lynda.com/</a> <a href="https://ocw.mit.edu/index.html">https://ocw.mit.edu/index.html</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT55 Virtual Reality and Immersive Technologies**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT55 Virtual Reality and Immersive Technologies		
<b>Module tutor</b>	David Matravers	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module builds on SCDT45 3D Visualisation and Interaction Design (IxD). In this module students will have a further opportunity to build on their 3D modelling skills by implementing these into a virtual reality; using immersive technologies.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To introduce students to the principles, processes and methods in the development of virtual reality and immersive technologies.</li> <li>• To explore and develop virtual reality solutions for the computing and other industries.</li> <li>• To develop students' professional communication and team working skills.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Critically understand the principles, processes and methods in the development of virtual reality and immersive technologies.</p>	A3	Lectures Practical Workshops
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Critically analyse the extent to which virtual reality and immersive technologies meets the criteria for its current use and future development.</p>	<b>B4</b>	Lectures Practical Workshops
<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		Lectures Practical Workshops



<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
C1 Design and develop interactive virtual and augmented reality solutions that utilise immersive technologies.	C3	

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Work both independently, and co-operatively as a member of a group to generate virtual and augmented reality solutions whilst managing time and other resources effectively.</p> <p>D2 Communicate ideas, information and arguments professionally and effectively when working as a team.</p>	<p><b>D3</b></p> <p>D4</p>	<p>Lectures</p> <p>Practical Workshops</p>

<b>8. Indicative content.</b>
Virtual/augmented/mixed reality interfaces; headsets, tracking techniques, headset specifications (i.e. FOV, resolution), touch controllers, eye tracking; simulator sickness; culling this for those more sensitive through FOV constriction, snap-turning, teleportation locomotion; haptic feedback; hand tracking; ethical considerations; VR/AR devices and requirements; cost and availability; creating content; real life capture; immersive audio.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Written Report	50%		%	A1, B1
Coursework Two – VR/AR Solution and Documentation	50%		%	C1, D1, D2

**10. Teaching staff associated with the module**

<b>Name and contact details</b>
David Matravers matraversd@btc.ac.uk

**11. Key reading list**

<b>Author</b>	<b>Year</b>	<b>Title</b>	<b>Publisher</b>	<b>Location</b>
Parisi, T.	2015	Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile	O'Reilly Media	
Claudia tom Dieck, M and Jung, T.	2019	Augmented Reality and Virtual Reality: The Power of AR and VR for Business	Springer Nature Switzerland AG	
Palmer, C and Williamson, J.	2018	Virtual Reality Blueprints: Create compelling VR experiences for mobile and desktop	Packt Publishing	
Anderson, A.	2019	Virtual Reality, Augmented Reality and Artificial Intelligence in Special Education: A Practical Guide to Supporting Students with Learning Differences	Routledge	

12. Other indicative text (e.g. websites)

<https://unity3d.com/learn/tutorials>  
<https://3dtotal.com/tutorials/3ds-max>  
<https://www.lynda.com/>

13. List of amendments since last (re)validation

Area amended	Details	Date Central Quality informed

**SCDT56 Collaborative Team Project and Industry Experience**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT56 Collaborative Team Project and Industry Experience		
<b>Module tutor</b>	Simon West	<b>Level</b>	5
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>This module builds on SCDT46 Professional Skills and Industry Practices. The module provides an opportunity for students to collaborate in the development of a computing and digital technologies project. Students will implement project management techniques in the delivery of a computer-based project within a required timescale, in turn, facilitating the development of communication and interpersonal skills.</p> <p>In addition, students will undertake, report and reflect upon a minimum 15-day individual industry experience placement. The placement will enable students to develop the qualities and transferrable skills necessary for working in the computing and digital technologies industry including the ability to apply their academic and professional practice in the real-world.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To develop students' awareness of how to deliver a technology solutions project accurately consistent with business needs.</li> <li>• To develop students' skills in planning and managing a computing and digital technologies team project.</li> <li>• To develop professional and ethical standards involved in computing and digital technologies by the undertaking of an industry experience placement.</li> <li>• To introduce the expectations of a computing and digital technologies project in preparation for the Level 6 individual project.</li> </ul>

4. Pre-requisite modules or specified entry requirements
No

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Critically understand the use, management and deployment of computing and digital technologies solutions within specific businesses and the wider industry.</p> <p>A2 Understand how to deliver a technology solutions project accurately consistent with business needs.</p> <p>A3 Understand the issues of quality, cost and time for projects, including contractual obligations and resource constraints.</p>	<p><b>A4</b></p> <p><b>A4</b></p> <p><b>A4</b></p>	<p>Lectures Seminars Case studies</p>
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Critically analyse the key issues in a computing and digital technologies project and undertake research to understand previous relevant solutions.</p>	<p>B4</p>	<p>Lectures Seminars Case studies</p>



## 8. Indicative content.

### **Collaborative Team Project**

Students are required to work as part of collaborative team approved by the module tutor. Each team is required to produce a written proposal for a relevant project idea of their own choosing or from a published list. The project must be relevant to the Computer and Digital Technologies industry. The written proposal will be submitted as team, but each student will be assessed on their own individual contribution. This will be assessed by the module tutor and carries 10% weighting of the overall mark for this module.

The written project proposal will address the nature of the project and any ethical considerations. Each proposal will then be considered by an internal ethics panel for final approval. If the ethics panel is not satisfied with any aspect of the proposed project, conditions will be provided, and the proposal will need to be re-submitted to the panel before the project can proceed.

On approval, the students will work collaboratively to produce their proposed Computer and Digital Technologies solution e.g. a software artefact, web application or cyber security assessment. On completion of the team project, each student is required to produce an individual project report on the final solution. This report is assessed individually. This will be assessed by the module tutor and carries 50% weighting of the overall mark for this module.

Each project team will also be required to give a demonstrative presentation to peers and academic staff on their final projects, each student will be assessed on their own individual contribution to this presentation. This will be assessed by the module tutor and carries 20% weighting of the overall mark for this module.

### **Industry Experience**

As part of this module each student is expected to undertake a minimum 15-days mandatory industry experience placement with a business operating within the Computer and Digital Technologies industry. This placement is undertaken individually and is independent of the collaborative team project. Each student must produce a reflective industry experience account within their professional portfolio. This will be assessed by the module tutor and carries 20% weighting of the overall mark for this module.

9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
Assessment Strategy: 100% Coursework				
Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
<b>Coursework One</b> Team project proposal	10%		%	A3, C1
<b>Coursework Two</b> Individual report of final team project	50%		%	A1, B1, D1
<b>Coursework Three</b> Team presentation of final team project	20%		%	A2, D2
<b>Coursework Four</b> Individual industry experience account	20%		%	C2

10. Teaching staff associated with the module
Name and contact details
Simon West wests@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Dawson, C.W.	2015	The Essence of Computing Projects: A Student's Guide.	Prentice Hall	



11. Key reading list				
Author	Year	Title	Publisher	Location
Cottrell, S.	2014	Dissertations and Project Reports: A Step by Step Guide (Palgrave Study Skills)	Macmillian	
Wysocki, R. K.	2019	Effective Project Management: Traditional, Agile, Extreme	Wiley	

12. Other indicative text (e.g. websites)

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT61 Software Development and Quality Assurance**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT61 Software Development and Quality Assurance		
<b>Module tutor</b>	Simon West	<b>Level</b>	6
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module is aimed to enable students to acquire a critical understanding of the management and methodological issues associated with software development and software quality assurance. This module builds on SCDT51 Advanced Programming and Software Engineering.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To enable students to critically analyse suitable software quality assurance methods in a proposed software development project.</li> <li>• To develop students critical understanding of how to apply software analysis and design approaches.</li> <li>• To enable students to deliver and deploy software solutions to industry standards and perform functional and unit testing.</li> <li>• To enable students to apply verification and validation techniques for software quality control.</li> </ul>

4. Pre-requisite modules or specified entry requirements
None

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand and advise upon the issues and approaches associated with software development and software quality assurance/control.</p> <p>A2 Understand how to apply software analysis and design approaches.</p>	<p><b>A5</b></p> <p><b>A5</b></p>	<p>Lectures</p> <p>Seminars</p> <p>Case studies</p>
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 To analyse suitable software tools and software quality assurance methods in a proposed software development project.</p>	<p>B5</p>	<p>Lectures</p> <p>Practical workshops</p> <p>Seminars</p>
<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>	<p><b>C5</b></p>	<p>Lectures</p> <p>Practical workshops</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
C1 Demonstrate an ability to perform functional and unit testing. C2 To apply verification and validation techniques for software quality control and advise upon their appropriateness. C3 Deliver software solutions using industry standard build processes, and tools for version control and software build, release and deployment.	C5  C5	Seminars

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<i>At the end of the module, students will be expected to:</i> D1 Conduct research effectively, drawing on a wide variety of sources under minimal direction, and be proficient in the use of referencing sources of information;	D5	Lectures Practical workshops Seminars Case Studies

<b>8. Indicative content.</b>
Software and systems engineering; software lifecycles and methodologies; project management: planning & scheduling, monitoring, cost, risk, etc. verification and validation for software quality; quality assurance and management; software quality control; software development; software deployment.

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>
<b>Assessment Strategy:</b> 100% Coursework

9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Written Report	50%		%	A1, A2, B1, D1
Coursework Two – Software Artefact and Documentation	50%		%	C1, C2, C3, B1

10. Teaching staff associated with the module
Name and contact details
Simon West wests@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Martin, R.	2008	Clean Code: A Handbook of Agile Software Craftsmanship	Prentice Hall	
Dooley, J.	2017	Software Development, Design and Coding: With Patterns, Debugging, Unit Testing, and Refactoring	Apress	
Walkinshaw, N.	2017	oftware Quality Assurance: Consistency in the Face of Complexity and Change (Undergraduate Topics in Computer Science)	Springer	

12. Other indicative text (e.g. websites)
<a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://www.lynda.com/">https://www.lynda.com/</a> <a href="https://ocw.mit.edu/index.html">https://ocw.mit.edu/index.html</a>

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT62 Smart Device Application Development**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT62 Smart Device Application Development		
<b>Module tutor</b>	Simon West	<b>Level</b>	6
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>Smart devices are an integral part of today's society, everyday life and information systems. The design and development of software applications for devices such as smart phones, tablets and digital assistants requires a critical understanding of the platform and its constraints. Designers and developers need to appreciate the distinct characteristics of smart devices and be able to select appropriate tools and standards to design and develop such applications. This module builds on SCDT52 User Experience (UX) and Full Stack Development.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To develop students' awareness of issues involved with new emerging smart devices technology and their applications.</li> <li>• To provide opportunities for students to problem-solve autonomously/with minimal supervision.</li> <li>• To provide opportunities for students to design, develop and deploy smart device applications.</li> </ul>

4. Pre-requisite modules or specified entry requirements
None

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

<b>7. Intended learning outcomes</b>		
<b>A. Knowledge and understanding</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand and critically appraise professional, economic, social, environmental, privacy and ethical issues involved with new emerging smart devices technology and their applications.</p>	A6	Lectures Seminars Digital learning
<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Effectively problem-solve with regards to the planning and production of smart device applications that are produced autonomously/with minimal supervision.</p>	B5	Lectures Practical workshops Seminars
<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		Lectures Practical workshops



<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
C1 Design, develop and deploy smart device applications to meet user and business requirements following industry standard practices.	C5	Seminars

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<i>At the end of the module, students will be expected to:</i> D1 Conduct research effectively, drawing on a wide variety of sources and be proficient in the use of referencing sources of information when researching the impacts of smart device applications.	<b>D5</b>	Lectures Practical workshops Seminars

<b>8. Indicative content.</b>
Smart device application life cycle; smart device application ecosystem; mobile hardware (sensors); mobile software (operating systems) mobile application design; smart device application development; UI; UX; data services including public APIs; networking services; alternative external services; deploying and promoting smart device applications

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>
<b>Assessment Strategy:</b> 100% Coursework

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Case Study Presentation	50%		%	B1, C1
Coursework Two – Software Artefact and Documentation	50%		%	A1, D1

**10. Teaching staff associated with the module**

Name and contact details
Simon West wests@btc.ac.uk

**11. Key reading list**

Author	Year	Title	Publisher	Location
Berkowski, G.	2017	How to Build a Billion Dollar App: Discover the secrets of the most successful entrepreneurs of our time	Piatkus	
Lea, P.	2018	Internet of Things for Architects	Packt	

**12. Other indicative text (e.g. websites)**

<a href="https://developer.amazon.com/alexa-voice-service/sdk">https://developer.amazon.com/alexa-voice-service/sdk</a> <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a> <a href="https://ocw.mit.edu/index.html">https://ocw.mit.edu/index.html</a>
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13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed

**SCDT63 Penetration Testing and Ethical Hacking**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT63 Penetration Testing and Ethical Hacking		
<b>Module tutor</b>	Ben Pople	<b>Level</b>	6
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
<p>This module builds on SCDT53 Advanced Networking and Cyber Security. Learners will utilise their foundational and advanced knowledge previously attained in order to showcase a holistic knowledge of networking and cyber security. This culminates in the ability to act as a penetration tester and ethical hacker, using a wide variety of tools and techniques to fully evaluate vulnerabilities, threats and remedies within network security.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To enable students to engage with a range of techniques that will allow an ethical hacker or penetration tester to understand their role and responsibilities identify targets (physical, virtual and human)</li> <li>• .</li> <li>• To examine penetration testing service including blue team/red team/purple team activities.</li> <li>• To enable students to probe systems and services for vulnerabilities before documenting the exploitable resources.</li> <li>• To evaluate protective mechanisms, appropriate to modern computer networks.</li> </ul>

4. Pre-requisite modules or specified entry requirements
None

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Understand and critique the roles and responsibilities of an ethical hacker and penetration tester, with consideration for legal and ethical issues.</p>	<b>A6</b>	<p>Lecturers Seminars Case Studies Digital learning</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Critically select appropriate tools and techniques that could be used to both attack and defend in given cyber security scenarios.</p> <p>B2 Interpret results from a range of tools and documenting findings in an appropriate manner.</p>	<p><b>B6</b></p> <p><b>B6</b></p>	<p>Lecturers Seminars Case Studies Practical Work Digital learning</p>

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Perform penetration testing as a member of the blue team/red team/purple team for a penetration testing service.</p> <p>C2 Produce detailed documentation of operations undertaken and the corrective measures needed to ensure future security.</p>	<p>C6</p> <p>C6</p>	<p>Lecturers Seminars Case Studies Practical Work Digital learning</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Apply critical and thinking skills and using an analytical approach to ethical hacking and penetration testing.</p>	<p>D6</p>	<p>Lecturers Seminars Case Studies Practical Work Digital learning</p>

<b>8. Indicative content.</b>
<p>Ethical hacking and penetration testing as a career – the roles, responsibilities, ethical and legal considerations that one has to consider.</p> <p>The tools and techniques required for effective penetration testing, such as foot-printing, reconnaissance, scanning, data access and exploitation techniques. The importance of documentation is crucial, and each of these techniques must be considered for their ethical and legal implications, as well as their effectiveness. Possible protection or mitigation mechanisms in place must also be understood and scouted.</p>

**8. Indicative content.**

Reverse engineering, as well as the ability to break through wireless network encryption and firewalls, will be considered in relation to quick extrication with no trace.

Legal/ethical context, footprinting, scanning, enumeration, sniffing, social engineering, application level attacks, wireless networks, firewalls, network access control, traffic auditing, exfiltration techniques, anonymisation, reverse engineering.

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

**Assessment Strategy:** 100% Coursework

Assessment Task	Weighting	Week submitted	Grading (Pass / Fail / %)	Module Learning Outcome(s) the assessment task maps to
Coursework One – Case Report	50%		%	A1, B1, D1
Coursework Two – Practical and Documentation	50%		%	B2, C1, C2

**10. Teaching staff associated with the module**

Name and contact details

Ben Pople poplep@btc.ac.uk

**11. Key reading list**

Author	Year	Title	Publisher	Location
Diogenes, Y and Ozakya, E.	2018	Cybersecurity – Attack and Defence Strategies	Packt	
Velu Kumar, V.	2017	Mastering Kali Linux for Advanced Penetration (2 <sup>nd</sup> Edition)	Packt	

12. Other indicative text (e.g. websites)

<https://www.khanacademy.org/>  
[http://linux.wikia.com/wiki/Kali\\_Linux](http://linux.wikia.com/wiki/Kali_Linux)  
<https://ocw.mit.edu/index.html>

13. List of amendments since last (re)validation

Area amended	Details	Date Central Quality informed



**SCDT64 Artificial Intelligence and Machine Learning**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT64 Artificial Intelligence and Machine Learning		
<b>Module tutor</b>	Simon West	<b>Level</b>	6
<b>Module type</b>	Taught	<b>Credit value</b>	20
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	200		

2. Rationale for the module and its links with other modules
This module builds on Big Data and Data Science. The module aims to introduce students to the worlds of machine learning and artificial intelligence and explore its use in modern society. Students will explore different machine learning and artificial intelligence methods and techniques to produce their own solutions.

3. Aims of the module
<ul style="list-style-type: none"> <li>• To enable students to evaluate artificial intelligence, machine learning and decision making for data science.</li> <li>• To critique the key concepts and techniques associated with machine learning and artificial intelligence.</li> <li>• To enable students to develop technical skills in using AI and machine learning to solve complex problems.</li> <li>• To enable student to develop critical thinking skills.</li> </ul>

4. Pre-requisite modules or specified entry requirements

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 To understand and critique the concepts of artificial intelligence, machine learning and decision making for data science, and compare and test a range of techniques.</p>	A5	Lecturers Seminars

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 To evaluate features of data sources, analysing and interpreting the outputs of machine learning and decision-making techniques in the context of practical situations.</p>	B6	Lecturers Seminars Case Studies Practical Work

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Develop a knowledge based system to analysis input data to solve a complex problem.</p> <p>C2 Implement appropriate machine learning tools and techniques in the classification of data items.</p>	<p><b>C6</b></p> <p><b>C6</b></p>	<p>Lecturers Seminars Practical Work</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>D1 Apply critical thinking skills and an analytical and scientific approach to problem solving.</p>	<p><b>D6</b></p>	<p>Case Studies Practical Work</p>

<b>8. Indicative content.</b>
<p>What is artificial intelligence and machine learning; applications of AI and ML in society, technology and industry; ethical, social and legal implication of AI and ML.</p> <p>Artificial Intelligence: decision trees, state machines, fuzzy logic, knowledge/rule-based systems; AI and gaming; AI algorithms and techniques;</p> <p>Machine Learning: supervised learning; unsupervised learning; semi-supervised; reinforcement; deep learning; neural networks; regression; clustering; machine learning algorithms and techniques; data sets.</p>

**9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes**

<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>
Coursework One – Practical and Presentation.	50%		%	A1, C2, D1
Coursework Two – Practical and Written Report	50%		%	B1, C1, D1

**10. Teaching staff associated with the module**

Name and contact details
Simon West wests@btc.ac.uk

**11. Key reading list**

Author	Year	Title	Publisher	Location
Geron, A.	2017	Hands-On Machine Learning with Scikit-Learn and TensorFlow.	Wiley	
Norvig, P.	2016	Artificial Intelligence: A Modern Approach	Pearson	

**12. Other indicative text (e.g. websites)**

<a href="https://ocw.mit.edu/index.html">https://ocw.mit.edu/index.html</a> <a href="https://archive.ics.uci.edu/ml/index.php">https://archive.ics.uci.edu/ml/index.php</a>
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**13. List of amendments since last (re)validation**

Area amended	Details	Date Central Quality informed

**SCDT65 Individual Project**  
Module Specification

1. Factual information			
<b>Module title</b>	SCDT65 Individual Project		
<b>Module tutor</b>	Simon West	<b>Level</b>	6
<b>Module type</b>	Taught	<b>Credit value</b>	40
<b>Mode of delivery</b>	Taught face-to-face		
<b>Notional learning hours</b>	400		

2. Rationale for the module and its links with other modules
<p>This individual project will provide students with the opportunity to apply the knowledge and skills that they have acquired on the programme, in a scientific manner to enable the development of a substantial computing project and write a comprehensive dissertation style report.</p> <p>Students will develop strategies allowing them to understand and practice problem solving with regard to inception, research, synthesis, realisation and evaluation. The module culminates in a final presentation of their computing project to a panel.</p>

3. Aims of the module
<ul style="list-style-type: none"> <li>• To enable students to become proficient in the extended application and manipulation of a range of tools, techniques and technologies in the production and delivery of a complex computing project</li> <li>• To fully plan and manage a self-developed design brief and final computer project in a professional manner.</li> <li>• To exercise and evaluate self-management skills</li> </ul>

4. Pre-requisite modules or specified entry requirements

5. Is the module compensatable?
No

6. Are there any PSRB requirements regarding the module?
No

7. Intended learning outcomes		
A. Knowledge and understanding	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module, students will be expected to:</i></p> <p>A1 Appraise essential facts, concepts, theory, principles and practice in the development of a professional project proposal.</p> <p>A2 A critical awareness of the professional, economic, social, environmental, moral and ethical issues involved in the design, development and deployment of computing and digital technologies solutions.</p>	<p><b>A5</b></p> <p><b>A6</b></p>	<p>Lecture Seminars Practical workshops</p>

B. Cognitive skills	Programme Learning Outcome(s) this maps against	Learning and teaching strategy
<p><i>At the end of the module students will be expected to:</i></p> <p>B1 Develop and apply new creative techniques and processes in the development and application of problem solving strategies throughout the professional computing project process</p> <p>B2 Conduct specialist literature review in order to judge the reliability, validity and significance of evidence to support conclusions and/or recommendations in the design, production and evaluation of a computing asset.</p>	<p><b>B5</b></p> <p><b>B6</b></p>	<p>Lecture Seminars Practical workshops Tutorial</p>

<b>B. Cognitive skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
B3 Critically evaluate and test the extent to which the developed computing asset meets defined criteria	<b>B5</b>	

<b>C. Practical and professional skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p> <p>C1 Manage own learning and work independently with confidence, adhering to professional codes of conduct and applying the entrepreneurial skills required in the computing sector.</p> <p>C2 Deploy new and previously acquired skills in the specification, design, implementation and evaluation of a major computing project</p> <p>C3 Examine, analyse and critically evaluate progress regularly in the form of a production log, reflecting upon strategies and methodologies appropriately in order to devise appropriate solutions in relation to the planning, development and implementation of a major computing project.</p>	<p><b>C5</b></p> <p><b>C6</b></p> <p><b>C6</b></p>	<p>Lecture</p> <p>Seminars</p> <p>Practical workshops</p>

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p><i>At the end of the module, students will be expected to:</i></p>		Lecture

<b>D Key transferable skills</b>	<b>Programme Learning Outcome(s) this maps against</b>	<b>Learning and teaching strategy</b>
<p>D1 Plan and implement actions taking responsibility for continuing professional development, including time management and organisational skills.</p> <p>D2 Apply critical thinking skills and an analytical and scientific approach to problem solving to complex problem and conducting research.</p> <p>D3 Conduct research effectively, drawing on a wide variety of sources under minimal direction, and be proficient in the use of referencing sources of information.</p>	<p><b>D6</b></p> <p><b>D6</b></p> <p><b>D5</b></p>	<p>Seminars</p> <p>Practical workshops</p>

<b>8. Indicative content.</b>
<p>This module requires students to develop a self-directed brief (with support from a subject specialist project supervisor), which involves the research, planning and design and implementation of a computing project. Regular progress review meetings with your allocated project supervisor will take place throughout the year, with support and guidance offered with the initial project concept, rationale and deliverables.</p> <p>The written project proposal will address the nature of the project and any ethical considerations. Each proposal will then be considered by an internal ethics panel for final approval. If the ethics panel is not satisfied with any aspect of the proposed project, conditions will be provided, and the proposal will need to be re-submitted to the panel before the project can proceed.</p> <p>Project reporting will include detail of project planning, research and development, use of resources and the presentation of the honours project findings in a report which supports the final presentation and academic poster of the final project.</p>

<b>9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes</b>				
<b>Assessment Strategy:</b> 100% Coursework				
<b>Assessment Task</b>	<b>Weighting</b>	<b>Week submitted</b>	<b>Grading (Pass / Fail / %)</b>	<b>Module Learning Outcome(s) the assessment task maps to</b>



9. Assessment strategy, assessment methods, their relative weightings and mapping to module learning outcomes				
Coursework One Project Proposal	10%		%	A2
Coursework Two Project Report	60%		%	A1, B2, B3, C2, C3, D3
Coursework Three Presentation (Viva) and Academic Poster	20%		%	B1, D2
Coursework Four Project Logs	10%		%	C1, D1

10. Teaching staff associated with the module
Name and contact details
Simon West wests@btc.ac.uk

11. Key reading list				
Author	Year	Title	Publisher	Location
Dawson, C.W.	2015	The Essence of Computing Projects: A Student's Guide.	Prentice Hall	
Cottrell, S.	2014	Dissertations and Project Reports: A Step by Step	Macmillian	

11. Key reading list				
Author	Year	Title	Publisher	Location
		Guide (Palgrave Study Skills)		
Wysocki, R. K.	2019	Effective Project Management: Traditional, Agile, Extreme	Wiley	

12. Other indicative text (e.g. websites)

13. List of amendments since last (re)validation		
Area amended	Details	Date Central Quality informed