



School of Computing, Engineering and Built Environment

Department of Computing

**BSc/BSc (Hons) Software Development (GA)
P03045**

Programme Specification

Appendix A

Date: April 2022

1. GENERAL INFORMATION

1. Programme Title:	BSc (Hons) Software Development (GA)
2. Final Award:	BSc (Hons) Software Development (GA)
3. Exit Awards:	BSc Software Development (GA) University Diploma in Computing University Certificate in Computing
4. Awarding Body:	Glasgow Caledonian University
5. Period of Approval:	September 2021
6. School:	School of Computing, Engineering and Built Environment
7. Host Department:	Department of Computing
8. UCAS Code:	7U8K
9. PSB Involvement:	British Computer Society, Skills Development Scotland
10. Place of Delivery:	Glasgow City Campus
11. Subject Benchmark Statement:	Computing
12. Dates of PSP Preparation/Revision:	April 2022

2. EDUCATIONAL AIMS OF THE PROGRAMME

The BSc/BSc (Hons) Software Development for Business (GA) programme has been developed to provide apprentices with the knowledge, understanding and skills needed to become effective Software Development professionals capable of working on the development of the software systems required by modern businesses. Specifically, this programme of study provides work-based learning opportunities at a BSc / BSc (Hons) level. Apprentices combine academic study with employer specific knowledge acquisition and skills development enabling participants to become more effective and productive in the workplace.

In the UK software professional roles are the fastest-growing in the ICT sector. This has led to an increased demand for employable and productive software engineering graduates. The programme development team has worked closely with the Sector Skills Council for Business and Information Technology, and top graduate employers to ensure the learning outcomes of this programme meet the competencies required by the ICT industry. The programme is also in alignment with the requirements of the SDS GLA ICT / Digital to SCQF Level 10 Framework and is therefore designed to accommodate apprentices currently working in industry.

This programme distinguishes itself from other ICT programmes in the following ways:

- (i) Over the past 5 years the computing landscape has experienced a “once every 20–25 years” shift to a new technology platform for growth and innovation called the “Third Platform”. On the Third Platform mobile devices and apps, cloud services, mobile broadband networks, Big Data analytics, and social networking technologies come together and create opportunities for innovation. It is estimated that by 2020 over 40% of the ICT industry’s revenue and 98% of its growth will be driven by Third Platform technologies¹. The Software Development for Business programme is aligned with this “Third Platform” since it incorporates cloud, mobile and web platform development as well as Big Data Analytics.
- (ii) Through industrial and partner engagement we recognise the need for a more focussed work based degree programme that offers the learner work based experience while studying for a degree level qualification. It is also recognised and agreed with industrial partners that this requires a different and accelerated learning model completed in four years just as for full-time delivery.

¹ http://eskills-lead.eu/fileadmin/lead/reports/lead_-_technology_trends_-_august_2014_rev_sep1.pdf

This programme is derived from and has the same learning outcomes as the current BSc/BSc (Hons) Software Development for Business which is accredited by the British Computer Society (BCS) Core Requirements for Accreditation of Honours Programmes and The Degree Competency Outcomes for Software Development. On successful approval we would present this variation of the programme seeking accreditation with the BCS.

2.1 Programme Philosophy

The philosophy of the programme is to produce multi-disciplinary professional Graduate Apprentice (GA) Software Engineers with a bias towards software development and business systems. The programme aims to produce apprentices who have the required knowledge and understanding of specific software engineering principles integrated with an understanding of general software development, design and business reinforced with good personal, inter-personal, team working and project management skills, to enable them to perform effectively in any appropriate work environment. This is reinforced through significant formal integration of Work Based Learning opportunities and Work Based Assessment as negotiated with employers at each level of the programme.

The broad educational aims of this programme are to:

- Provide apprentices with a specific understanding of the theories, concepts, processes, methods and tools used for software development, and their application to the development of solutions that have real business value.
- Provide apprentices with expert knowledge of the entire software development life cycle.
- Create in the apprentice, the ability to think clearly and logically.
- Equip apprentices with a range of theoretical and practical skills relevant to the task of developing and evaluating robust software solutions to real world problems.
- Enable apprentices to develop a cultural understanding of the context of software applications.
- Equip apprentices with the ability to work as an individual and as part of a team to develop and deliver quality software solutions.
- Enable apprentices to acquire good analytical, synthesis and communication skills.
- Enable apprentices to take responsibility for their own learning as they progress through the programme.
- Assist the apprentice in developing the skills required in adapting to changing technological and organisational developments and learning new skills.
- Provide education and training which is accredited by the BCS and aligned to the SDS GA ICT / Digital to SCQF Level 10 Framework.
- Integrate the expertise of staff gained from research, consultancy and scholarly activity into the programme materials where appropriate.
- Develop the apprentices' interpersonal skills to enable effective communication and team working and operate within project management roles.
- Provide a broad education by an integrated study of vocational and academic disciplines.
- Integrate the programme with the apprentice's developing experiential learning and training as part of an apprenticeship with his employer.
- Integrate a work-based learning culture to deepen and broaden academic understanding within the context of employer focussed activities.

2.2 Expected Levels of Attainment

- On successful completion of level 1 an apprentice should have a basic knowledge of the software and hardware concepts which underpin modern computing systems.
- On successful completion of level 2 an apprentice should have a sound knowledge of software design and development and show competence in applying this to a range of software development domains.
- On successful completion of level 3 an apprentice should be able to plan, specify, design, implement and support components of a software system in response to a business need in accordance with fundamental principles and methods, using appropriate techniques and tools.
- On successful completion of level H an apprentice will, in addition, be able to critically evaluate alternative approaches to software solutions and be able to use advanced knowledge and techniques in the

construction of a software solution.

3. INTENDED LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas: [cross refer to the appropriate benchmark statement]

Preamble

The development of this programme has been informed by:

- The Quality Assurance Agency for Higher Education (QAA) Subject Benchmark Statement for Computing.
- The Joint Task Force on Computing Curricula Computer Science Curricula 2013, ACM and AIS Curriculum Guidelines for Undergraduate Degree Programmes in Information Systems 2010, ACM and IEEE Curriculum Guidelines for Undergraduate Degree Programmes in Information Technology 2008 and the IEEE and ACM Joint Task Force Curriculum Guidelines for Undergraduate Degree Programmes in Software Engineering 2014.
- The British Computer Society (BCS) Core Requirements for Accreditation of Honours Programmes.
- The Department of Computing research in the areas of:
 - Networks and Communications,
 - Distributed and Pervasive Systems Initiative,
 - Interactive and Trustworthy Technologies,
 - Visual, Affective and Pervasive Systems and
 - Computer Science Education.
- The Department of Computing Knowledge Transfer and Lifelong Learning programmes.
- Glasgow Caledonian University's Strategy for Learning (SfL).
- The School of Computing, Engineering and Built Environment Learning, Teaching and Assessment Strategy (LTAS).
- The requirements documented in the Skills Development Scotland Graduate Level Apprenticeship ICT / Digital SCQF Level 10 Framework (Appendix 2 table shows a mapping that is compliant with SDS Graduate Level Apprenticeship Framework IT and Digital SCQF Level 10 IT Software Development Learning and Skills Outcomes).

3A Knowledge and understanding:

- A1: Explain the theoretical and practical aspects of software and hardware that underpins modern computer systems.
- A2: Demonstrate knowledge and understanding of facts, concepts, principles and theories relating to software development.
- A3: Utilize and appraise tools and techniques to assist in the development of software systems.
- A4: Demonstrate an understanding of methods used to specify, model, develop, and maintain software systems in an operational context.
- A5: Demonstrate an awareness of the role of the IT professional and the context in which they operate including moral, legal, safety and ethical issues.
- A6: Demonstrate an understanding and appreciation of the importance of negotiation, effective work habits, leadership, and good communication with stakeholders.
- A7: Demonstrate an understanding of the advanced technologies and the techniques required in the development of complex software systems.

3B Practice: Applied knowledge, skills and understanding:

- B1: Undertake the analysis, design, implementation and testing of computer systems across a variety of application domains.
- B2: Demonstrate effective use of a variety of appropriate techniques, tools and integrated development environments in the development and deployment of computer based information systems.
- B3: Use appropriate methods and techniques to specify, develop and deploy software systems and services.

- B4: Demonstrate competence in using processes and organisational working practices to manage IT projects within an operational context.
- B5: Apply theory to practical and realistic career related tasks.
- B6: Develop specialist knowledge and demonstrate through application.
- B7: Demonstrate skills in critical thinking and problem solving.
- B8: Demonstrate skills in critical analysis.
- B9: Demonstrate effective information retrieval and research skills.
- B10: Demonstrate commercial awareness.

3C Generic cognitive skills:

- C1: Identify, analyse and solve practical problems.
- C2: Plan, conduct and report upon work.
- C3: Evaluate alternative solutions to a problem in an appropriate subject domain.
- C4: Critically evaluate work undertaken by themselves and others.
- C5: Gather and evaluate research information from a variety of sources.

3D Communication, numeracy and ICT skills:

- D1: Communication skills, written, oral and listening.
- D2: Numeracy as applied to the solution of software development problems.
- D3: Computer literacy.
- D4: Presentation skills.

3E Autonomy, accountability and working with others:

- E1: Self-confidence, self-discipline and self-reliance (Independent working).
- E2: Awareness of strengths and weaknesses.
- E3: Creativity, innovation and independent thinking.
- E4: Knowledge of international affairs.
- E5: Appreciating and desiring the need for continuing professional development.
- E6: Reliability, integrity, honesty and ethical awareness.
- E7: Entrepreneurial independence and risk taking.
- E8: Ability to prioritise tasks and time management.
- E9: Interpersonal skills, team working and leadership.
- E10: Gain additional industry focussed competence in the application of the knowledge and practical skills obtained on this programme.
- E11: Develop an understanding of the practical considerations that constrain the application of theory in the workplace.
- E12: Communicate and interact effectively in a work place environment.
- E13: Evaluate current research and technology concepts and their relationship and application to work based problems.

Strategy for Learning:

The Strategy for Learning (SfL) for this programme has been designed to meet the overall aims of the programme as well as the specific learning outcomes expected of apprentices. The teaching approach is student centred, practical, participative and has been designed to move away from the traditional teacher centred paradigm to a more active, apprentice driven, independent model of learning using state of the art technologies necessary for employability in the digital age. The integration of Work-Based Learning and Assessment is fundamental to the ethos of this programme and an essential component requiring a formal structured interaction between academia and the employer. The programme structure has a core of 25% Work Based Assessment with the opportunity to increase this to around 40%-50%. This can be achieved through modules incorporating generic and negotiated Work-Based Assessment contextualised to the individual's workplace.

The accelerated learning model for this programme runs over three trimesters (i.e. the full year) with the third trimester over the summer primarily delivered through a work based learning format agreed and

delivered in partnership between the company and the academic team. This accelerated programme uniquely allows completion of this part time degree in four years.

The delivery of our accelerated model differs from our existing undergraduate full and part-time design, implementation and execution. We recognise that an approach based on work based principles (as described in the SDS Graduate Level Apprenticeships Work-Based Learning Principles document) requires careful execution to exploit the work based pedagogy and gain the significant benefits afforded by effective work based learning.

Modules have been adapted to an on-line format that supports flexible and distributed delivery, as preferred by employers, with a greater focus on mastering material through 'flipped classroom' class contact sessions. In this approach apprentices study the online learning material before a class contact session and spend their time during the sessions guiding activities to support their learning with the module leader.

In this revised approach, content is made available online for learners to work through before they attend seminars where the materials is discussed and related to practical experiences in the workplace. Apprentices are encouraged to reflect on their work practices and review learning from experiences in the workplace.

The appointment of a Company Based Technical Supervisor for each module addresses the need to contextualise the learning for a specific company situation. The Company Based Technical Supervisor will liaise with the Module Leader on practical aspects of the embedding of the work based learning and assessment into the delivery of the module, typically in the form of coursework assignments.

While it is anticipated that seminars will usually take place on campus at GCU to allow learners to interact with each other and build a community of knowledge it is possible that they may also be conducted via Webex, Collaborate in GCULearn or other video conferencing software. This is in response to the fact that apprentices are sometimes required to work at client premises or at other locations outwith Glasgow.

Apprentices are also encouraged to take a broad view of their education and also contextualise course material to their focused personal objectives within the real world and in cooperation and consultation with their employer. A range of delivery methods are used on the programme including: lectures, group based tutorials and seminars (both tutor and student led 'flipped classroom' mode); group based practical exercises (supervised and directed); problem based learning scenarios and case studies; directed study; coursework assignments (individual, group-based, WBL and non-WBL, as appropriate) and supervised projects. Online digital support media allows apprentices to utilise alternative learning material suitable to their personal learning style. Aspects delivered in the 'flipped classroom' mode will require apprentices to view learning material online and complete formative assessments prior to engaging and completing an on-campus seminar with academic support leading the discussions to explore the relevance of the content, specific to their workplace.

GCU's SfL is underpinned by a model comprising of eight design principles. This programme embeds these principles in the following ways

Engaged Learning:

- Induction is carried out before the apprentices start classes in week 1 of each year and is carried out by members of the programme and module delivery teams. These staff members are involved in teaching the apprentices from the first week of trimester A, allowing a continuity of exposure to key staff in the programme delivery and management. This involves providing a coherent plan for the coming year and defining the apprentices' requirements for the 'flipped classroom' sessions.
- WBL forms a large part of the student experience in all years of the programme. In particular, in L1-L3 the Integrated Project module is a significant WBL group project agreed between the employer and Integrated Project Module Leader. This strengthens and consolidates the apprentice's experience in working and developing professional confidence. Academic support in this module is provided through the module leader and work based support is provided through a Company Based Technical Supervisor.
- The programme team are aware of the importance of tracking and monitoring student WBL progress and an online Individualised Learning and Teaching Assessment Plan is shared by the student, relevant programme academic members and the relevant company contacts.
- A range of effective and accessible forms of academic support, including academic advisors and academic development tutors, is available to apprentices on the programme.

- Apprentices have been involved in the course development process and will continue to be involved in the development of the programme.
- Apprentices are encouraged to broaden their range of skills, knowledge and strengths by participating in external competitions and events, and to apply these experiences to their studies.

Divergent Thinking:

- From L1, apprentices develop skills in divergent thinking and creativity in a number of modules. In particular, the Integrated Project modules encourage cross curricular activity and involve developing solutions to problems incorporating interdisciplinary skills from a range of modules already studied at that level.
- A number of academic modules will have generic assessment that is related to the workplace which will encourage apprentices to critically evaluate their workplace environment.
- Apprentices are encouraged to engage in the use of collaborative tools and learning.
- The university makes available flipped classroom seminar sessions which the apprentices can attend as required supported by online learning material they engage with. It is expected that the apprentices will collaborate using appropriate social media platforms and using video conferencing when asked to undertake teamwork as is the case with their Integrated Projects. They are also encouraged to engage with academics in a similar manner mainly using the GCULearn platform.
- At all levels of the programme, apprentices will be encouraged to reflect on how the academic learning they are undertaking relates to their workplace, being lateral thinkers and creative in the application of this new knowledge in the workplace.

Flexible, Inclusive, Accessible Learning:

- Applicants, as formally employed apprentices, may be eligible for admission under the GCU Recognition for Prior Learning (RPL) Policy. Credit Transfer or Recognition for Prior Learning (RPL) can be applied for by any student. Consideration of pre-admission claims for RPL from potential apprentices is coordinated centrally by the Student Recruitment and Admissions Services (SRAS) and will normally involve consultation with the Programme Leader or Associate Dean for Learning and Teaching.
- The programme has four exit award opportunities to allow apprentices to exit the programme after one-year with a Certificate in Computing, two years with a Diploma in Computing, three years with a BSc Unclassified or four years with a BSc(Hons).
- The delivery of modules will be flexible and enabled through the use of three trimesters that will allow 120 credits of content to be completed each year. This will be a combination of workplace learning using on-line teaching materials and university based 'flipped classroom' sessions with a strong focus on Work-Based content and assessment.
- Work Based Project L1-L3 allows apprentices to engage in computing projects.
- The individual project in L4 allows apprentices to work on a capstone project in areas of career interest as well as those of their particular company.
- All modules involve significant personal study time when apprentices are expected to work on their own, managing and prioritising their own study.
- Apprentices are given feedback on assessments. Module Leaders and Module Tutors are available for additional feedback on student performance as appropriate and will flag up any issues affecting progress and completion.
- To complete the programme through WBL and in four years, it is essential that the material for the programme is accessible to apprentices in variety of modes. Suitable modules will be delivered in a 'flipped classroom' where the onus is on the student to prepare for the following week's sessions. The advantage of this is that the apprentices can study in their own time, whilst still maintaining the required pace to ensure achievement of the required learning outcome.
- All of the modules are accessible to all apprentices through support from the GCULearn digital portal. A range of software development tools supporting the programme through all levels have been made available through the Application Jukebox, which means that these programmes can be accessed in the University and off-campus. In addition, tools are often provided in the form of a VM or Docker images.

- The School has experience of developing and delivering programmes to a wide range of apprentices. Based on identified needs, specific staff development, adaptation of resources and the development of learning and teaching approaches is continually taking place to ensure access to the curriculum is maximised. In particular expertise and resources are in place to provide access to and support for apprentices with a range of disabilities. The programme team fully supports the University's vision for Equality and Diversity and is fully committed to supporting *"A culture and environment which is inclusive of all sections of society and responsive to the needs of individuals"*. This results in staff, apprentices and other stakeholders who are free from any form of discrimination in respect of all their dealings with Glasgow Caledonian University, enabling them to participate fully in all aspects of University life and make a valuable contribution to the success of the institution.
- The programme team is committed to the principles of promoting equality of opportunity through the elimination of discrimination and disadvantage, and recognising the benefits of diversity. The Programme Board for the proposed programmes will ensure that all potential and current staff, apprentices and other stakeholders are treated fairly, and are not discriminated against on grounds of sex, marital status, gender reassignment, racial group, disability, sexual orientation, religion or belief, age socio-economic background, trade union membership, family circumstances, or any other irrelevant distinction. The Programme Board will strive to create an inclusive and supportive environment for apprentices that value diversity and promote equality.

Broad and Deep Learning:

- Work Based Project modules in L1-L3 provide opportunities for multi and inter-disciplinary group working.
- The Work Based project modules have been designed to develop team building and team working skills, as well as to encourage the use of reflective practices.
- The L2-L3 of the Work Based Project also introduces peer assessment.
- Apprentices in the final year of the programme have the opportunity to choose electives which allow them to tailor their studies to their individual strengths and interests.
- The importance of timely, high quality and constructive formative feedback in a variety of forms is recognised by the programme team. A number of team members are Caledonian Scholars and are working on projects in this area and modules have been written in the knowledge of the Feedback for Future Learning's 8 Feedback Principles. Module teams are expected to provide feedback within 3 weeks for both formative and summative submissions.
- Companies with apprentices on the programme will be invited in to deliver specialist 'Guru Lectures' in their area of expertise. It is hoped that these lectures offer apprentices the opportunity to increase their awareness of the broader context of their discipline.
- A variety of assessment methods are used within the modules, depending on the aims, objectives and the learning outcomes of the module. For example, some of the modules are more theoretical in nature and others more practical or software based, while others are more discursive or presentation based. These therefore require different teaching and learning assessment approaches. The most common instruments of assessments used are coursework of various types and unseen examination.
- If required by the employer, the assessments can be Work-Based and contextualised to the individual apprentices' workplace. The contextualisation of Work-Based assessment will be captured within the apprentices' 'Learning and Teaching Assessment Plan'.
- Coursework can take a number of forms: (i) Coursework which tests understanding without the element of recall, computer based design exercises, critically research a topic and report; (ii) Presentations; (iii) Laboratory work and critical appraisal and evaluation of results; (iv) Project Activity; (v) In-class test (closed or open book) – period of recall is shorter and under more relaxed conditions; (vi) A major formal coursework that can be completed in six to eight hours work by the average student, an in-class test that can be completed in 2 hours and extensive laboratory report or program folder; (vii) A minor formal coursework that is normally completed in class time and can be a class test, a laboratory report, a programming exercise. At all times, cognisance of the workplace relevance will be paramount in the coursework definition.

Global Learning:

- The programme has been designed with input from employers, many of whom are multinational companies. For example, P&G, CGI Group and IBM. They have provided case studies which include working in international teams, managing distributed projects etc.
- Through the nature of their workplace it is expected that the apprentices will be exposed to the global aspects of their employer's business.

Real World Problem Solving:

- The Integrated Project modules L1-L3 will use live project specifications that meet the learning outcomes of these modules. The project specification will be developed between the Integrated Project Module Leaders and Company Based Technical Supervisor.
- Students will be encouraged to reflect upon the theoretical learning within the work place and the application of newly learned concepts to the work environment.
- A number of modules, for example, IT Project Management 1 always makes use of employer written case studies.
- As discussed above, assessment for a number of modules will be based on real-world problems and contextualised to the student's workplace through WBL activities.
- The programme will have a dedicated Programme Board and include representation from employers, along with apprentices engaged on this programme.
- Studying of taught modules throughout the programme in parallel with Integrated Project modules and the Honours Project module in Level 4 assists the apprentices with their time planning and workload balance.

Entrepreneurship and Employability:

- The entrepreneurial attitudes of the apprentices are specifically developed through a range of modules and study opportunities, including the Integrated Project and Honours Project modules.
- A number of modules contain aspects where the apprentices are required to consider the business aspects of software development decisions they are making and this is further encouraged through reflection in their workplace.
- Apprentices are encouraged to attend talks by guest speakers, undertake industrial visits and employer led activities such as CV writing workshops, interview technique classes and employability events.

Responsible Leadership and Professionalism:

- The programme offers professional recognition through British Computer Society (BCS) accreditation.
- Reflection activities are embedded within many modules, notably the Integrated Project L1-L3.
- The understanding of standards and professional ethics, behaviours and work activities are embedded within modules at each level of study and specialised knowledge of the professional field is additionally addressed explicitly in the Research Skills and Professional Issues module in year 3.

4. PROGRAMME STRUCTURES AND REQUIREMENTS, LEVELS, MODULES, CREDITS AND AWARDS

There will be a minimum of 40 credits per trimester and a minimum of 20 at each level of dedicated Work Based Assessment in Level 1 & 2 over the academic year. Level 3 & 4 will have a minimum of 40 credits of Work Based Assessment over the academic year. Trimester C has a lighter taught module load throughout the programme since it includes the project modules which are work based. There will also be the possibility of negotiated Work Based Assessment for a number of other modules if possible as identified in the individual module descriptors. The module descriptors also contain an allocation to Work Based Learning, which is defined as the reflection upon the theoretical learning for each module within the work place and the application of newly learned concepts to the work environment. Appendix 4 highlights both Work Based Learning and Work Based Assessment for individual modules as a percentage.

Apprentices will not be in Full-Time attendance mode and each Trimester will have a GA specific timetable, with a combination of traditional module delivery and 'Flipped Classroom' sessions as appropriate.

Year 1			Module Title	Credits
SCQF 7				
Trimester A				
M1I325893	1	A	Fundamentals of Computer Systems	10
M1I326726	1	A	Programming 0	20
Trimester B				
M1I325895	1	B	Fundamentals of Network and Cloud Computing	10
M1I325894	1	B	Database Development	20
M1I325085	1	AB	Maths for Computing	20
Trimester C				
M1I326710	1	C	Fundamentals of Software Engineering	20
M1I326711	1	C	Work Based Project 1	20
Exit Award – Certificate of Higher Education in Computing (GA)				120

Year 2			Module Title	Credits
SCQF 8				
Trimester A				
M2I326727	2	A	Programming 1	20
M2I325090	2	A	Object Oriented Analysis & Design	20
Trimester B				
M2I326730	2	B	Programming 2	20
M2I326718	2	B	Web Application Development 1	20
Trimester C				
M2I625901	2	C	Human Computer Interaction	20
M2I326714	2	C	Work Based Project 2	20
Exit Award – Diploma of Higher Education in Computing (GA)				240

Year 3			Module Title	Credits
SCQF 9				
Trimester A				
M3I325896	3	A	DevOps	20
M3I326702	3	A	Introduction to Data Science	20
Trimester B				
M3I325099	3	B	Research Skills & Professional Issues	20
M3I326794	3	B	Web Application Development 2	20
Trimester C				

M3I326704	3	C	Programming 3	20
M3W226716	3	C	Work Based Project 3	20
Exit Award: Bachelor of Science (Unclassified) Software Development (GA)				360

Year 4			Module Title	Credits
SCQF 10 Level				
Trimester A				
MHI226698	H	A	Big Data and IoT	20
One Elective from:				
MHI326842	H	A	Elective: Mobile Platform Development	20
MHI326717	H	A	Elective: Front End Web Development	20
Trimester B				
MHI326728	H	B	Cloud Platform Development	20
MHI226695	H	B	Information Security	20
Trimester C				
MHW226542	H	ABC	Honours Project	40
Exit Award: Bachelor of Science (Hons) Software Development (GA)				480

1.

5. SUPPORT FOR STUDENTS AND THEIR LEARNING

- Induction Programme
- Programme and Module Handbooks
- Year Tutors
- Project Co-ordinators
- Personal tutors
- Employability and Career Planning programme
- Personal Development Planning
- Study Guides for projects and coursework
- Sir Alex Ferguson Library with access to other local and national library resources
- Student e-mail and programme/module based Virtual Learning Environment facilities (GCU Learn)
- Departmentally based PC Computer Laboratories equipped with the full range of software used on the programme.
- Open access to Departmental and University Computer facilities including access to the 24-hour computing laboratory
- Specialist Computer Laboratories E.g. E-Motion Laboratory, ITT Laboratory
- Supply of specific proprietary course software for home use to provide additional study and work access
- Open access to teaching staff including the Programme Leader
- Access to Campus Life which provides support, assistance and guidance to students
- SCEBE Learning Development Centre which provides specific study skills support and guidance
- Web based learning facilities
- Access to University Careers Centre
- Professional and Industry Body Contacts
- Student representatives on the Programme Board
- Student representatives on Senate and its Standing Committees
- Student Staff Consultative Group

A number of company based individuals also play a key role in supporting the academic journey of the apprentice. (i) The Company Apprentice Mentor is the first point of contact at the company and responsible for an apprentice throughout their academic journey. The Company Apprentice Mentor will be involved in the development of the 'Learning and Teaching Assessment Plan' and review the apprentice's academic progress. Company Apprentice Mentor should meet with the apprentices regularly to discuss progress in their apprenticeship, and should be empowered to take action on behalf of the employee if need be. (ii) The Company Based Technical Supervisor will liaise with module leaders on specific Work Based Learning and Assessment activities. This will include the adaption of coursework and embedding of workplace learning and assessment in taught modules and in particular within the Integrated Projects and Final Year Project.

Students will be supported in the Work Based Project module L1-L3 through the module leader and allocation of a Company Based Technical Supervisor who will agree on a project topic that meets the learning outcomes of the module.

6. CRITERIA FOR ADMISSION

Candidates must be able to satisfy the general admissions requirements of Glasgow Caledonian University

Candidates for the programme should meet the minimum age requirements for GCU entry at the start of the programme, be in suitable employment as an apprentice and meet the following entry requirements.

Programme Admission Requirements:

Standard First Year Entry Requirements

The minimum entrance requirements for entry into the first year of the programme are one of the following:

- SQA passes in 5 subjects of which at least 4 are at Higher Grade.
- GCE passes in 5 subjects of which 2 are Advanced level (or equivalent).
- An appropriate program of SQA National Certificate Course units which must include passes in modules which are at least equivalent to SQA/GCE English and Mathematics at Ordinary/ Standard grade at Credit level.
- HNC in Computing/IT or Equivalent.
- BTEC National Diploma in Computing/IT.
- IT Access course or equivalent.
- Advanced GNVQ in IT.
- Irish Leaving Certificate – 5 subjects passed at H level (at least C grade) or equivalent.
- International qualifications which are equivalent to standard entry (in these cases appropriate EOSL qualification is required).

In all of the above cases, the qualifications must include SCE/GCE pass in English at Standard grade at Credit level (or equivalent) and Mathematics at Higher Grade C (or equivalent)

Annually the Programme Board also considers the competitive entry requirements based on apprentice demand and allocated places.

Entry with Advanced Standing:

Flexible Entry - Credit Transfer and Recognition of Prior Learning (RPL):

Integration of flexible entry and RPL are integral to the delivery within this programme.

Accumulation of credit points from other programmes of study and from prior experiential learning may allow direct entry into the programme at the appropriate level, subject to satisfying the necessary pre-requisites for completion of the programme.

Articulation to Level 2 and Level 3

Companies are encouraged to put forward apprentices for possible entry to L2 and L3 through the GCU accreditation of prior learning route. This is applicable to current employees with many years of experience and some formal qualifications or to new apprentices who have achieved qualifications from further education study.

Equal Opportunities

The University will seek at all times equality of opportunity for all applicants and seeks not to discriminate on any grounds irrelevant to the above general principle of admission.

Applicants with a Disability

All applicants for admission to the programme who reveal a disability will be invited to a meeting with the Admissions Tutor and/or University Disability Adviser in order that the specific needs of the applicant can be assessed. This is not part of the selection process but students may be advised at this stage if the nature of their disability means that they might be unable to fulfil the academic or professional requirements of the programme. Equally it may not be possible for the University to make reasonable adaptations to enable an applicant to undertake a particular programme. Should this be the case, the University will respond positively and advice on alternative programmes and options will be offered.

7. METHODS FOR EVALUATING AND IMPROVING THE QUALITY AND STANDARDS OF TEACHING AND LEARNING

Mechanisms for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

- Annual Module Monitoring Process
- Annual Programme Monitoring Process/ Continuous Quality Improvement Plan
- Module Feedback Questionnaire
- External Examiner reports
- Annual monitoring (required by Professional and/or Statutory Bodies)
- Enhancement-led Internal Subject Review (ELISR)
- Enhancement-led Institutional Review (ELIR)
- Annual report to external accrediting bodies
- Reports from Professional/Statutory Body
- Academic strategy review and development by School Learning and Teaching Committee(SLTC)
- School based quality procedures for moderation of assessments (Exam and Coursework)

Committees with responsibility for monitoring and evaluating quality and standards:

- Student-Staff Consultative Group (SSCG)
- Programme Board (PB)
- School Board
- Progression and Awards Board (PAB)
- University Learning and Teaching Sub-Committee (LTSC)
- University Academic Policy and Practice Committee (APPC)
- University Senate
- School Learning and Teaching Committee (SLTC)
- Undergraduate Assessment Board

Mechanisms for gaining student feedback on the quality of teaching and their learning experience:

- Student-Staff Consultative Group (SSCG)
- Student representation on Programme Board (PB)
- Student representation on School Board
- Module Feedback Questionnaire
- GCULearn
- Open access to members of Programme Team E.g. Module Leaders, Programme Leader, Personal Tutor, Year Tutor
- Placement Reports
- NSS
- Frequent and regular meetings with Company Mentor
- Regular meetings with Technical Based Company Supervisor when appropriate

Staff development priorities include:

- Postgraduate Certificate in Learning and Teaching
- Continuous Professional Development (CPD)
- Performance and Development Annual Review (PDAR)
- Peer support for teaching
- Mentoring scheme for new teaching staff
- Conference and seminar attendance and presentation
- Research Excellence Framework (REF) submission
- Membership of Higher Education Academy (HEA)

- Membership of and involvement with Professional Bodies
 - Regular Programme Team and Subject Group meetings
- Institutional learning and teaching workshops

8. ASSESSMENT REGULATIONS

Students should expect to complete their programme of study under the Regulations that were in place at the commencement of their studies on that programme, unless proposed changes to University Regulations are advantageous to students.

The Glasgow Caledonian University Assessment Regulations which apply to this programme, dependent on year of entry can be found at:

[GCU Assessment Regulations](#)

Assessment rules and Honours classification:-

- Minimum pass mark is (40%) for each module
- Overview of assessment details are provided in the Student Handbook for the programme and a copy of full assessment regulations are available from the University web site
- To qualify for an award, students must complete all the programme requirements and obtain 360 SCQF credit points for the Unclassified degree (BSc) and 480 SCQF credit points for the Honours degree (BSc Hons)

Summary of classifications, marks and their interpretation for honours degree classification

<u>Classification</u>	<u>Marks</u>	<u>Interpretation</u>
1 st	70% - 100%	Excellent: Marks represent a first class performance
2 nd /Upper	60% - 69%	Very Good: Marks represent an upper second class performance
2 nd /Lower	50% - 59%	Good: Marks represent a lower second class performance
3 rd	40% - 49%	Satisfactory: Marks represent a third class performance

The calculation for the award and final classification of the Honours Degree is on the basis of the best 180 SCQF 10 and SCQF 9 credits, of which a minimum of 90 must be at SCQF 10. The Dissertation/Project at level 10 must be included in this set.

If a student enters directly into fourth year, then the marks from the taught 4th year only contribute to the award and final classification of the Honours Degree.

Regulations for distinction at Unclassified degree level:

Students who pass all 6 modules in year 3 at the first attempt and who achieve an average of 70% or more (with no mark in any module below 55%) shall normally be eligible for the award of an Unclassified degree with distinction.

Role of External Examiner:

External Examiners are appointed to Undergraduate Progression and Awards Boards. The duties of an External Examiner will include the following:

- To moderate the work of the Internal Assessors in respect of the assessments under his/her jurisdiction
- To attend Progression and Awards Boards at which the results of a final stage assessment will be determined
- To satisfy himself/herself that the work and decisions of the Progression and Awards Board(s) are consistent with the policies and regulations of the University and best practice in higher education
- To ensure that students are assessed within the regulations approved by the University for the programme

and to inform the University on any matter which, in his/her view, militates against the maintenance of proper academic standards

- To report annually to the School's Learning and Teaching Committee on the standards attained by students on the programme and on any other matters which may seem appropriate for report

Programme specific Assessment Regulations

In line with the Engineering Council and as such the British Computer Society compensation related requirements for Accreditation specifically that a maximum of 30 credits in a Bachelors or integrated Masters degree programme can be compensated, and a maximum of 20 credits in a Masters degree other than the integrated Masters degree.

Exception to Undergraduate Assessment Regulations, Sub-section 13.2.1: Compensation

This was presented and accepted at the exceptions committee on 8TH October 2020 **Case 215**

9. INDICATORS OF QUALITY AND STANDARDS

Internal Indicators

- Details of approval, development events and Enhancement Led Internal Subject Reviews organised by the School/University
- Departmental statement on modules
- Annual Programme Monitoring and development of programme's Programme Enhancement Plan
- Annual module performance monitoring
- Prizes awarded by the School for outstanding performance

External Indicators

- Professional/Statutory Body accreditation visits and reports
- Quality Assurance Agency subject reviews
- External Examiner Reports

10. INFORMATION ABOUT THE PROGRAMME

Key information about the programme can be found in:

- Definitive Programme Document
- Programme Handbook
- Module Handbook
- University Website <http://www.gcu.ac.uk>
- School Website
- GCULearn
- My Caledonian
- University Prospectus
- GA Employer Handbook

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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning assessment methods of each module can be found in the University Module catalogue which can be accessed from the University website. The accuracy of the information in this document is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

A curriculum map is attached showing how the outcomes are being developed and assessed within the programme. This relates the modules from Section 4 to the outcomes in Section 3.

Appendix 1 Curriculum Map for BSc/BSc (Hons) Software Development (GA)

The curriculum map links the modules (Section 4) to the Outcomes listed in Section 3

PSMAP

This map provides both a design aid to help academic staff identify where the programme outcomes are being developed and assessed within the course. It also provides a checklist for quality assurance purposes and could be used in approval, accreditation and external examining processes. This also helps students monitor their own learning, and their personal and professional development as the course progresses. The map shows only the main measurable learning outcomes which are assessed. There are additional learning outcomes (e.g. attitudes and behaviour) detailed in the module specifications which are developed but do not lend themselves to direct measurement

Modules

Programme outcomes

	Code	Title	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	C5	C6	
SCQF7		Fundamentals Of Software Engineering		X	X	X				X	X		X		X	X			X	X	X		X	X		
		Fundamentals Of Computer Systems	X													X	X	X		X	X	X		X		
		Programming 0		X	X				X	X		X				X					X		X			
		Fundamentals Of Network and Cloud Computing	X						X							X	X			X	X	X	X			
		Database Development	X	X	X	X					X	X	X	X			X	X			X	X	X	X		
		Work Based Project 1			X	X	X	X			X		X	X	X	X	X		X	X	X	X		X		
		Maths for Computing		X							X						X					X		X		
SCQF8		Object Oriented Analysis and Design		X		X				X	X		X			X				X	X		X			
		Human Computer Interaction	X	X	X	X				X	X	X	X			X				X	X	X		X		
		Programming 1		X	X					X		X				X					X		X	X	X	
		Programming 2		X	X					X		X				X				X	X	X	X	X		
		Web Application Development 1	X	X	X					X	X	X				X	X				X		X			
SCQF9		Work Based Project 2			X	X	X	X		X		X	X	X	X	X		X	X	X	X	X	X			
		DevOps			X	X	X		X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	
		Work Based Project 3			X	X	X	X		X		X	X	X	X	X		X	X	X	X		X	X	X	
		Introduction to Data Science		X	X				X	X	X	X				X	X	X	X		X	X	X	X	X	
		Programming 3 (DS & A/AP)		X	X				X	X	X	X	X			X	X	X			X	X	X		X	
		Research Skills and Professional Issues		X			X									X		X	X	X	X		X	X		X
SCQF10		Web Application Development 2	X	X	X				X	X		X	X			X	X			X	X	X		X		
		Honours Project			X	X	X		X	X	X				X	X	X	X		X	X	X	X	X	X	
		Mobile Platform Development	X	X	X					X	X	X	X			X	X	X			X	X	X			
		Big Data and IoT	X	X	X				X	X		X	X			X	X	X		X	X			X		
		Cloud Platform Development	X	X					X	X	X	X	X			X	X				X	X	X			
	Information Security		X	X	X	X		X			X					X	X									

	Code	Title	D1	D2	D3	D4	D5	E1	E2	E3	E4	E5	E6	E7	E8
SCQF7	M1I326710	Fundamentals Of Software Engineering	X	X		X			X	X	X				X
	M1I325893	Fundamentals Of Computer Systems	X	X						X	X	X			
	M1I326726	Programming 0	X												
	M1I325895	Fundamentals Of Network and Cloud Computing	X	X		X		X		X					X
	M1I325894	Database Development	X	X		X				X					
	M1I326711	Work Based Project 1	X		X	X	X	X	X	X	X	X	X	X	X
	M1I325085	Maths for Computing		X						X	X				
SCQF8	M2I325090	Object Oriented Analysis and Design	X			X		X		X		X			
	M2I625901	Human Computer Interaction				X	X			X		X			
	M2I326727	Programming 1	X	X		X		X		X					
	M2I326730	Programming 2	X	X		X		X		X					
	M2I326718	Web Application Development 1	X			X		X		X					
	M2I326714	Work Based Project 2	X		X	X	X	X	X	X	X	X			X
SCQF9	M3I325896	DevOps	X			X		X		X	X	X			
	M3W226716	Work Based Project 3	X		X	X	X	X	X	X	X	X	X	X	X
	M3I326702	Introduction to Data Science	X	X		X									
	M3I326704	Programming 3	X	X		X		X	X	X					
	M3I325099	Research Skills and Professional Issues	X		X		X		X	X					X
	M3I326794	Web Application Development 2	X	X		X				X					
SCQF10	MHW226542	Honours Project	X		X	X	X	X	X	X	X				
	MHI326842	Mobile Platform Development	X		X	X		X	X	X	X				
	MHI226698	Big Data and IoT		X		X									X
	MHI326728	Cloud Platform Development				X									X
	MHI226695	Information Security				X			X					X	

Appendix 2: BSc (Hons) Software Development (GA) & SDS Graduate Apprenticeship Framework document for IT: Software Development at SCQF level 10

Topics and high-level learning and skills outcomes:

Key	Skills Topics for Custom Software Development
1.	Business
1.1	Business functions, behaviours, ethics, and courtesies
1.2	Business strategy and management
1.3	Business finance and accounting
2.	Technology
2.1	Software Development Essentials
2.2	Data and algorithms
2.3	Software modelling and analysis
2.4	Software architecture
2.5	Software requirements management
2.6	Software design
2.7	Software verification and testing
2.8	Software development process
2.9	Software development in context
2.9	Software configuration and release management
2.10	Software deployment
2.11	Software maintenance
2.12	Legacy systems
2.13	Software quality
2.14	Data modelling, database development, and data analysis
2.15	Software security
2.16	Software modelling and analysis
3.	Personal and interpersonal
3.1	Communications
3.2	Personal attributes
3.3	Professional attributes
3.4	Team working

4.	Software project and delivery management
4.1	Project management approaches and methodologies
4.2	Project planning
4.3	Project execution
4.4	Agile project delivery
4.5	Risk assessment and management

1.1 Business behaviours, ethics and courtesies	
ITSD1.1.1.a.	Understood and mastered basic business behaviour, ethics and courtesies, demonstrating timeliness and focus when faced with distractions and the ability to complete tasks to a deadline with high quality
ITSD1.1.1.b.	Demonstrated an understanding of basic business functions and own employer's organisational structure and that of its senior leadership team
ITSD1.1.1.c.	Understanding of and be able to demonstrate competence in time management
ITSD1.1.1.d.	Apply basic management considerations: prioritisation, task versus responsibility management, managing up and across the organisation, people considerations
ITSD1.1.1.e.	Understand employment relations issues and the application of policies and procedures for managing these relationships, and the application of good practice relating to equality and diversity issues in the workplace
1.2 Business Strategy and management	
ITSD1.1.2.a.	Understand own employer's business objectives and strategy and its position in the market and how own employer adds value to its clients through the services and/or products it provides
ITSD1.1.2.b.	Gained an appreciation of the strategic importance of data analytics for business decision making
ITSD1.1.2.c.	Gained an appreciation of the strategic importance of business processes and demonstrated an ability to document and understand them
ITSD1.1.2.d.	Understand the principles of business transformation by being able to decompose and abstract a non-obvious business problem, structure it, collect relevant information, consider options and make recommendations
1.3 Business Finance and Accounting	
ITSD1.1.3.a.	Be able to conduct a security risk assessment for a defined business context that includes documenting what information is at risk, the type and level of risk realised; and the impact of the risk being realised
ITSD1.1.3.b.	Understand that information is an organisational asset that has utility and a value which may be relative depending on the perspective taken. Recognise that it has attributes relating to confidentiality, possession, integrity, authenticity and availability, any of which can make it vulnerable to attack
ITSD1.1.3.c.	Understand that business information is vulnerable to threats from systems and people
ITSD1.1.3.d.	Understand the difference between threat, risk, attack and vulnerability. Be able to describe typical threats, attacks and exploits and the motivations behind them
2.1 Software development essentials	
ITSD1.2.1.a.	Understand the foundations of custom software development that support the design and construction of software products, including the transformation of a design into an implementation, the tools used during this process, formal software construction methods and maintainability
ITSD1.2.1.b.	Understand software design and development methodology (e.g., structured or object-oriented), and be able to apply appropriate industry standard design notation such as UML and agile user story management
ITSD1.2.1.c.	Select, with justification, an appropriate set of tools to support the development of a range of software products
ITSD1.2.1.d.	Explain the potential benefits and drawbacks of using formal specification languages
ITSD1.2.1.e.	Understand the software development process as aligned to industry practice

2.2 Data and Algorithms	
ITSD1.2.2.a.	Write programs that use each of the following data structures: arrays, strings, linked lists, stacks, queues, and hash tables
ITSD1.2.2.b.	Understand language at a level lower than data structures and differences e.g. distinction between Double and BigDecimal
ITSD1.2.2.c.	Use pseudo code or a programming language to implement, test, and debug algorithms for solving problems
ITSD1.2.2.d.	Confidently design and apply algorithms for manipulating data in programming solutions for a variety of computational problems
ITSD1.2.2.e.	Understand search techniques with pros/cons and be able to implement with regard to complexity and memory management
ITSD1.2.2.f.	Understand common pitfalls and mitigations
2.3 Software Modelling & Analysis	
ITSD1.2.3.a.	Understand the role and purpose of modelling to visualise and better understand and document the system being developing and the proposed design solutions
ITSD1.2.3.b.	Understand the distinction between analysis and design models e.g. robustness analysis vs. object level interaction diagrams
ITSD1.2.3.c.	Apply a wide variety of industry standard software modelling techniques, including object and state-based approaches to model aspects of the domain and system behaviour and to aid design of software
ITSD1.2.3.d.	Analyse the problem domain to establish a basis for the creation of a software design, to describe what the customer require through solution design modelling
ITSD1.2.3.e.	Understand common pitfalls and mitigations
2.4 Software Architecture	
ITSD1.2.4.a.	Understand the differences between multi-tiered (1/2/3) architectures and layers and identify their merits. Be able to formulate a system according to a multi-tier architecture, so that the presentation, the application processing and the data management can be separated into different logical processes
ITSD1.2.4.b.	Understand concepts such as separation of concerns, loose coupling, etc.
ITSD1.2.4.c.	Software architecture, as an aid to software design
ITSD1.2.4.d.	Understand common pitfalls and mitigations
2.5 Software Requirements Management	
ITSD1.2.5.a.	Understand the requirements development process: elicitation, specification, analysis, and management and the use of tools for managing requirements, and how requirements, design, implementation and verification are linked together to control development and ensure quality
ITSD1.2.5.b.	Elicit and negotiate requirements using a variety of techniques
ITSD1.2.5.c.	Be competent in writing clear and concise functional and non-functional requirements
ITSD1.2.5.d.	Represent functional and non-functional requirements for different types of systems using industry standard practices for formal and informal techniques (UML, User Requirements notation)
ITSD1.2.5.e.	Organize and prioritize requirements for some innovative client-server application of very small size
ITSD1.2.5.f.	Validate requirements according to criteria such as feasibility, clarity, testable, freedom from ambiguity, etc.
ITSD1.2.5.g.	Understand common pitfalls and mitigations

2.6 Software Design	
ITSD1.2.6.a.	Discuss the properties of good software design including the nature and the role of associated documentation, appreciating that design increasingly covers use of existing code and 3rd party elements that may be an alternative to development of code from scratch through make/buy decisions
ITSD1.2.6.b.	Select and apply appropriate design patterns in the construction of software using industry standard documentation such as GoF (the "Gang of Four")
ITSD1.2.6.c.	Understand the different contexts for HCI (mobile devices, consumer devices, business applications, web, business applications, collaboration systems, games, etc.) and be able to define a user-centred design that explicitly recognises the user and is DDA compliant (Disability Discrimination Act)
ITSD1.2.6.d.	Create and specify a software design for a medium-size software product using a software requirement specification, an accepted program design methodology (e.g., structured or object-oriented), and appropriate design notation
ITSD1.2.6.e.	Understand common pitfalls and mitigations
2.7 Software Verification & Testing	
ITSD1.2.7.a.	Describe in detail the purpose of, and distinguish between the different types and levels of verification (analysis, demonstration, test, formal proof, inspection etc.) and testing (unit, integration, systems, and acceptance) including the role and value of test driven development techniques
ITSD1.2.7.b.	Analyse requirements to determine appropriate testing strategies understanding the trade-off between the extent and cost of testing vs. Quality requirements
ITSD1.2.7.c.	Create, evaluate, and implement a test plan for a medium-size code segment
ITSD1.2.7.d.	Develop and execute accurate and clear test scripts through UI harnesses against acceptance criteria, requirements and internal and/or external standards using industry standard unit and component testing tools
ITSD1.2.7.e.	Be competent in developing automated tests within the build phase for web applications at a transaction and method level
ITSD1.2.7.f.	Assess test results against expected results and acceptance criteria and through traceability to requirements, presenting and communicating results effectively using appropriate communication styles
ITSD1.2.7.g.	Understand common pitfalls and mitigations
2.8 Software Development Process	
ITSD1.2.8.a.	Explain the importance of a software process for governing software development both technically, and in terms of cost control, quality, adherence of technical strategy, IPR identification etc.
ITSD1.2.8.b.	Understand the software life cycle, its phases and the deliverables that are produced, compare the traditional waterfall model to newer models such as agile, test-led development and other appropriate models
ITSD1.2.8.c.	Select, with justification software development models and process elements most appropriate for the development and maintenance of a diverse range of software products
ITSD1.2.8.d.	Understand the nature of industry standard software development process, including distributed work (e.g. onshore, near shore and offshore), to understand benefits and drawbacks of each and key enablers to make each model successful
ITSD1.2.8.e.	Understand common pitfalls and mitigations

2.9 Software Development in Context	
ITSD1.2.9.a.	Understand the fundamental components of technology solutions in a range of typical modern business environments and explain their interactions for any applicable target system - including games console, smart-phone, embedded system understanding the differences that these environments bring
ITSD1.2.9.b.	Understand the contexts of real time and embedded systems development as well as component software within hardware systems
ITSD1.2.9.c.	Demonstrate the capability to select, with justification, and apply an appropriate set of tools to support the development of a range of software products of medium size
ITSD1.2.9.d.	Create a specification for a user interface based on requirements and implement a range of GUI's for different contexts at different levels of detail from specifications
ITSD1.2.9.e.	Develop and test a range of small and medium-scale technology solutions (programmes, apps or games), utilising an industry standard method and programming language
ITSD1.2.9.f.	Understand common pitfalls and mitigations
2.10 Software Configuration and Release Management	
ITSD1.2.10.a.	Recognise the difference between configuration management at a software component/function level, and configuration of a release
ITSD1.2.10.b.	Define configuration management processes for use throughout the product development life cycle in storing software deliverables and controlling and tracking changes to software both at component and release level, using configuration management tools effectively, and apply change management processes properly
ITSD1.2.10.c.	Modify software designs and deliverables following sound change control approaches and change control tools
ITSD1.2.10.d.	Understand the importance of version control and the difference between software level versus component level version control
ITSD1.2.10.e.	Be competent in using and applying industry standard version control tools to manage software deliverables
ITSD1.2.10.f.	Select and apply configuration management and change control tools for use within software development projects
ITSD1.2.10.g.	Be able to apply industry standard release management frameworks (e.g. Puppet) to release and manage software artefacts
ITSD1.2.10.h.	Understand common pitfalls and mitigations
2.11 Software Deployment	
ITSD1.2.11.a.	Understand the organisational context into which software is deployed and the human and business issues associated with deployment
ITSD1.2.11.b.	Recognise the challenges of deploying software releases which form part of a software or hardware system, perhaps with other software elements from a 3rd party, and embedded systems. Being able to interact to agree dependencies on interfaces, processing speed, resource utilisation etc. and staged deployment in to maturing prototypes and systems
ITSD1.2.11.c.	Develop and apply user documentation and training materials as part of software development and deployment activities
ITSD1.2.11.d.	Design and develop training materials and plan end user training following software deployment
ITSD1.2.11.e.	Understand common pitfalls and mitigations

2.12 Software Maintenance	
ITSD1.2.12.a.	Understand the impact of developing software for systems which need to be maintained for extended operational periods (e.g. avionics could be ~25 years), and be aware of the importance of documentation rigour in these circumstances, when contrasted against fast changing IT software where changes are likely to occur at a far higher frequency
ITSD1.2.11.b.	Read and analyse existing software behaviour in order to improve its efficiency, reliability, and maintainability
ITSD1.2.11.c.	Maintain and update software as required to ensure continued effectiveness or in response to external factors
ITSD1.2.11.d.	Understand the role and purpose of refactoring in improving programming solutions efficiency, scalability, maintainability and extensibility and be able to revise the performance of existing code to provide for scalability and extensibility
ITSD1.2.11.e.	Understand common pitfalls and mitigations
2.13 Legacy Systems	
ITSD1.2.13.a.	Gain an understanding of legacy architectures and technologies (e.g. mainframe/COBOL etc.)
ITSD1.2.13.b.	Identify and review legacy system documentation, whilst appreciating that documentation is often missing, inadequate and out-of-date
ITSD1.2.13.c.	Analyse existing legacy software, and review the source code if available, appreciating that part or all of the system may be implemented using an obsolete programming language
ITSD1.2.13.d.	Identify legacy system data architecture, and understand that the data processed by the system may be distributed in different files which have incompatible structures. There may be data duplication and the data itself may be out of date, inaccurate and incomplete
ITSD1.2.13.e.	Understand the risks associated with replacing or keeping and maintaining legacy systems, and that keeping legacy systems in use avoids the risks of replacement but making changes to existing software usually becomes more difficult and expensive as systems get older
ITSD1.2.13.f.	Understand common pitfalls and mitigations
2.14 Software Quality	
ITSD1.2.14.a.	Explain and apply recognised principles to the building of high-quality software components, understanding the difference between safety and quality, and how mechanisms that improve quality may be used to partially underpin a safety argument
ITSD1.2.14.b.	Interpret and apply standards for software quality planning and assurance (e.g. ISO/IEC 9126 - international standard for the evaluation of software quality)
ITSD1.2.14.c.	Compare and contrast the different methods and techniques used to assure the quality of a software development processes and deliverables
ITSD1.2.14.d.	Awareness of industry standard static and dynamic code analysis frameworks (e.g. FindBugs, Checkstyle, etc.)
ITSD1.2.14.e.	Understand common pitfalls and mitigations

2.15 Data modelling, database development, and data analysis	
ITSD1.2.15.a.	Describe the basic principles of the relational data model and the issues of scale and management of large data or big data
ITSD1.2.15.b.	Be competent at developing a range of industry standard database models, including state and process models
ITSD1.2.15.c.	Create a relational database schema that incorporates key, entity integrity, and referential integrity constraints
ITSD1.2.15.d.	Implement a database-driven web site, explaining the relevant technologies involved in each tier of the architecture and the accompanying performance trade-offs
ITSD1.2.15.e.	Write stored procedure queries that deal with parameters and have some control flow, to provide given functionality
ITSD1.2.15.f.	Understand the role of data mining, the algorithms developed to address different data mining goals and the application of these algorithms to real-world problems including big data
ITSD1.2.15.g.	Design, implement and evaluate big data analysis systems
ITSD1.2.15.h.	Understand common pitfalls and mitigations
2.16 Software Security	
ITSD1.2.16.a.	Understand the nature of risk to information and information systems and define what cyber security is, and explain its importance when developing software solutions and mitigating risk
ITSD1.2.16.b.	The importance of determining and managing risk for threats and vulnerabilities to information systems on an ongoing basis
ITSD1.2.16.c.	Understand human aspects of information security including client data protection and the data protection act
ITSD1.2.16.d.	Awareness of the types of testing that are commonly applied to identify vulnerabilities in software and how to make software more resilient to threats
ITSD1.2.16.e.	Design in robust, scalable and future-proof software security solutions that meet specific and generic requirements, and internal/external security standards and best practice
ITSD1.2.16.f.	Correctly apply the organisation's security architecture to any systems or solutions development activities. Rewrite a simple program to remove common vulnerabilities, such as buffer overflows, integer overflows, and race conditions
ITSD1.2.16.g.	Understand common pitfalls and mitigations
3.1 Communications	
ITSD1.3.1.a.	Identify the purpose of the communication, the audience and the outcomes to be achieved. Decide which method of communication to use and the level of formality required
ITSD1.3.1.b.	Make concise, engaging and well-structured verbal presentations, arguments and explanations of varying lengths, with and without the use of media, always taking into account the audience viewpoint.
ITSD1.3.1.c.	Competent in active listening appreciating others views and contributions
ITSD1.3.1.d.	Give and receive feedback constructively applying appropriate techniques and incorporate it into his/her own development and life-long learning
ITSD1.3.1.e.	Effectively prepare and deliver presentations using relevant presentation media products such as PowerPoint, Prezi etc., and the use of appropriate visualisations and images to present information and ideas clearly and convincingly
ITSD1.3.1.f.	Be fluent in written communications with the ability to articulate complex issues, selecting an appropriate structure and with appropriate tone, style and language
ITSD1.3.1.g.	Be competent at selling, questioning, negotiating and closing techniques in a range of interactions and engagements, both with internal and external stakeholders
3.2 Personal attributes	

ITSD1.3.2.a.	Be creative, self-motivated, self-aware and able to reflect on successes and failures in ways that strengthen positive attitude and develop self-reliance through an understanding of their own personal preferences, styles, strengths and weaknesses
ITSD1.3.2.b.	Is able to identify the preferences, motivations, strengths and limitations of other people and apply these insights to work more effectively with and to motivate others
ITSD1.3.2.c.	Be able to understand the outputs from and apply insights by using personal profiling tools such as Myers Briggs Type Indicator, or Kirton Adaption/Innovation Indicator
ITSD1.3.2.d.	Be able to put forward, demonstrate value and gain commitment to a moderately complex technology-oriented solution, demonstrating understanding of business need, using open questions and summarising skills and basic negotiating skills
ITSD1.3.2.e.	Apply analytical and critical thinking skills to Technology Solutions development and to systematically analyse and apply structured problem-solving techniques to them
3.3 Professional attributes	
ITSD1.3.3.a.	Capability to deal with different, competing interests within and outside the organisation with excellent negotiation skills
ITSD1.3.3.b.	Conduct effective research, using literature and other media, into IT and business-related topics
ITSD1.3.3.c.	Demonstrate competence in gathering information from people using a variety of techniques including interviewing
ITSD1.3.3.d.	Understanding of performance evaluation tools and be able to demonstrate competence in designing and applying performance evaluation tools (including 360-degree feedback)
ITSD1.3.3.e.	Understanding of the importance of learning strategies and techniques in own development and life-long learning and for corporate learning and development
ITSD1.3.3.f.	Understand the principles of personal development planning, and create, implement and maintain a personal development portfolio and a personal action plan
3.4 Team working	
ITSD1.3.4.a.	Plan and implement work goals, objectives, priorities and responsibilities with others
ITSD1.3.5.a.	Within the team, communicate, identify different abilities and potential and show respect for individuals.
ITSD1.3.6.a.	Understand how teams work effectively to produce technology solutions, working with team members to identify and solve problems and disagreements, sharing feedback with others on the achievement of team objectives and making suggestions and encouragement for improving team-working
4.1 Project management approaches and methodologies	
ITSD1.4.1.a.	Understanding of the software development lifecycles and processes
ITSD1.4.1.b.	Follow a systematic methodology for initiating, planning, executing, controlling, and closing technology solutions projects
ITSD1.4.1.c.	Apply industry standard processes, methods, techniques and tools to execute projects
ITSD1.4.1.d.	Be familiar with structured programme and project management environments, such as 'waterfall' methods, and be able to apply the underpinning philosophy and principles of agile in a project situation even in a non-agile environment. Be able to communicate technical and agile concepts to non-technical people
ITSD1.4.1.e.	Interpret and use standards in software project management, including PRINCE2, ISO 10006 (project management quality) and ISO 12207 (software development process) along with the SEI's CMMI model

4.2 Project planning	
ITSD1.4.2.a.	Identify all stakeholders involved in the project and agree the purpose of the project with all relevant stakeholders
ITSD1.4.2.b.	Identify and agree the project scope, timescale, aims and objectives and be able to construct a project specification and plan for a multi-threaded project, including resources and budget
ITSD1.4.2.c.	Understand how to estimate the range of digital development activities and produce overall estimates of costs/effort and allocating and managing appropriate phased contingency
4.3 Project execution	
ITSD1.4.3.a.	Manage a project (typically less than six months, no inter-dependency with other projects and no strategic impact) including identifying and resolving deviations and the management of problems and escalation processes
ITSD1.4.3.b.	Recognise how to identify and manage deviations from the planned schedule of a project
ITSD1.4.3.c.	Understand the importance of regular project reviews and the need to effectively manage the project review process, including planning and management
ITSD1.4.4.d.	Understand the issues of quality, cost and time concerned with project implementation, including contractual obligations and resource constraints
4.4 Agile Project Delivery	
ITSD1.4.4.a.	Understanding of agile project delivery and be able to roll out a business system project accurately and timely in a customer friendly way and consistent with the business needs
ITSD1.4.4.b.	Identify the importance of delivering value early and often, iterating and continuously improving workflows where necessary
ITSD1.4.4.c.	Understand the need to identify and manage project deliverables
ITSD1.4.4.d.	Recognise the principles of quality assurance for project deliverables, including contractual obligations
ITSD1.4.4.e.	Awareness of the roles & responsibilities of a typical agile project management team and how they interact
4.5 Risk assessment and management	
ITSD1.4.5.a.	Identify, analyse and prioritise project risks and issues
ITSD1.4.5.b.	Record and communicate risks through risk reports, registers or logs
ITSD1.4.5.c.	Plan and implement contingency plans and risk responses
ITSD1.4.5.d.	Track risks and associated tasks

Software Development Framework Mapping																								
Level	SCQF 7							SCQF 8						SCQF 9					SCQF 10					
	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
1.1 Business behaviours, ethics and courtesies																								
ITSD1.1.1.a.	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	F	P	P	P	P	F
ITSD1.1.1.b.							P					P		P				F						F
ITSD1.1.1.c.	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	F	P	P	P	P	F	
ITSD1.1.1.d.						P	P	P				P	P	P				F						F
ITSD1.1.1.e.							P					P		P				F						F
1.2 Business Strategy and management																								
ITSD1.1.2.a.						P	P	P				P		P				F						F
ITSD1.1.2.b.		P		P								P		P	P			F	P			P	P	F
ITSD1.1.2.c.						P	P	P				P	P		P			F	P			P	P	F
ITSD1.1.2.d.						P	P	P				P	P		P	P		F	P			P	P	F
1.3 Business Finance and Accounting																								
ITSD1.1.3.a.						P	P							P				P	P				F	F
ITSD1.1.3.b.						P	P		P		P		P	P	P			P	P			P	F	F
ITSD1.1.3.c.	P			P	P	P	P	P	P	P		P	P	P		P	P	P	P	P	P	P	F	F
ITSD1.1.3.d.	P			P	P	P	P		P	P	P		P	P	P		P	P	P	P	P	P	F	F

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
Framework Skills and Knowledge Coverage/ Modules																								
2.1 Software development essentials																								
ITSD1.2.1.a.		P		P		P	P	P	P	P	P	P	P			P	P	F	P	P	P	P	F	
ITSD1.2.1.b.						P		P	P		P					P	P	F	P	P			F	
ITSD1.2.1.c.		P		P		P	P	P	P	P		P			P	P	P	F	P	P	P	P	F	
ITSD1.2.1.d.						P				P							P	F					F	
ITSD1.2.1.e.						P	P	P			P		P			P	P	F	P	P			F	
2.2 Data and Algorithms																								
ITSD1.2.2.a.		P							P		P					P	P	P	F			P	F	
ITSD1.2.2.b.	P	P							P		P						F							
ITSD1.2.2.c.		P							P		F				P		P	F						
ITSD1.2.2.d.		P							P		P				P		F				P			
ITSD1.2.2.e									P		F				P		F							
ITSD1.2.2.f.		P							P		P				P		F							
2.3 Software Modelling & Analysis																								
ITSD1.2.3.a.						P	P	P	P		P	P	P			P		F	P	P			F	
ITSD1.2.3.b.						P		P				P						F					F	
ITSD1.2.3.c.						P		P				P				P		F	P	P			F	
ITSD1.2.3.d.						P	P	P				P	P			P	P	F	P	P			F	
ITSD1.2.3.e.						P	P	P				P				P	P	F	P	P			F	

Level	SCQF 7							SCQF 8						SCQF 9					SCQF 10					
	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
Framework Skills and Knowledge Coverage/ Modules																								
2.4 Software Architecture																								
ITSD1.2.4.a.	P			P	P	P	P			P	P	P	P				P	P	F	P	P	P	P	F
ITSD1.2.4.b.		P			P			P	P		P	P	P					F						
ITSD1.2.4.c.					P	P			P		P	P					P	P	F	P	P			
ITSD1.2.4.d.	P				P	P	P		P		P	P	P				P	P	F		P			F
2.5 Software Requirements Management																								
ITSD1.2.5.a.				P		P	P	P	P	P	P	P		P	P	P	P	F		P				F
ITSD1.2.5.b.				P		P		P	P	P	P	P		P			P	F						F
ITSD1.2.5.c.				P		P		P	P	P	P			P	P		P	F						F
ITSD1.2.5.d.						P		P			P	P						F						F
ITSD1.2.5.e.				P		P		P				P						P	F					
ITSD1.2.5.f.						P		P				P							F					F
ITSD1.2.5.g.						P		P			P	P							F					F
2.6 Software Design																								
ITSD1.2.6.a.		P				P	P	P	P		P	P	P				P	P	F		P			F
ITSD1.2.6.b.								P	P		P						P	P	F		P			
ITSD1.2.6.c.								P				P					P		F		P			F
ITSD1.2.6.d.		P						P	P		P	P	P				P	P	F		P			F
ITSD1.2.6.e.		P						P	P		P		P				P	P	F		P			

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
	2.7 Software Verification & Testing																							
ITSD1.2.7.a.						P		P	P		P		P				P	P	F					F
ITSD1.2.7.b.		P				P		P	P		P		P				P	P	F	P	P			F
ITSD1.2.7.c.		P							P	P		P					P	P	F	P	P			F
ITSD1.2.7.d.									P	P		P						P	F					F
ITSD1.2.7.e.									P	P		P						P	F					F
ITSD1.2.7.f.		P							P	P		P					P	P	F	P	P			F
ITSD1.2.7.g.		P						P	P		P		P				P	P	F	P	P			F
2.8 Software Development Process																								
ITSD1.2.8.a.						P		P			P		P	P					F					F
ITSD1.2.8.b.						P		P					P	P					F					F
ITSD1.2.8.c.						P		P					P				P		F	P	P			F
ITSD1.2.8.d.						P		P					P	P					F					F
ITSD1.2.8.e.						P		P					P						F					F

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	Work Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	Work Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
Framework Skills and Knowledge Coverage/ Modules																								
2.9 Software Development in Context																								
ITSD1.2.9.a.				P			P	P	P	P	P	P	P				P	P	F	P	P	P	P	F
ITSD1.2.9.b.										P								F			P			F
ITSD1.2.9.c.								P	P	P	P		P				P	P	F	P	P	P	P	F
ITSD1.2.9.d.		P						P		P	P						P		F		P			F
ITSD1.2.9.e.		P		P				P	P	P	P						P	P	F		P			F
ITSD1.2.9.f.		P		P				P	P	P	P						P	P	F		P			F
2.10 Software Configuration and Release Management																								
ITSD1.2.10.a.						P				P		P	P					P	F					F
ITSD1.2.10.b.							P			P		P	P					P	F					F
ITSD1.2.10.c.							P			P		P	P					P	F					F
ITSD1.2.10.d.					P							P	P				P	P	F	P	P			F
ITSD1.2.10.e.										P		P	P				P	P	F	P	P			F
ITSD1.2.10.f.												P	P						F					F
ITSD1.2.10.g.												P	P						F					F
ITSD1.2.10.h.												P	P						F					F

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	Work Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	Work Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
2.11 Software Deployment																								
ITSD1.2.11.a.				P		P	P	P	P	P		P	P			P	P	F	P	P	P		F	
ITSD1.2.11.b.						P		P					F	P				F					F	
ITSD1.2.11.c.							P						P			P		F					F	
ITSD1.2.11.d.							P						P					F					F	
ITSD1.2.11.e.						P	P	P	P		P		P			P		F					F	
2.12 Software Maintenance																								
ITSD1.2.12.a.						P		P	P		P		P			P	P	F					F	
ITSD1.2.11.b.		P			P			P		P		P	P				P	F					F	
ITSD1.2.11.c.		P						P	P		P		P	P			P	F					F	
ITSD1.2.11.d.		P				P		P	P		P		P			P	P	F					F	
ITSD1.2.11.e.		P				P		P	P		P		P			P	P	F					F	
2.13 Legacy Systems																								
ITSD1.2.13.a.						P					P						P	F					F	
ITSD1.2.13.b.						P											P	F					F	
ITSD1.2.13.c.											P		P				P	F					F	
ITSD1.2.13.d.						P							P					F	P			P	F	
ITSD1.2.13.e.						P							P				P	F					F	
ITSD1.2.13.f.						P							P					F	P			P	F	

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
2.14 Software Quality																								
ITSD1.2.14.a.						P					P	P					P	F						
ITSD1.2.14.b.						P						P					P	F						F
ITSD1.2.14.c.						P						P					P	F						F
ITSD1.2.14.d.										P		P					F							
ITSD1.2.14.e.						P				P		P					P	F						F
2.15 Data modelling, database development, and data analysis																								
ITSD1.2.15.a.				P			P					P						P			P			F
ITSD1.2.15.b.				P								P						P			P			F
ITSD1.2.15.c.				F								P				P		P						
ITSD1.2.15.d.				P					P			P				F		P						
ITSD1.2.15.e.				F								P						P					P	
ITSD1.2.15.f.				P												P		F			P			
ITSD1.2.15.g.				P								P				P		F			P			
ITSD1.2.15.h.				P								P				P		F			P			

Level	SCQF 7							SCQF 8							SCQF 9							SCQF 10						
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project				
	2.16 Software Security																											
ITSD1.2.16.a.	P	P		P	P	P			P	P	P		P		P		P	P	F	P	P	P	F	F				
ITSD1.2.16.b.					P										P				F			P	F	F				
ITSD1.2.16.c.															P				F			P	F	F				
ITSD1.2.16.d.								P		P						P	P	F	P	P			F	F				
ITSD1.2.16.e.		P		P				P		P						P	P	F	P	P			F	F				
ITSD1.2.16.f.		P						P		P						P	P	F	P	P			F	F				
ITSD1.2.16.g.								P		P						P	P	F	P	P			F	F				
3.1 Communications																												
ITSD1.3.1.a.							P						P		P				F									
ITSD1.3.1.b.							P						P		P				F					F				
ITSD1.3.1.c.						P	P	P				P	P		P		P		F					F				
ITSD1.3.1.d.						P	P	P				P	P		P		P		F					F				
ITSD1.3.1.e.						P	P	P					P		P		P		F					F				
ITSD1.3.1.f.							P	P					P		P		P	P	F	P	P	P	P	F				
ITSD1.3.1.g.							P						P						F					F				

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	iWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	iWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
3.2 Personal attributes																								
ITSD1.3.2.a.						P						P	P	P	P	P			F					F
ITSD1.3.2.b.													P		P				F					F
ITSD1.3.2.c.													P						F					
ITSD1.3.2.d.				P		P	P	P	P	P	P	P	P	P			P	P	F	P	P	P	P	F
ITSD1.3.2.e.	P	P		P	P	P	P	P	P	P	P	P	P			P	P	P	F	P	P	P	P	F
3.3 Professional attributes																								
ITSD1.3.3.a.						P	P					P	P		P				F					F
ITSD1.3.3.b.						P	P						P		P	P		P	F	P	P	P	P	F
ITSD1.3.3.c.						P	P	P	P	P		P	P		P		P		F					F
ITSD1.3.3.d.							P						P		P				F					F
ITSD1.3.3.e.							P		P	P	P		P	P	P		P	P	F	P	P			F
ITSD1.3.3.f.							P					P	P		P				F					F
3.4 Team working																								
ITSD1.3.4.a.						P	P	P					P	P	P			P		F				F
ITSD1.3.5.a.						P	P	P					P	P	P			P		F				F
ITSD1.3.6.a.						P	P	P					P	P	P			P		F				F

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10							
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems							Object Oriented Analysis and Design							DevOps						Cloud Platform Development					
	Programming 0							Programming 1							Research Skills & Professional Issues						Mobile Platform Development OR Front End Web Development					
	Mathematics for Computing							Web Application Development 1							Introduction to Data Science						Big Data and IoT					
	Database Development							Programming 2							Web Application Development 2						Information Security					
	Fundamentals of Network and Cloud Computing							Human Computer Interaction							Programming 3						Honours Project					
	Fundamentals of Software Engineering							Work Based Project 2							Work Based Project 3											
	Work Based Project 1																									
	4.1 Project management approaches and methodologies																									
	ITSD1.4.1.a.		P				P	P	P	P		P	P	P	P			P	P	F					F	
	ITSD1.4.1.b.							P	P				P	P		P				F					F	
	ITSD1.4.1.c.							P					P	P	P					F					F	
	ITSD1.4.1.d.						P		P				P	P		P				F					F	
	ITSD1.4.1.e.												P							F					F	
	4.2 Project planning																									
	ITSD1.4.2.a.						P	P	P					P		P				F					F	
	ITSD1.4.2.b.							P						P		P				F					F	
	ITSD1.4.2.c.							P						P		P				F					F	
4.3 Project execution																										
ITSD1.4.3.a.							P						P						F					F		
ITSD1.4.3.b.							P						P						F					F		
ITSD1.4.3.c.							P						P						F					F		
ITSD1.4.4.d.							P						P						F					F		

Level	SCQF 7						SCQF 8						SCQF 9						SCQF 10					
Framework Skills and Knowledge Coverage/ Modules	Fundamentals of Computer Systems	Programming 0	Mathematics for Computing	Database Development	Fundamentals of Network and Cloud Computing	Fundamentals of Software Engineering	Work Based Project 1	Object Oriented Analysis and Design	Programming 1	Web Application Development 1	Programming 2	Human Computer Interaction	IWork Based Project 2	DevOps	Research Skills & Professional Issues	Introduction to Data Science	Web Application Development 2	Programming 3	IWork Based Project 3	Cloud Platform Development	Mobile Platform Development OR Front End Web Development	Big Data and IoT	Information Security	Honours Project
4.4 Agile Project Delivery																								
ITSD1.4.4.a.						P							P		P					F				F
ITSD1.4.4.b.						P							P	P	P					F				F
ITSD1.4.4.c.						P							P		P					F				F
ITSD1.4.4.d.													P		P					F				F
ITSD1.4.4.e.													P		P					F				F
4.5 Risk assessment and management																								
ITSD1.4.5.a.						P	P						P	P	P					F				F
ITSD1.4.5.b.						P	P						P		P					F				F
ITSD1.4.5.c.						P	P						P	P	P					F				F
ITSD1.4.5.d.						P	P						P		P					F				F
ITSD1.4.5.e.						P	P						P	P	P					F				F

ASSESSMENT LOADING MATRIX

Appendix 3

SCQF Level 7									
Module Code	Module Title	Trimester	Credits	Assessment Weighting					
				Cw1	Cw2	Cw3	Exam1 (Exams Office)	Ex2 (Exams Office)	Ex3 (Class Test)
M1I326726	Programming 0	A	20	50%	50%				
M1I325893	Fundamentals Of Computer Systems	A	10	50%	50%				
M1I325895	Fundamentals Of Network and Cloud Computing	B	10	50%	50%				
M1I325894	Database Development	B	20	100%					
M1I325085	Maths for Computing	A-B	20	40%			60%		
M1I326711	Work Based Project 1	C	20	100%					
M1I326710	Fundamentals Of Software Engineering	C	20	50%	50%				
EXIT AWARD: Certificate of Higher Education Computing (GA)									

SCQF Level 8									
Module Code	Module Title	Trimester	Credits	Assessment Weighting					
				Cw1	Cw2	Cw3	Exam1 (Exams Office)	Ex2 (Exams Office)	Ex3 (Class Test)
M2I325090	Object Oriented Analysis and Design	A	20	50%	50%				
M2I326727	Programming 1	A	20	50%	50%				
M2I326730	Programming 2	B	20	50%	50%				
M2I326718	Web Application Development 1	B	20	100%					
M2I625901	Human Computer Interaction	C	20	60%	40%				
M2I326714	Work Based Project 2	C	20	100%					
EXIT AWARD: Diploma of Higher Education Computing (GA)									

SCQF Level 9									
Module Code	Module Title	Trimester	Credits	Assessment Weighting					
				Cw1	Cw2	Cw3	Exam1 (Exams Office)	Ex2 (Exams Office)	Ex3 (Class Test)
M3I325896	DevOps	A	20	50%	50%				
M3I326702	Introduction to Data Science	A	20	50%	50%				
M3I325099	Research Skills and Professional Issues	B	20	30%	70%				
M3I326794	Web Application Development 2	B	20	100%					
M3I326704	Programming 3	C	20	50%	50%				
M3W226716	Work Based Project 3	C	20	100%					
EXIT AWARD: Bachelors Degree (Unclassified) Software Development (GA)									

SCQF Level 10									
Module Code	Module Title	Trimester	Credits	Assessment Weighting					
				Cw1	Cw2	Cw3	Exam1 (Exams Office)	Ex2 (Exams Office)	Ex3 (Class Test)
MHI226698	Big Data and IoT	A	20	40%	60%				
MHI326842	Mobile Platform Development (option)	A	20	70%	30%				
MHI326717	Front End Web Development (option)	A	20	50%	50%				
MHI326728	Cloud Platform Development	B	20	50%			50%		
MHI226695	Information Security	B	20	50%			50%		
MHW226542	Honours Project	C	40	100%					
EXIT AWARD: Bachelors Degree with Honours Software Development (GA)									

Appendix 4: Work Based Learning & Assessment Allocation

The detail of Work Based Learning and Work Based Assessment weightings have been taken from the high level Module Descriptors available as part of this documentation set.

Level	Module Code	Module Title	WBL%	WBA%
1 (SCQF7)	M1I326726	Programming 0	79	10
	M1I325893	Fundamentals of Computer Systems	79	0
	M1I325085	Mathematics for Computing	79	0
	M1I325894	Database Development	79	10
	M1I325895	Fundamentals of Network and Cloud Computing	79	0
	M1I326710	Fundamentals of Software Engineering	79	0
	M1I326711	Work Based Project 1	61	100
2 (SCQF8)	M2I326727	Programming 1	79	10
	M2I325090	Object Orientated Analysis and Design	79	50
	M2I326730	Programming 2	79	10
	M2I326718	Web Application Development 1	79	10
	M2I625901	Human Computer Interaction	79	60
	M2I326714	Work Based Project 2	82	100
3 (SCQF9)	M3I326704	Programming 3	79	10
	M3I325896	DevOps	73	0
	M3I326794	Web Application Development 2	79	10
	M3I325099	Research Skills and Professional Issues	79	100
	M3I326702	Introduction to Data Science	73	0
	M3W226716	Work Based Project 3	82	100
4 (SCQF10)	MHI226698	Big Data and IoT	79	40
	MHI226695	Information Security	79	0
	MHI326717	Front End Web Development 2 (<i>Option</i>)	79	0
	MHI326842	Mobile Platform Development (<i>Option</i>)	79	0
	MHI326728	Cloud Platform Development	73	0
	MHW226542	Honours Project	90	100

The data in the table above was used to assess the level of Work Based Learning and Work Based Assessment at each level of the programme and is expressed as a percentage for each level below.

Level	Work Based Learning (%)	Work Based Assessment (%)
1	76	20
2	79	40
3	77	43
4	81	42