

Validation Document		
1	Title of Programme	Software Development
2	Award (e.g. FdA, FdSc)	FdSc
3	Contained Award	Certificate of HE for successful completion of 120 credits at Level 4
4	UCAS Code	G3T1
5	HECOS codes	100374 50% 100366 50%
6	Mode of Study (full and/or part-time)	Full Time
7	Duration (total number of years)	2
8	Number of weeks per academic year	31 Each Trimester consists of 8 weeks of module delivery. Trimester 1 has an extra week in which students are prepared for study at the new level. There are 6 assessment weeks.
9	Accrediting Professional / Statutory Body (if applicable)	n/a
10	Location of delivery	Grimsby Institute / Institute of Technology
11	Faculty	Digital & Creative Industries
12	Entry requirements	
<p><b>Standard offer</b></p> <p>Standard entry requirement for the degree will be 80 UCAS points, with a minimum of grade '4' in GCSE English or equivalent (Functional Skills Literacy Level 2 or Adult Literacy Level 2), and grade '4' in GCSE Mathematics or equivalent (Functional Skills Numeracy Level 2 or Adult Numeracy Level 2).</p> <p><b>Non-standard offer</b></p> <p>The TEC Partnership will also encourage applications from non-traditional learners who lack formal academic qualifications for the standard entry route. All such non-traditional applicants will be interviewed, set an appropriate piece of work (a research based written assignment investigating a current topic within the digital technologies sector), asked to provide evidence of relevant digital product development and a judgement made taking into account their academic potential and relevant experience.</p> <p><b>Accreditation of prior learning</b></p>		

TEC Partnership encourages student transfers from other institutions. Applicants may be admitted with credit for prior certificated learning (APcL) or work/life experience or other uncertificated learning (APEL). Please refer to the [HE07 Admissions, Admissions Appeals and APEL Admissions, Admissions Appeals and Accreditation of Prior Learning \(Transfers\)](#).

### International admissions

The TEC Partnership recognises a wide range of entry qualifications as being equivalent to A' level standard; if students hold a qualification not listed above please contact.

International students must evidence they possess a satisfactory command of English language in terms of reading, writing, listening and are expected to have achieved Level B2 on the Common European Framework of Reference for Language (CEFR), as defined by UK Visas and Immigration.

13	Minimum number of students required for the programme to run	8
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14	Degree classification weighting	
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The degree classification is awarded based on the average percentage mark achieved at level 5 of the degree.

15	Aims of the programme and distinctive features/fit with existing provision	
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### Overall programme description:

The Web and Application branch in the IT Sector is growing at a remarkable rate. Every week new and innovative solutions to problems and tasks push the boundaries of what computers and connected devices can do and offer.

With this demand for fast thinking and fresh coders it is important for students new to programming to have a higher understanding of coding practices and frameworks than ever before. software development skills to meet business requirements are now compulsory at all levels, not just project managers and lead developers.

This course will allow students to develop their skills and practices via assignment work, lab work and their final major project both to industry/sector and academic standards. Students will acquire and develop techniques for identifying, analysing and testing IT solutions to develop their skills in designing innovative IT solutions.

Students will apply new and modern models, techniques and tools for implementing custom designs of IT solutions and deliver high standard software products for various platforms. Testing skills to meet the ethical and professional standards required by business and the industry will be present throughout the course.

State of the art servers, workstations and accessories, coupled with a wide range of stand-alone platforms like the Raspberry Pi and the inclusion of 'Internet of Things' (IoT) devices, will give students the best start to their programming career, giving them the skills and confidence to code in any environment.

**Level 4** will focus on the acquisition of Software fundamentals and requirements. Students will develop fundamental skills in current popular and versatile programming languages such as C#.NET, asp.NET, PHP and Web languages like HTML 5, CSS 3 and JavaScript (to be reviewed and updated in line with industry practice). This coupled with the inclusion of frameworks and repositories/versioning from the start will hone their skills in the modern standards of programming.

**Level 5** will focus on the development of skills within business and commercial scenarios with the opportunity to move towards specialism within a specialist project module at the end of level 5.

Students will be involved with practical work, carrying out both individual and team tasks in software development, from analysis and design to implementation, testing and maintenance.

**All Levels** will incorporate systems analysis and database design, full software development workflow including planning and deployment, making use of frameworks, IDEs and repositories while also maintaining version histories. UX/GUI design will also be a key feature of the programme with students considering principles of 'Human Computer Interaction' (HCI) and the importance of a positive user experience in the design and development of software interfaces and features.

**Aims of the Programme:**

- To introduce modern coding practices and methodologies to the next generation of coders;
- To develop knowledge and critical/analytical thinking of core programming fundamentals;
- To allow students to expand their abilities in problem solving for real world scenarios;
- To develop the capability to critically reflect on personal and professional aspirations in relation to further study or employment in the ever-expanding IT Sector;
- To develop and nurture an awareness of professional and ethical work practices for all roles and responsibilities;
- To equip students with cutting edge skills along with experience in the full software development lifecycle from planning and management to full delivery.

**What makes this programme distinctive against other providers?**

State of the art servers, workstations and accessories, coupled with a wide range of stand-alone platforms like the Raspberry Pi and the inclusion of 'Internet of Things' (IoT) devices, gives the option to develop software from design to full implementation. Students will have access to industry standard infrastructures not only from a user perspective but from that of a service management. This innovative mode of delivery gives students the chance of working in both software and hardware environments creating a more in-depth knowledge comparable to that of senior development roles.

With this in mind much of the programme will include the development of fully functional products for each assessment, building a portfolio of applications and services students can show to potential employers.

**How does it match and compliment current provision?**

The programme does not directly match existing provision although there is some common ground between the programme and the current. It does compliment a range of degrees including those in Games Design and Computing .

### What can graduates progress to on successful completion of the programme?

It is possible for students to apply to other institutions offering comparable BSc (hons) top up programmes. Many employers both within the computing/ICT sector and other industry/commercial sectors will fully recognise the FdSc award opening up the potential to apply for graduate employment in some cases. Students may also choose to follow up the programme by undertaking professional certification programmes (for example, those offered by CISCO, Microsoft, Adobe, etc.).

16 Programme Learning Outcomes <i>Upon successful completion of this programme a student will be able to...</i>		
	Programme Learning Outcome	Subject Benchmark Reference
1	Be able to critically analyse a business problem, identifying and evaluating the role of IT systems and propose appropriate solutions	6.3 i, 6.3 ii, 6.3 iii, 6.3, vi, 6.5 i, 6.5 ii, 6.5 iv, 6.5 v, 6.7i, 6.7 ii & 6.7 iii
2	Be able to identify user, system and data requirements in the context of Software Development Lifecycles, model data solutions and demonstrate understanding of the application' purpose	6.3i, 6.3 ii, 6.3 iii, 6.5 i, 6.5 ii, 6.5 iv, 6.5 v, 6.7 i & 6.7 iii
3	Demonstrate understanding in Software Development Lifecycles and the planning process of an application and critically evaluate suitable methodologies to support the software./systems development process.	6.3 i, 6.3 ii, 6.3 iii, 6.5 i, 6.5 ii, 6.5 iv, 6.5 v, 6.5 vi, 6.7 i & 6.7ii
4	Critically analyse and explain the implications of the use of IT within a Corporate environment.	6.3 i, 6.3 ii, 6.3 iv, 6.3 v, 6.3 vi, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v & 6.5 vi
5	Understand the implications of using standard and non-standard coding techniques and practices and critically evaluate development environments, frameworks and versioning systems in order to support those techniques.	6.3 i, 6.3 ii, 6.3 iv, 6.3 v, 6.5 i, 6.5 ii, 6.5 iv, 6.5 v, 6.7 i & 6.7 iii
6	Be able to carry out both secondary and primary research (using a variety of research methodologies) in order to derive underpinning theory and contextual insight to support the planning and design of digital solutions and support study within the programme following academic conventions.	6.3 i, 6.3 ii, 6.3 vi,6.5 i, 6.5 ii, 6.5 v, 6.5 vi & 6.7iii
7	Design, develop, test and implement key components of an application system based on communication with data sources.	6.3 i, 6.3 ii, 6.3 iii, 6.3, vi, 6.3 v, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v, 6.5 vi, 6.7i, 6.7ii & 6.7iii
8	Demonstrate an understanding of Technologies and Architectures for building secure, data driven software applications within a distributed network environment.	6.3 i, 6.3 ii, 6.3 iii, 6.3 iv, 6.3 v, 6.3 vi, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v, 6.5 vi, 6.7 i & 6.7ii
9	Demonstrate the ability to create graphic-based websites and interfaces that are accessible to all users with full consideration of UX/HCI principles.	6.3 i, 6.3 ii, 6.3 iii, 6.3 iv, 6.3 v, 6.3 vi, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v, 6.5 vi, 6.7 i & 6.7ii
10	Create and critically analyse a range of core Software Solutions based on a set requirement list.	6.3 i, 6.3 ii, 6.3 iii, 6.3 iv, 6.3 v, 6.3 vi, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v, 6.5 vi, 6.7 i & 6.7ii
11	Be able to demonstrate professional, business and interpersonal skills appropriate to the organisation and in wider contexts including the ability to explain complex information technology projects to non-experts persuading them to adopt solutions to problems.	6.3 i, 6.3 ii, 6.3 v, 6.5 i, 6.5 ii,6.5 v, 6.5 v, 6.7 i, 6.7 ii & 6.7 iv
12	Be able to apply project management in the context of systems analysis and design projects and incorporating relevant stages identified within recognised systems development methodologies in	6.3 iv, 6.3 v, 6.5 i, 6.5 ii, 6.5 iii, 6.5 iv, 6.5 v, 6.7 i, 6.7 ii & 6.7 iv

	order to ensure that projects are carried out to completion and including reflective practice.	
17	<b>Teaching and Learning Strategy</b>	
<p>The teaching and learning strategy for this programme will be based around a combination of traditional lectures and seminars for the delivery of underpinning theory, core module content and the demonstration of practical skills; together with labs/workshops to allow students to apply and develop practical and technical skills. The balance of formal delivery to lab/workshop sessions will be determined by the requirements of each module. In addition to the combination of lectures/seminars and labs/workshops, students will be able to access tutorial support in order to address individual needs (in addition to more traditional tutorials covering pastoral support requirements) and in the case of self-directed research and/or development projects each student will be entitled to 5 hours of academic supervision per relevant module.</p> <p>Practical and professional skills will be developed through projects, briefs and assignments which develop and encourage practical application of learning. Both core modules and the later specialist modules will employ this approach to ensure that learning outcomes are planned to reflect real world business practices and requirements.</p> <p><b>Level 4</b></p> <p>Modules at level 4 are designed with an understanding that students joining the programme may have widely varying skills and experience and therefore the subject matter of any given module may be unfamiliar to the student. With that in mind each level 4 module covers the fundamental theories of its subject as if the subject is being delivered ‘from scratch’ within the earliest stages of the module; however the coverage of the fundamentals will be limited and it is expected that students who are unfamiliar with a module’s subject will also carry out independent study in that area and will make use of tutorial support to address any shortfall or gaps in their knowledge and skills. From this foundation students will then go on to develop knowledge and skills to meet the level 4 outcomes.</p> <p>The approach at level 4 is still very much one of teaching and learning with tutors guiding students through the modules but actively encouraging independent study and work that goes beyond threshold learning outcomes with deeper exploration of each modules indicative content.</p> <p>All modules will encourage thorough secondary research and the application of that research, critical thinking, analysis and evaluation, and reflective practice. This will be reflected in the assessment requirements and guidance for each module.</p> <p>The balance between lecture/seminar and labs/workshops will reflect the emphasis on teaching.</p> <p>Essential study skills, research skills and core professional skills are included at level 4 in order to ensure students are able to make the transition to level 5 successfully.</p> <p><b>Level 5</b></p> <p>Modules at level 5 will build upon modules covered at level 4 both directly and in combination and with this in mind level 4 modules will be identified as pre-requisites for level 5 modules where relevant.</p> <p>At level 5 the approach will shift from one of teaching and learning to one of learning and teaching, implying that students will be expected to be more independent and capable of self-directed study with teaching intended as support for those areas where students identify additional support needs. Each module will still include delivery of relevant and new underpinning theory and new skills, but the balance between lectures/seminars and labs/workshops will shift with an increase in workshop time to allow students to carry out their own self-directed development activities.</p>		

This will culminate in students undertaking and completing a substantial (40 credit) research and development project in which delivery will be minimal (specifically to support research skills and project management) and support will be offered primarily through academic supervision.

Project management will be delivered within a dedicated module at the start of level 5 in preparation for the major project mentioned above.

18 Programme Structure				
Module Title	Core/ Option	Credits	Level	Delivery T1/T2/T3
Professional and Study Skills	C	20	4	T1
Introduction to Programming and Frameworks	C	20	4	T1
Database Design and Implementation	C	20	4	T2
IT Infrastructure and Maintenance	C	20	4	T2
Web Development	C	20	4	T3
Business Systems and Process Automation	C	20	4	T3
Advanced Programming	C	20	5	T1
Security and Intrusion Prevention	C	20	5	T1
Application Development	C	20	5	T2
Robotic Process Automation	C	20	5	T3
Major Development Project	C	40	5	T2&T3

19	References used in designing the programme
QAA Subject Benchmarking Statement – Computing – 2019	
20	Indicators of quality and standards
<p>The programme will follow the QA standards of the TEC Partnership. The programme has been written with reference to appropriate external reference points.</p> <p>QAA reviews will be published and any weaknesses addressed as appropriate. The TEC Partnership also undertakes a number of scheduled internal periodic and thematic reviews throughout each academic year to assure itself of the quality and standards of its provision.</p> <p>External Examiners reports are received by the HE Quality department and a copy forwarded to the relevant School. The TEC Partnership requires action plans to be created for any actions recommended as a result of student, tutor, moderator or External Examiner comments. These are reported to the relevant HE Committees. The TEC Partnership also monitors External Examiner reports and these are reported on through faculty self-evaluation and enhancement documents, the quality enhancement report and the Institute's External Examiner's institutional analysis report.</p> <p>Annual course reviews (AMRs) will take place in line with the requirements of the TEC Partnership and actions planned to rectify any weaknesses and further develop the quality of the provision. These AMRs are moderated internally by the Curriculum Manager and then submitted to the HE Quality department to ensure key sources such as External Examiner reports are fully reflected upon before being published and also to reduce variability in the quality of information presented.</p> <p>In addition to the AMR a quality improvement proforma (QIP) is used to outline and monitor any and all recommended actions indicated within the AMR. Both the AMR and QIP for the programme are treated as living documents to be reviewed, actioned and updated throughout each academic period.</p>	
21	Particular support for learning
<p>The needs of disabled learners are taken into account in the design of all learning programmes.</p> <p>Students will be screened at induction to identify those with individual learning support needs. The TEC Partnership has well-established procedures in place to support all identified students through the application and assessments for the Disabled Students' Allowance to secure any specialist equipment or tuition which is required.</p> <p>Students will also be invited in for advice and support through the DSA procedure.</p> <p>Each student is entitled to one tutorial per semester with the programme leader to discuss individual issues relating to both modules and the programme overall.</p> <p>In addition to study skills embedded in the programme, the TEC Partnership employs an Academic Achievement Coach. The Academic Achievement Coach is responsible for working with students to support them in the development of their study skill abilities and includes interventions such as support towards use of ICT, giving presentations, using formal writing and appropriate academic conventions, avoiding plagiarism, analytical and critical writing skills. Students have access to one support and also timetabled study skills workshops.</p>	
22	Methods for evaluating and improving the quality of learning

All students will have the opportunity to comment on the quality of the learning experience on each module. Staff will also be expected to complete module evaluations for each module that they deliver. This feedback must be analysed by the module leader and the results fed into the annual monitoring report, faculty self-evaluation document and subsequent year's module handbook. Programme and module leaders must give consideration to modification to improve the delivery of any module and this should be recorded in the annual monitoring report and carried forward for minor or major modifications as appropriate.

The TEC Partnership's policy requires that all teaching staff should be observed delivering learning at least annually. Teaching and learning that does not reach the minimum expected standard will result in an action plan agreed between the line manager and the member of staff.

Student satisfaction is measured by student surveys on larger courses, on the smaller courses student opinion may be gathered by other survey means. Student representatives are invited to course team meetings and additionally have the opportunity to raise items with the course leader at individual meetings outside the course team.

All modules make use of standardised module evaluation questionnaires on their completion allowing students to feedback on all aspects of a module's delivery, resources and assessment. Students are actively encouraged to complete these and the information gathered is used within the programme's AMR & QIP and also reviewed within each module's handbook. This information can then be used to make changes to the module (if necessary up to the level of minor modifications) during the annual review period and prior to release for the next cohort.

Further, The TEC Partnership facilitates the UCG Student Senate, which consists of student representatives from each HE department. The Senate meets on a monthly basis and their remit is to:

- Consider matters relating to the student experience within Higher Education.
- Enhance the Student Voice within the TEC Partnership's Higher Education strategic and operational agenda.
- Provide feedback on areas of good practice.
- Put forward suggestions of the development of Institutional policy and strategy.
- Enhance the student learning experience by promoting academic and research events and cultural events in UCG.
- Increase student engagement in all aspects of Higher Education quality processes.

23	Identify any ethical issues that relate to this programme's teaching and assessment
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While the majority of modules should present no ethical issues student will undertake a major project at level 5 which will require the students to engage with an external employer/agency in order to provide foundation for and approval of the project. With this in mind it is possible that issues may arise regarding GDPR (use of live data within projects) and that students may also need to conduct primary research within the problem domain of the project.

To address this the major project will require students to complete and have approved an ethics proposal prior to any development activity or primary research taking place.

Ethics proposals will then be reviewed by the programme leader and the departmental ethics co-ordinator prior to being presented to the TEC Partnership's ethics committee for review (if this is deemed to be necessary by the programme leader and departmental ethics co-ordinator).

24	Is the Work Based or Work Related?	Work Related
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25	How are WBL/WRL opportunities managed, monitored and reviewed, and what particular arrangements are there for student support	
<p>There are no traditional work placements within the programme, however the major project will be undertaken with a local employer (students will be required to engage with and liaise with a local employer throughout the duration of the project and the development focus of the project must represent a real world business case/problem agreed with that employer). On rare occasions where this is not possible simulation will be used to ensure progression for the student.</p> <p>In all cases students will be required to complete a project proposal to be agreed by the major project module tutor, the student, the employer and any other major stakeholders of the project, prior to the project start. This document will be signed off by all parties. In addition to which, all students will be required to complete an ethics proposal to be approved by the local ethics co-ordinator in cases where no ethical issues are identified or sent for review and approval by the ethics committee at Grimsby Institute.</p> <p>All modules, where relevant, will include scenarios or case studies that reflect current, real world, business practices.</p>		
26	Resources Supplied to the Student	
<p>Access to a laptop or desktop PC with online access through a maintained internet connection. Access either locally or remotely to isolated network servers (*3) and additional networking equipment (routers, switches, hubs and firewall firmware). Office 365 or an equivalent suite of office/ICT applications. OneDrive or equivalent cloud based storage. Packet Tracer for design and simulation of networks. MySQL, Microsoft SQL Management Studio, phpMyAdmin or an equivalent set of tools for database design and development. MS Visual Studio.NET or equivalent IDE with support for languages used within module delivery (e.g. HTML, CSS, Javascript, Java, Python, C#).</p> <p>Students will also require access to the library catalogue and be able to order books both on site and off site.</p>		
27	Resources needed to pass the programme	
<p>All Students will need to ensure they have suitable stationary (pens, notebooks, pencils, ruler, eraser) and at least two USB storage devices to allow for storage and back-up of their work.</p> <p>If working off site Students will need access to a suitable desktop or laptop computer with access to Office 365 and additional software as listed above .</p>		
28	Revision History	
Version	Details of major modification	Date of approval
1		
2		
3		

GIFHE Module Specification		
A	Module title	Professional and Study Skills
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Whilst this is a technical programme, it still provides students with an academic qualification and therefore must ensure academic standards and skills are delivered and assessed. Aside from aiding students in the completion of the concurrent and future submissions, the skills learnt will enable them to work effectively as part of a team, communicate in a professional manner, plan large scale IT projects within industry, present ideas, proof of concept or functional prototypes to colleagues and clients and write technical and research reports within the field of computing.</p>		
H	Aims and distinctive features	
<p>This module aims to support students in their academic studies such as Harvard referencing, report writing, secondary and primary research methodologies and the structure of technical documentation for systems development. However, the primary aim is to ensure that they can be effective as part of a workforce within the field of computing. It will investigate professional issues around computing in business, for example security of data, ethical considerations, hacking, and fair use. In addition, it will consider core skills such as producing a CV/letter for job applications. Electronic communications in the workplace will also be considered, not only using email but file communication systems, and a variety of social media applications which are critical to employability. Presentation skills and basic project management will also be delivered and assessed to support the planning and maintenance of computing projects. Students will also be expected to be able to work effectively in teams in the planning and enaction of small scale projects.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1 Plan academic research, with an awareness of recognised and appropriate research methodologies.
		2 Structure an academic report in an appropriate format with clear evidence of the application of wider reading, citation and referencing techniques.
		3 Work in teams to plan and manage a small scale project using appropriate project management takes and making effective use of digital communications.
		4 Demonstrate effective presentation skills both within and outside a peer group that includes reflective practice.
J	Learning and teaching strategy	

## Lectures/Seminars

The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.

## Workshop

Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.

## Group Activity

Students will develop group work related to their assessment both on-site (in workshops) and off site; making effective use of e-mail, VOIP, video calling, social media platforms and online project repository/version control systems (e.g. trello, slack, github).

## Additional Study

Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.

K	Direct and indirect contact hours	This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery. The remainder is preparation for lessons, independent study and assessment preparation. This module runs for one trimester/term.
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	This module is compensatable. Social Media Report and Reflective Evaluation (60%) – 2000 words Group Presentation (40%) – 20 minutes
N	Methods of reassessment (if different to M)	Individual Presentation -12 minutes
O	Rationale for assessment and reassessment	

## Social Media Report and Reflective Evaluation

Aimed at developing the ability to produce and structure both academic and technical reports, integrate and reference wider reading and evaluate situations and draw conclusions. Furthermore, to encourage the development of reflective evaluation practise and self-evaluation skills using recognised formal approaches (e.g. Gibbs Reflective Cycle, Kolb's Reflective Cycle)

## Group Presentation

To ensure the ability to work effectively as a team in managing and delivering small scale technical projects and in delivering professional, well-structured and timed presentations with formal elements.

#### Group Presentation Re-assessment

Although the assessment is a group assessment it will be individually graded as a result of which only those individuals who fail within this assessment would be required to resubmit, with the resubmission being the proportional contribution of an individual within the group assessment.

P		Assessment Mapping				
Assessment	Percentage	LO1	LO2	LO3	LO4	
Social Media Report and Reflective Evaluation	60%	X	X		X	
Group Presentation	40%			X	X	

Q		Indicative content				
<p><b>Theoretical elements of this module will include:</b></p> <ul style="list-style-type: none"> <li>• Professionalism in the IT industry;</li> <li>• Social Media in Professional Practice;</li> <li>• Communication in Professional Practice;</li> <li>• Presenting information;</li> <li>• The nature of secondary research;</li> <li>• Potential secondary sources;</li> <li>• The nature of primary research;</li> <li>• Methods for primary research;</li> <li>• Research methodologies;</li> <li>• An examination of current social media systems;</li> <li>• Use of theory to examine team roles.</li> </ul> <p><b>Practical elements of this module will include:</b></p> <ul style="list-style-type: none"> <li>• Harvard Referencing</li> <li>• Structuring academic and technical reports in an appropriate manner.</li> <li>• Conducting wider reading and research using a range of sources;</li> <li>• Using wider reading to consolidate views and opinions;</li> <li>• Preparing and delivering professional presentations;</li> <li>• Writing formal reports;</li> <li>• Planning IT projects within the computing industry;</li> <li>• Utilising correct planning tools;</li> <li>• Setting Aims, Objectives and SMART targets;</li> <li>• SWOT Analysis, risk assessment and contingency planning;</li> <li>• Incorporating a range of software applications for project planning;</li> <li>• Exam preparation skills.</li> </ul>						
R		Core and indicative reading				

**Core Reading**

Cottrell, S. (2019). *The Study Skills Handbook* 5<sup>th</sup> Edition. London: Palgrave Macmillan.

Day, T, (2018). *Success in Academic Writing*. London: Macmillan Study Skills.

Dawson, C. (2015). *Projects in Computing and Information Systems: A Student's Guide*. 3<sup>rd</sup> Edition. Harlow: Pearson.

**Indicative Reading**

Crene, P. & Lea, M. (2008). *Writing At University: A Guide For Students*. 3<sup>rd</sup> Edition. London: Oxford University Press.

Gibbs, G. (1988). *Learning by Doing: A Guide to Teaching and Learning Methods*. London: Further Education Unit.

Hennessy, B. (2007). *Writing An Essay*. Oxford: How To Books.

Lock, D. (2013). *Project Management*. 9<sup>th</sup> Edition. Aldershot: Gower Publishing.

Kolb, D. (1984). *Experiential learning*. 2<sup>nd</sup> Edition. Prentice-Hall.

**Websites**

<https://www.ucas.com/undergraduate/student-life/study-skills-guides>

**Journals**

Science Direct (<https://www.sciencedirect.com>)

S	Resource needs essential for delivery of this module		
No specialist hardware or software resources are required for the delivery of this module.			
T	Minor Modifications		
Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			

GIFHE Module Specification		
A	Module title	Introduction to Programming and Frameworks
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>General purpose programming contributes to a vast range of disciplines within the computing industry. In addition to providing the foundation to the more advanced programming modules covered later in the course, the skills that are learnt in this module will contribute to a better understanding of databases, web development and even network hardware. As part of this it is understood that workflows need to be efficient if industry is to be able to deploy software across multiple hardware platforms and devices and to this end the module also considers the use of IDEs and Frameworks within software development to enhance workflow.</p>		
H	Aims and distinctive features	
<p>This module will introduce the basic concepts of programming. It will provide an understanding of the general principles and concepts of programming which will create the foundation on which to build. Programs will be developed using a structured approach to programming using a high level programming language. The module will consider programming paradigms (event driven, procedural and object oriented) and a range of essential concepts such as, loops, conditional statements, data types, inputs, outputs, functions and passing data. It will also consider essential documentation and testing. The concepts covered in this module provide the essential building blocks to progress onto more advanced programming including object oriented programming.</p> <p>The module will also take into consideration the software development lifecycle and how this relates to commonly applied methodologies (e.g. RAD, Agile, Spiral and Waterfall).</p> <p>Use of frameworks (such as JQuery, Bootstrap, MVC) and development environments (for example Visual Studio.NET) will be embedded within the module to address the industry need for efficient workflows and standardised practice.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1. Demonstrate effective problem solving through design of software applications prior to implementation;
		2. Construct a software solution using structured programming methods, and using modularisation in the implementation of the software application to include the use of frameworks where applicable;
		3. Develop and deploy appropriate documentation for a given software application emphasising the processes involved in software design and in solving practical problems;

		4. Apply recognised testing techniques for software testing and documentation, creating appropriate test plans/schedules and test logs for the tracking and rectification of semantic errors;
J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	<p>This module is non-compensatable.</p> <p>Product Development (100%)</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	
<p><b>Product Development Portfolio</b></p> <p>Development of a portfolio which demonstrates a range of software solutions and development techniques to a specified complex problem. Portfolio will include the planning, designing, development and testing of each solution using appropriate documentation methods. Portfolio will also include source code for the chosen solution with supporting documentation to justify choice of language, programming paradigm, use of frameworks, and selection of IDE.</p>		
P	Assessment Mapping	

Assessment	Percentage	LO1	LO2	LO3	LO4
Product Development	100%	X	X	X	X

Q	Indicative content
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**Theoretical elements of this module will include:**

- Programming paradigms: event driven, procedural and object oriented;
- Design before development, problem solving, link to requirements, working as a team member (where applicable);
- Flow diagrams, pseudo code, structured English, data dictionaries, class diagrams;
- Test plan and test log, debugging tools, dry running, compiler errors;
- Syntax, semantic and run-time errors;
- test plan, what is and is not testing;
- when testing starts;
- black and white box testing;
- alpha and beta and release candidate testing;
- evidence of testing;
- schedule of error resolution;
- Selection of appropriate methodology;
- Selection of appropriate development tools;
- Evaluation and selection of appropriate frameworks;
- developing tested programs that meet the requirements.

**Practical elements of this module will include:**

- Standards: Commenting, indenting, code layout.
- Data types: String, char, int, double, boolean.
- Data structures: 1D and multi-dimensional arrays.
- Data manipulation: Assignment, maths on variables.
- Variable scope: Global, local.
- I/O: System.in, System. Out, Visual IO capabilities.
- Control syntax: Loop (for, while, do-while, repeat-until) and decisional (if- then - else, case).
- Modular: Methods (functions and procedures) passing and returning data values.
- Standards for professional documentation.

R	Core and indicative reading
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**Core Reading**

Schildt, H (2018). *Java: A Beginner's Guide*, 8<sup>th</sup> Edition. McGraw Hill

Stroustrup, B(2014) *Programming: Principles and Practice Using C++*, 2<sup>nd</sup> ed, Addison-Wesley

Yaeger, Dorian P (2013) *Object-oriented Programming Languages and Event-driven Programming (Computer Science)*, Mercury Learning & Information

**Indicative Reading**

Gabrielli, M (2010) *Programming Languages:Principles and Paradigms (Undergraduate Topics in Computer Science)*, London, Springer



Cadenhead R, Lemay L (2012) *Teach Yourself Java 6 in 21 Days*. SAMS.

Jakobus, B. Marah, J. (2018) *Mastering Bootstrap 4*. 2<sup>nd</sup> ed. Packt Publishing.

Duckett, J. (2014) *Javascript & jQuery: Interactive Front-end Web Development*. Wiley

BAL, H. and GRUNE, D. (1994) *Programming Language Essentials*. 1st edn. Wokingham: Addison-Wesley. (INTERNATIONAL COMPUTER SCIENCE).

**Websites**

[www.w3schools.com](http://www.w3schools.com)

[www.codecademy.com](http://www.codecademy.com)

[www.php.net](http://www.php.net)

**Journals** Elsevier. (2020) *Science of Computer Programming*. (online) available at:

<https://www.journals.elsevier.com/science-of-computer-programming>

**S** Resource needs essential for delivery of this module

Functional IDE and frameworks for programming (e.g. Notepad++, Visual Studio.NET, MVC). Access to software through MS Azure is recommended.

**T** Minor Modifications

Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			

GIFHE Module Specification		
A	Module title	Database Design and Implementation
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	Work Related
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Information and data are at the heart of all modern commercial and organisational practice. Organisations depend on robust systems to collect, store, manipulate and retrieve data and as such, most IT systems are underpinned by a relational database management system (RDBMS). This module explores the key components of a RDBMS. In addition to this the module considers databases as the server-side component of applications developed for delivery through web based interfaces on the client side via the internet or an intranet.</p>		
H	Aims and distinctive features	
<p>The module aims to provide the student with a range of generic and bespoke client and server side skills that prepare them to further explore the database development role in the context of client/server based applications managed through the use of relational database management systems. Substantial and complex data driven applications systems are investigated to encourage deeper understanding of what makes such applications work. The use of any Rapid Application Development tools is strongly discouraged and systems should be developed using hand coding methods to reinforce underlying principles. The module also develops students skills in working with SQL and XML. Specific aspects of security (registration, log in, access rights and permissions) will also be covered within the module.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1. Evaluate data driven client/server applications
		2. Design, write, test and host a complex client/server database application
		3. Demonstrate how to implement secure access to a variety of client/server database applications
		4. Review, compare and implement an appropriate server configuration.
J	Learning and teaching strategy	

## Lectures/Seminars

The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.

## Workshop

Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.

## Additional Study

Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.

K	Direct and indirect contact hours	This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery. The remainder is preparation for lessons, independent study and assessment preparation. This module runs for one trimester/term.
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	This module is compensatable Report (30%) – 1500 words Product Development (70%)
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	

## Report – Evaluating Data Driven Applications

The report will allow students to demonstrate a thorough understanding of the range and scope of data driven applications and to identify best practice in the development of data driven applications and their implementation.

## Product Development

Students will design, development, testing and implementation stages to a solution which meets the specified business requirements.

Documentation will allow students to demonstrate a thorough understanding of the range and scope of data driven applications and identify best practise in the development of data driven applications and their implementation.

Development will allow students to demonstrate a full range of practical skills in the development of a robust and functional client/server based data driven application. It will also allow them to demonstrate an understanding of requirements for server configuration and secure access.

P Assessment Mapping					
Assessment	Percentage	LO1	LO2	LO3	LO4
SA1 – Report	30%	X			
SA2 – Product Development	70%		X	X	X

Q Indicative content	
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**Theoretical elements of this module will include:**

- Set theory;
- Database normalization;
- Design: UML and systems analysis to entity relationship diagrams;
- Database Schemas;
- Structured Query Language (SQL);
- Relational Operations (Unions, Joins, Links to Set theory);
- ACID transactions (Atomicity, Consistency, Isolation, Durability);
- SQL/XML ▪ Other types of DBMS (e.g. Distributed Relational Database Architecture, Object Oriented Database and NoSQL databases);
- An introduction to PHP & AJAX;
- Database security;
- Basics of GDPR 2018;
- Physical and logical security design;
- Asset management (Inventory & users);
- Password entropy;
- Encryption;
- IT Security Roles in a typical organisation;
- Intellectual property;
- Managing key risks (rogue employees; corporate espionage; ransomware);
- Managing directory services.

**Practical elements of this module will include:**

- Creating tables and views using SQL ▪ Stored procedures and functions;
- Creating, Reading, Updating and Deleting data using Stored Procedures;
- Indexes, tuning and optimisation;
- Coding with PHP & AJAX;
- Data migration (Extract, Transform, Load);
- Data backup and restore;
- Working in different environments (development, stage/test, live);
- Server configuration;

- Testing.

R	Core and indicative reading
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**Core Reading**  
 Elmasri, R. (2016). *Fundamentals of Database Systems*. 7<sup>th</sup> Edition. London: Pearson

Connolly, T., Begg, C. (2014). *Database Systems, A practical approach to design, implementation and management*, 6th ed, Boston, MA: Addison-Wesley.

**Indicative Reading**  
 Roth, R., Dennis, A. and Haley Wixom, B. (2014). *Systems Design And Analysis*. 6th ed. London: John Wiley

Hamer, M (2017). *Relational database practices: Bridging the gap between the theory of database design and real-world practices*. Malcolm Hamer

**Websites**  
<https://dev.mysql.com/doc/>  
<https://www.w3schools.com/sql/default.asp>

**Journals**  
 Journal of Management and Information Systems (available online)

S	Resource needs essential for delivery of this module
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Suitable IDE (Notepad ++), access to web hosting should be provided. W3C validation service for HTML and CSS should be used, access to suitable database development tools (e.g. PHPMyAdmin, MySQL).

T	Minor Modifications		
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Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			
3			
4			
5			
6			
7			

GIFHE Module Specification		
A	Module title	IT Infrastructure and Maintenance
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	Work Related
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Almost every modern commercial, industrial and social organisation is dependent on maintaining the function and operation of the IT systems that provide the backbone for their activity. At the heart of this is the IT infrastructure, which is comprised of all the hardware, software and communications systems used by the organisation within their day to day operations. Not only is it essential for this infrastructure to be carefully planned, but it must be maintained in order to avoid significant impact upon the organisation. This maintenance includes not only maintaining the operational functions of the IT infrastructure, but the need to ensure that operations are carried out within recognised legal and regulatory requirements.</p>		
H	Aims and distinctive features	
<p>The module allows students to understand the nature and purpose of IT infrastructures across multiple disciplines, including networking and communications requirements, provision of hardware and software and the development of robust policy for ensure that operations are carried out within legal and regulatory requirements. Students will have the opportunity to develop this understanding through the evaluation of a real world case study and by making recommendations for the development of a robust and maintainable infrastructure to meet the needs identified within the case study scenario.</p> <p>Students will also consider the job roles that directly relate to maintaining service in a substantial IT infrastructure.</p> <p>IT professionals do not work in isolation; however, this is often forgotten. This represents a unique opportunity within the programme to understand IT systems form an organisational perspective and to develop an awareness of the wider implications of IT systems within that context.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1. Describe and discuss the range of disciplines required to evaluate and maintain IT infrastructure in organisations;
		2. Evaluate and recommend software and hardware solutions to meet the requirements for a working IT Infrastructure;
		3. Communicate IT solutions to non-experts by explaining the proposed solutions to problems.

		4. Develop policy to meet with legal and regulatory requirements within an organisations IT infrastructure.
J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	<p>This module is compensatable</p> <p>Action Plan Report (75%) – 3000 words Pitch (25%) 10 mins</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	
<p><b>Action Plan Report</b></p> <p>Students will receive a case study based on a real world scenario where an organisation has identified problems that require an overhaul of their existing IT infrastructure. They will research and document the range of job roles that would contribute to the development and maintenance of IT infrastructure within a contemporary organisation. They will continue to describe the responsibilities associated with each of the roles discussed and the specific impacts of each role.</p>		

Students will then evaluate the case study, identifying the specific problems, and develop a high level action plan with strategies covering hardware, software and networking requirements together with drafting policy documents to cover key legislative and regulatory requirements and provision for maintenance of the new infrastructure.

Students will not be required to develop low levelled technical documentation or make consideration towards budgetary or financial responsibilities, though they will be able to present a robust business case for the development of a new infrastructure.

#### Pitch

This assessment develops students skills in presenting to clients and non-experts. It will explain the proposed solutions for the organisation.

P		Assessment Mapping			
Assessment	Percentage	LO1	LO2	LO3	LO4
Action Plan Report	75%	X	X		X
Pitch	25%			X	

Q	Indicative content
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#### **Theoretical elements of this module will include (this is a theory based module):**

- IT/Computing job role within organisations;
- Problem solving strategies and methods;
- Teamwork;
- Policies standards and reference models;
- Strategy creation, future, current and transition architectures;
- Utilising a service oriented architecture and web services to build distributed systems;
- Explore the main features of distributed applications and the characteristics of e-commerce and e-business systems, together with modularity and maintainability of Internet/Intranet applications;
- Discuss distribution in terms of the dissemination of functions or processing and establish that software as well as data needs to be distributed to maximise the robustness of the DDBMS;
- Perform a critical analysis of design methods used to develop centralised and distributed systems;
- Critical evaluation of design methods and methodologies;
- Developing and critiquing group and collaborative development skills;
- Developing individual roles in enterprise-wide development projects;
- Pitching for work
- Presentation Skills

R	Core and indicative reading
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#### **Core Reading**

Evernden R, Evernden E (2015) Enterprise Architecture, The Eight Fundamental Factors: A Practical

Fowler M (2017) Patterns of Enterprise Application Architecture. Pearson Education



Bocij, P. (2018) *Business Information Systems*. 6<sup>th</sup> Edition. Pearson

**Indicative Reading**

Bratton, J (2017) *Introduction to Work and Organizational Behaviour*, 3<sup>rd</sup>ed, Palgrave

Capon, C (2009) *Understanding the Business Environment*, 3<sup>rd</sup>ed, Financial Times & Prentice Hall

**Websites**

Kimball R (2016) The Kimball Group. (online) available from : <http://www.kimballgroup.com/>

**Journals**

Journal of Computer Information Systems

International Journal on Computing Science and Engineering

S	Resource needs essential for delivery of this module
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No specialist resources are required for this module.

T	Minor Modifications
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Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			
3			
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7			

GIFHE Module Specification		
A	Module title	Web Development
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Web development is now a significant area of software and systems development in addition to being fundamental to commercial and organisational development. Web pages and websites have become the most widely used tool for disseminating information in all aspects of work and life. Accessing web pages has also changed, moving from being a relatively passive process to an activity in which users actively participate with web sites and pages acting as applications, tools, social and commercial portals and a forum for communications of all kinds.</p> <p>Due to the far reaching nature of web pages and websites the production of high quality web content and the need to provide robust and intuitive means of accessing such content have become ever more important. In addition to this, web content can now be accessed on a wider variety of platforms than ever before. With this in mind good and responsive design is needed to provide content in a format that adapts to suit the device on which it is being displayed ensuring that user experience is maintained to a high standard and that any information or services delivered operate with the maximum efficiency and minimal disruption while providing the user with an intuitive means of access. The challenge is one for both the designer and the developer who are often required to combine robust data services at the back-end through an intuitive and engaging interface on the front end.</p>		
H	Aims and distinctive features	
<p>This module aims to develop students understanding and skills in the area of website development. To focus on design skills, scripting ability, an understanding of user requirements and the use of validation (using XHTML Strict 1.0 and where applicable elements of HTML5) to ensure that work meets the high standards expected in terms of accessibility, transferability and performance of product. Students will also move on to styling and structuring using cascading style sheets in order to create efficient and flexible website designs that can respond to the full range of platforms on which they are deployed. Students will also be able to include media rich content including both audio-visual media and data driven content, creating websites in the form of fully functional applications that provide users with an engaging experience and practical services.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:

		<ol style="list-style-type: none"> <li>1. Use recognised methods to design media rich, interactive and dynamic web sites.</li> <li>2. Develop websites to meet with recognised standards for delivery on a range of platforms and devices.</li> <li>3. Select, create, edit and maintain audio-visual and data driven media content for use in web site development</li> <li>4. Evaluate, test and validate web applications to recognised standards for accessibility, compatibility and quality assurance.</li> </ol>
J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	<p>This module is non-compensatable.</p> <p>Portfolio (100%)</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	
<p><b>Web Development Portfolio</b></p> <p>Students will develop a portfolio which demonstrates their ability to develop a website to a specified business requirement using HTML, CSS, Javascript (or other scripting languages). This portfolio will</p>		

include evidence of product design, development, robust testing with validation, and finished source code.

Students will demonstrate a thorough understanding of the purpose and value of their chosen product development through design documentation and in-line commenting. Students will also demonstrate their ability to develop accessible content for all users and devices using recognised techniques.

P		Assessment Mapping			
Assessment	Percentage	LO1	LO2	LO3	LO4
Portfolio	100%	X	X	X	X

Q	Indicative content
<p><b>Theoretical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• Nature and purpose of websites;</li> <li>• Current standards for web design and development;</li> <li>• Box in a box approach;</li> <li>• Mobile first philosophy and liquid layouts;</li> <li>• Documentation requirements for web design, development and testing;</li> <li>• HCI (Human Computer Interaction);</li> <li>• UX design (User eXperience);</li> <li>• Accessibility.</li> </ul> <p><b>Practical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• Produce design documentation in recognised formats (sitemaps, storyboards, wireframes, asset catalogues);</li> <li>• Produce data design documentation in recognised formats (data-dictionaries, entity relationship diagrams);</li> <li>• Creating well-structured xHTML pages using correct doctype declarations and character sets.</li> <li>• Structuring and formatting basic pages in xHTML</li> <li>• Using cascading elements of style sheets to optimise styling and formatting across a web site.</li> <li>• Create dynamic liquid layouts to meet multiple platform and device requirements.</li> <li>• Use media types and media queries to control dynamic page layout across multiple devices and platforms.</li> <li>• Develop interactive menu systems using xHTML and CSS.</li> <li>• Incorporate audio-visual media using HTML5 and JavaScript;</li> <li>• Incorporate data driven media and/or dynamic content using JavaScript and other scripting languages for client/server connectivity.</li> <li>• Create visual and functional enhancements to web pages using JavaScript and/or other scripting languages.</li> </ul> <p><b>Standards covered will include:</b></p> <ul style="list-style-type: none"> <li>• Validating web pages and style sheets to established web standards (XHTML 1.0 Strict, CSS 3).</li> <li>• Reviewing and designing to meet accessibility requirements.</li> <li>• Eliminating errors and warnings within HTML and CSS.</li> </ul>	

- Structuring web pages applying established design principles including consideration of HCI and UX.
- Developing web content in line with legal standards.
- Using recognised approaches to plan and record testing.

R Core and indicative reading

### Core Reading

Meloni, J., Kyrnin, J. (2018) *HTML, CSS & Javascript All in One*. 3<sup>rd</sup> Edition. Sams/Pearson

Frain, B. (2015) *Responsive Web Design with HTML5 & CSS3*. 2<sup>nd</sup> Edition. Packt Publishing

Benyon, D. (2019) *Designing User Experience*. 4<sup>th</sup> Edition. Pearson

### Indicative Reading

Alvaro, F (2016). *JAVASCRIPT: Easy JavaScript Programming For Beginners. Your Step-By-Step Guide to Learning JavaScript Programming (JavaScript Series)*. ,CreateSpace Independent Publishing Platform

Chapman N & J, (2006). *Web Design, a complete introduction*. Wiley

Meyer E, (2006). *Cascading Style Sheets: The Definitive Guide*, 2nd ed, O'Reilly Associates

### Websites

<http://www.w3.org/>

### Journals

Linux Journal. (2020) *Web Development*. (online) available at:

<https://www.linuxjournal.com/tag/web-development>

S Resource needs essential for delivery of this module

Suitable IDE (Notepad ++), access to web hosting should be provided. W3C validation service for HTML and CSS should be used, access to suitable database development tools (e.g. PHPMyAdmin, MySQL).

T Minor Modifications

Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			

GIFHE Module Specification		
A	Module title	Business Systems and Process Automation
B	Credits	20
C	Level	4
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Computer systems and information technology sit at the heart of modern business practices. For any and all work activity information systems are used to collect, store, manipulate, analyse and retrieve data and information across all areas of a business's activity. One significant benefit is in the automation of processes within organisations, making use of the connectivity offered between an organisations department through data and communications transactions.</p>		
H	Aims and distinctive features	
<p>The module aims to introduce students to the concepts of business information systems allowing them to critically evaluate the application of information systems in a range of business activities including areas such as planning, strategic development, budgeting, human resources, marketing and data processing. Students will then be able to consider how data can be shared between an organisations system to automate processes and provide efficiencies in the day to day activities of the organisation.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1. Evaluate a range of information systems used within businesses and organisations.
		2. Investigate how the integration of a business's information systems can add value to a business's data assets.
		3. Design models for the integration of information systems in the context of automation.
		4. Investigate the use of automation within an organisations system and the potential impacts both positive and negative.
J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p>		

## Workshop

Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.

## Additional Study

Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.

K	Direct and indirect contact hours	This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery. The remainder is preparation for lessons, independent study and assessment preparation. This module runs for one trimester/term.				
L	Ethical issues which relate to this module's teaching and assessment					
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.						
M	Methods of assessment	This module is compensatable. Report (100%) - 3000 words				
N	Methods of reassessment (if different to M)	Resubmission of failed components only.				
O	Rationale for assessment and reassessment					
Report – The Application of Business Information Systems						
Students will receive a case study based on a real world scenario where an organisation has identified problems that require an overhaul of their existing Information Systems. Students will write a report which demonstrates a thorough understanding of the nature and purpose of business information systems, their application and the benefits of systems wide data integration. Students will critically evaluate a number of widely used systems and how they are used within business to inform development and decision making processes.						
Students will continue to demonstrate their ability to identify business need and develop conceptual solutions to business problems making use of widely used business systems. Students will analyse the case study and design and evaluate a model for automation in order to enhance business processes and improve efficiency and effectiveness within the automation.						
P	Assessment Mapping					
Assessment		Percentage	LO1	LO2	LO3	LO4
Report		100%	X	X	X	X

Q	Indicative content
<p><b>Theoretical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• Accounting and Payroll systems;</li> <li>• Relational Databases;</li> <li>• Information systems and budgeting;</li> <li>• Information systems and human resources;</li> <li>• Information systems and marketing;</li> <li>• Data gathering and mechanisms for data gathering;</li> <li>• Organisational structures;</li> <li>• Operational, Tactical and Strategic levels within organisations;</li> <li>• Information and data in decision making processes;</li> <li>• Corporate process automation;</li> <li>• Integration of data and information systems;</li> <li>• MIS (Management Information Systems).</li> </ul> <p><b>Practical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• Action planning strategies;</li> <li>• Smart target setting;</li> <li>• Writing a formal proposal document;</li> </ul> <p>Reflective practice.</p>	
R	Core and indicative reading
<p><b>Core Reading</b>  Bocij, P. (2018) <i>Business Information Systems</i>. 6<sup>th</sup> Edition. Pearson</p> <p>Laudon, K., Laudon, J. (2017) <i>Management Information Systems, Global Edition</i>, 15<sup>th</sup>ed, Pearson</p> <p><b>Indicative Reading</b></p> <p>Bratton, J (2017) <i>Introduction to Work and Organizational Behaviour</i>, 3<sup>rd</sup>ed, Palgrave</p> <p>Capon, C (2009) <i>Understanding the Business Environment</i>, 3<sup>rd</sup>ed, Financial Times &amp; Prentice Hall</p> <p>Clifton, H (2000) <i>Business Information Systems</i>, Prentice Hall</p> <p>Williamson, K (2018) <i>Research Methods</i>, 2<sup>nd</sup> ed, Elsevier Ltd.</p> <p><b>Websites</b></p> <p><a href="https://www.ibm.com/common/ssi/start/apilite.html">https://www.ibm.com/common/ssi/start/apilite.html</a></p> <p><a href="https://www.mysql.com/">https://www.mysql.com/</a></p> <p><b>Journals</b>  Journal of Management and Information Systems (available online)</p>	
S	Resource needs essential for delivery of this module



No specialist resources are required for this module.

T Minor Modifications			
Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			
3			
4			
5			
6			
7			

GIFHE Module Specification		
A	Module title	Advanced Programming
B	Credits	20
C	Level	5
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	Work Related
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>The use of Model View Controllers is often an essential skill in software development and filters into many roles such as web developer and app developer, underpinning the development of interactive and data driven content in many disciplines of computing. The use of Model View Controllers in programming has risen with the emergence of Object Oriented Programming methods and the development of Management Information Systems. Agile Development is a methodology which breaks down the development of solutions into measurable phases of activity (Sprints) with regular consultation between the developer and end user (A user centred approach). The module considers the process of advanced programming with an emphasis on software development and Agile Development Methodology. In developing a software system for computing, students can explore a range of subsystems including HR &amp; Payroll, Customer Assistance, Production, and more. Whilst these may be considered as individual entities they are generally linked by a single system within business.</p>		
H	Aims and distinctive features	
<p>This practical module aims to develop students' abilities to work in an Agile Development environment and use Model View Controllers to develop widely inclusive business systems. This includes the development of full stack systems which aim to combine and centre multi-departmental organisations through a central system using recognised approaches and languages such as C# in a .NET environment.</p> <p>Common recognised practises will be encouraged throughout design, development, and testing phases making use of version control techniques using local or server based repositories (e.g. GitHub)</p> <p>The skills and knowledge provided by this module will transfer easily to other areas within the programme and build on the programming and other software development skills and techniques covered at level 4.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		<ol style="list-style-type: none"> <li>1. Critically analyse a range of frameworks, languages, and existing systems in relation to a given centralised and distributed development problem;</li> </ol>

		<p>2. Adapt current skills and knowledge to design a range of solutions to a given problem using the Agile Development methodology;</p> <p>3. Evaluate product designs and develop a chosen solution using recognised methods in software development and version control;</p> <p>4. Apply recognised testing techniques for software testing and documentation, creating and deploying appropriate test plans and test logs for the tracking and rectification of semantic errors and explain this to others;</p>
J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery and 22% to online structured learning.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.		
M	Methods of assessment	<p>This module is non compensatable.</p> <p>Product Development Portfolio (70%) – 3000 words equivalent</p> <p>Product Demonstration (30%) – 1500 words equivalent</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	

## Product Development Portfolio

Students will be given a case study based on a real life business scenario which details the requirement of a bespoke software system which centralises data and information across multiple departments. Students will analyse this case study and evaluate a range of solutions to be developed by designing high-levelled documentation for further development. Chosen solution will be documented and developed using a Model View Controller framework and version controlled. Finished prototype, proof of concept, or solution will be tested using an appropriate robust test plan and logged accordingly.

## Product Demonstration

Students will formally present their portfolio to their client (tutor) as a solution to the provided case study. Presentation will demonstrate the student's abilities to design, develop, and test a solution to the given problem and provide training where required.

P		Assessment Mapping			
Assessment	Percentage	LO1	LO2	LO3	LO4
Product Development Portfolio	70%	X	X	X	X
Product Demonstration	30%		X		X

Q	Indicative content
	<p><b>Theoretical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• Nature and purpose of project management;</li> <li>• Identification of project phases/stages;</li> <li>• Stakeholders;</li> <li>• Milestones;</li> <li>• Resource types (consumable, reusable, sustainable);</li> <li>• Change management;</li> </ul> <p><b>Practical elements of the module will include:</b></p> <ul style="list-style-type: none"> <li>• <b>Project Overview</b> <ul style="list-style-type: none"> <li>○ Description of project;</li> <li>○ Identification of aims and objectives;</li> <li>○ Specification of SMART targets;</li> </ul> </li> <li>• <b>Project Planning</b> <ul style="list-style-type: none"> <li>○ Identifying and selecting resources;</li> <li>○ Resource allocation and tasks;</li> <li>○ Risk assessment and contingency planning;</li> <li>○ SWOT analysis;</li> <li>○ MoSCoW prioritisation model;</li> <li>○ Project planning and time management;</li> <li>○ Work breakdown structure;</li> <li>○ Gantt charts;</li> <li>○ Network Diagrams;</li> <li>○ Budgets;</li> </ul> </li> </ul>

- PERT analysis;
- Critical Path Analysis;
- Implementation planning;
- **Monitoring & Maintaining Projects**
  - Project planning documentation as living documents;
  - Project Management software;
- **Evaluation & Reflection**
  - Reviewing project outcomes against project planning;
  - Reflective Practice.

R Core and indicative reading

**Core Reading**

Cockburn, A. (2006) *Agile Software Development: The Cooperative Game*, 2<sup>nd</sup> Edition. Addison-Wesley Professional

Freeman, A. (2017) *Pro ASP.NET Core MVC 2*, 7<sup>th</sup> ed. Apress

**Indicative Reading**

Chacon, S. Straub, B. (2014) *Pro Git*, 2<sup>nd</sup> edition. Apress

Price, M. (2019) *C# 8.0 and .NET Core 3.0*, 4<sup>th</sup> Edition. Packt Publishing

**Websites**

Microsoft. (2020) *ASP.NET* (online) available at:

<https://dotnet.microsoft.com/apps/aspnet>

GitHub. (2020) *Project management, made simple*. (online) available at:

<https://github.com/features/project-management/>

**Journals**

Elsevier. (2020) *Journal of Systems and Software*. (online) available at:

<https://www.journals.elsevier.com/journal-of-systems-and-software>

S Resource needs essential for delivery of this module

Access to appropriate Integrated Development Environment, client/server hosting, database solution (e.g. Visual Studio Community ASP.NET environment and Microsoft Server Management Studio)

T Minor Modifications

Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			

GIFHE Module Specification		
A	Module title	Security and Intrusion Prevention
B	Credits	20
C	Level	5
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>The issues surrounding the management and governance of information security within an organisational context have increased in the past decade. Consideration is given to the need for related policy, analysis of risk and the management of organisational assets. Students need to understand the legal and personnel aspects of security, giving an overview of the wide range of laws and regulations governing systems and information security. In addition, there is a requirement to consider fundamental aspects of security configuration and methods for testing that a given configuration is secure (penetration testing).</p>		
H	Aims and distinctive features	
<p>This theoretical module aims to introduce the basic concepts of security. It will provide an understanding of the general principles and concepts of security within IT and digital solutions creating the foundation on which to build further knowledge and understanding. The module will consider security paradigms and a range of essential concepts such as networking and system security and integrity from threat. The concepts covered in this module provide a basis of knowledge in threat detection, prevention and management.</p> <p>While primarily a theoretical module, students will engage in developing basic secure network configurations and testing these (through penetration testing) in a simulated environment.</p>		
I	Learning outcomes	Upon successful completion of this module a student must be able to:
		1. Identify and evaluate a range of real and potential sources of cyber security threats and why these have become a key business concern;
		2. Critically evaluate a range of practical solutions by which threats to IT systems are detected and prevented;
		3. Identify and evaluate a range of potential impacts to business where security of IT systems and data integrity may be compromised;
		4. Configure security protocols and procedures in IT systems and critically evaluate their effectiveness.
J	Learning and teaching strategy	

## Lectures/Seminars

The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.

## Workshop

Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.

## Additional Study

Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.

K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>				
L	Ethical issues which relate to this module's teaching and assessment					
Ethical approval will not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.						
M	Methods of assessment	<p>This module is non-compensatable.</p> <p>Case Study Report (100%) – 3500 words equivalent</p>				
N	Methods of reassessment (if different to M)	Resubmission of failed components only.				
O	Rationale for assessment and reassessment					
<p><b>Case Study Report</b></p> <p>Students will demonstrate a clear understanding of potential security threats to organisations, the impact of such threats, and the recognised counter-measures that may be used to prevent security threats. They will then recreate a scenario from a case study in a secure network area (Physical or Simulated) to implement and test a range of cybersecurity measures. Their approach to security may take the form of hardware solution, software solution, or an application of policies and procedures. Students will evaluate and report on their solution as evidence of a secure and sufficient method of securing a network.</p>						
P	Assessment Mapping					
Assessment		Percentage	LO1	LO2	LO3	LO4
Case Study Report		100%	X	X	X	X

Q	Indicative content
<p><b>Both Theoretical and Practical elements will cover the following areas:</b></p> <ul style="list-style-type: none"> <li>• Networking <ul style="list-style-type: none"> <li>○ Introduction to network security and the importance of securing networks.</li> <li>○ Elements of network security including Public &amp; private keys, WPA/WEP, physical firewalls and access control lists</li> </ul> </li> <li>• Systems – secure databases <ul style="list-style-type: none"> <li>○ How and why databases are secured, covering JavaScript &amp; SQL Injections</li> <li>○ Risks of insecure databases</li> <li>○ Case studies of Database intrusions</li> </ul> </li> <li>• Web <ul style="list-style-type: none"> <li>○ Client and Server Side Security</li> <li>○ Encryption</li> <li>○ Client and Server Side Validation</li> <li>○ SSL</li> <li>○ Web Server security</li> </ul> </li> <li>• Firewalls <ul style="list-style-type: none"> <li>○ Both Hardware and Software firewalls</li> <li>○ Benefits they provide</li> <li>○ Why are they used</li> </ul> </li> <li>• Cyber security <ul style="list-style-type: none"> <li>○ Importance of cybersecurity in modern age</li> <li>○ Relate to GCHQ, COBRA &amp; Government initiatives</li> <li>○ White hat &amp; Black hat</li> <li>○ Relate to past case studies</li> </ul> </li> <li>• Threat detection and prevention <ul style="list-style-type: none"> <li>○ Why threat detection and prevention is critical to businesses</li> <li>○ How security threats are identified, responded to and prevented</li> <li>○ Software &amp; Hardware involved in the provision of security</li> <li>○ Risks involved in IT security</li> <li>○ Penetration Testing</li> </ul> </li> </ul> <p><b>Online content, resources, support and interactive content.</b></p> <p>Online resources will be provided to support all topics covered in the indicative content. These resources should include: breakdown of study topics and initial research information sources; pre-prepared presentations; pre-recorded lectures and practical demonstrations or instruction, access to discussion forum and Q&amp;A (FAQs where relevant) and direct communication with module tutor for questions, support, advice and guidance.</p>	
R	Core and indicative reading
<p><b>Core Reading</b>  Brooks, C. Grow, C. 2018) <i>Cybersecurity Essentials</i>. Sybex</p>	



Stallings, W., Brown, L. (2018) *Computer Security: Principles & Practice*. 4<sup>th</sup> Edition. Pearson

**Indicative Reading**

Scott, R. (2019) *Networking for Beginners*. Independently Published

Fitzgerald and Dennis (2011) *Fundamentals of business data communications*. 11<sup>th</sup> ed. Wiley

Eiler B (2014) *Five Ways Network Virtualization Will Revolutionize IT*. Global Knowledge Expert Reference Series of White Papers

Bruce J (2015) *Everything You Need to Know About Home Networking*. ‘Make Use Of’ White Paper

Rathod H and Townsend J (2014) *Virtualisation 2.0 for Dummies*. Wiley

Stallings, W. (2012), *Business data communications*. Pearson Education

**Websites**

Mitchell, B. (2020) *A Short Guide on Networking Fundamentals*. (online) available from:  
<https://www.lifewire.com/home-networking-fundamentals-4097193>

Cisco (2020) *Networking Fundamentals*. (online) available from:  
[https://www.cisco.com/c/dam/global/fi\\_fi/assets/docs/SMB\\_University\\_120307\\_Networking\\_Fundamentals.pdf](https://www.cisco.com/c/dam/global/fi_fi/assets/docs/SMB_University_120307_Networking_Fundamentals.pdf)

**Journals**

Journal of Management and Information Systems (available online)

S	Resource needs essential for delivery of this module
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Local and remote access to servers and isolated network, suitable software for simulation (i.e. Packet Tracer).

T	Minor Modifications
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Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			
3			
4			
5			
6			
7			

GIFHE Module Specification		
A	Module title	Application Development
B	Credits	20
C	Level	5
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	Work Related
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Application development and object oriented programming is an essential skill and filters into most aspects of computing including software development, web design and even databases and 3D development, underpinning the development of interactive content in all disciplines of computing. The use of object oriented programming has risen significantly with the emergence of other object oriented development methods found in web development and the development of information systems. At the heart of object oriented development are concepts of modularity, encapsulation, inheritance and polymorphism that encourage the development of more efficient and more flexible systems.</p> <p>Agile Development is a methodology which breaks down the development of solutions into measurable phases of activity (Sprints) with regular consultation between the develop and end user (A user centred approach)</p>		
H	Aims and distinctive features	
<p>This module will introduce the concepts and principles of object oriented programming. It will provide an understanding of how to design and develop modular programs using an object oriented approach using languages such as Python, Java or C#. The skills and knowledge provided by this module will transfer easily to other areas within the programme and build on the programming and other software development skills and techniques covered at level 4.</p>		
I	Learning outcomes	<p>Upon successful completion of this module a student must be able to:</p> <ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the concepts and principles of object oriented programming and Agile development;</li> <li>2. Analyse and design an object oriented solution to a given problem that makes use of multiple software development disciplines;</li> <li>3. Develop and test a programmatic solution to a given problem working to professional standards and expectations;</li> <li>4. Critically evaluate and reflect on the approaches taken when developing an application in response to a given problem.</li> </ol>

J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
<p>Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.</p>		
M	Methods of assessment	<p>This module is non-compensatable.</p> <p>Solution Design and Development (60%) – 2500 words approximately</p> <p>Presentation (40%) – 15 minutes (1500 words equivalent)</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	
<p><b>Solution Design and Development</b></p> <p>Students will design a solution to a specified problem using an object oriented approach. As part of this solution they will use standard approaches to present their software design. Students will then discuss how their approach aims to make use of the principles and methods associated with object oriented programming. The design documentation will allow students to demonstrate a thorough understanding of the underpinning theories of object oriented development and object oriented programming.</p> <p>Students will then develop and document their programmatic solution following their designs. The development will allow students to demonstrate practical skills in object oriented programming,</p>		

making use of recognised approaches and tools. Students will make use of a robust test plan to ensure that their solution has been developed successfully and all requirements have been met.

### Presentation

Students will formally present their solution to their client (tutor) to demonstrate their interpretation of the requirements. The demonstration will allow the students to provide a walkthrough of their solution and provide training on how the solution should be used. During the demonstration, a reflective evaluation of the design and development process will be expected.

P		Assessment Mapping			
Assessment	Percentage	LO1	LO2	LO3	LO4
Solution Design and Development	60%	X	X	X	
Presentation	40%			X	X

Q	Indicative content
	<p><b>Underpinning Systems Development Lifecycle;</b></p> <ul style="list-style-type: none"> <li>• Agile Methodology;</li> <li>• Programming Paradigms;</li> <li>• Object Oriented Development;</li> <li>• Information requirements gathering;</li> <li>• Object Oriented Programming Methods: <ul style="list-style-type: none"> <li>○ Abstraction;</li> <li>○ Passing parameters;</li> <li>○ Modularity;</li> <li>○ Encapsulation;</li> <li>○ Inheritance;</li> <li>○ Polymorphism.</li> </ul> </li> </ul> <p><b>Practical (Design)</b></p> <ul style="list-style-type: none"> <li>• Data Dictionaries;</li> <li>• Flow Diagrams;</li> <li>• Entity Relationship Modelling;</li> <li>• DOM (document object model);</li> <li>• Object Modelling;</li> <li>• Class Diagrams;</li> </ul> <p><b>Practical (Development)</b></p> <ul style="list-style-type: none"> <li>• Selection of Programming Languages (subject to review to meet current industry standards): <ul style="list-style-type: none"> <li>○ Python;</li> <li>○ C++, C#, Objective C;</li> <li>○ Java;</li> <li>○ JavaScript.</li> </ul> </li> <li>• Working with IDEs (Integrated Development Environments)</li> <li>• Integrated development (working with data, SQL, PHP);</li> <li>• Integrated development (working with HTML, CSS, XML)</li> </ul>

### Practical (Testing)

- Types of testing (black and white/clear box);
- Stages of testing (alpha, beta, gold or Release Candidate);
- Test planning;
- Test logs.

### Practical (Implementation)

- Technical documentation requirements;
- User documentation requirements;
- Evaluation & reflection.

R

Core and indicative reading

#### Core Reading

Schildt, H (2018). *Java: A Beginner's Guide*, 8<sup>th</sup> Edition. McGraw Hill

Stroustrup, B(2014) *Programming: Principles and Practice Using C++*, 2<sup>nd</sup> ed, Addison-Wesley

Yaeger, Dorian P (2013) *Object-oriented Programming Languages and Event-driven Programming (Computer Science)*, Mercury Learning & Information

Bennett, S., McRobb, S. & Farmer, R, (2010). *Object Oriented Systems Analysis and Design using UML*. McGraw Hill.

#### Indicative Reading

Gabrielli, M (2010) *Programming Languages:Principles and Paradigms (Undergraduate Topics in Computer Science)*, London, Springer

Patton, R. (2005). *Software Testing*, 2<sup>nd</sup> ed, SAMS publishing

#### Websites

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

<https://www.w3schools.com/cs/default.asp>

<https://www.w3schools.com/php/default.asp>

<https://www.w3schools.com/python/default.asp>

<https://www.w3schools.com/sql/default.asp>

#### Journals

Elsevier. (2020) *Journal of Systems and Software*. (online) available at:

<https://www.journals.elsevier.com/journal-of-systems-and-software>

S

Resource needs essential for delivery of this module

Functional IDE and frameworks for programming (e.g. Notepad++, Visual Studio.NET, MVC). Access to software through MS Azure is recommended.

T	Minor Modifications		
Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			

GIFHE Module Specification		
A	Module title	Robotic Process Automation
B	Credits	20
C	Level	5
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	n/a
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>While many people think of robotics involving advanced mechanical devices which mimic the actions of a human workforce, the majority of robotics is concerned with the automation of mechanical and electro-mechanical processes. Examples can be as complex as a robotic arm within a factory production line or as simple as the programming and control systems of a washing machine. At the heart of many of these robotic systems are embedded computing devices; small, purpose built computer systems that handle the monitoring, feedback and control of the mechanical systems through the provision of software or firmware. Such devices include PIC controllers, Micro-controllers, FPGA solutions and small scale SOC systems (such as Raspberry Pi).</p> <p>It is these control systems which play a direct role in the automation of those processes and that are the focus of this module.</p>		
H	Aims and distinctive features	
<p>The module aims to provide students with an understanding of embedded computing devices in both domestic and commercial applications. How such systems are used to automate mechanical and electro-mechanical processes and the range of devices that are employed.</p> <p>Students will also be given the opportunity to explore practical development of such devices through the development of software deployed on the Raspberry Pi platform.</p>		
I	Learning outcomes	<p>Upon successful completion of this module a student must be able to:</p> <ol style="list-style-type: none"> <li>1. Critically evaluate the range of applications of embedded computing devices in mechanical and electro-mechanical systems;</li> <li>2. Critically evaluate the available technologies for developing embedded computing applications;</li> <li>3. Design solutions to meet specific requirements for automation in mechanical and electro-mechanical systems;</li> <li>4. Develop proof of concept software solutions to meet specific requirements for automation in mechanical and electro-mechanical systems.</li> </ol>

J	Learning and teaching strategy	
<p><b>Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory and seminars with practical demonstration and group discussion to cover the practical/skills based aspects of the module.</p> <p><b>Workshop</b></p> <p>Practical exercises will be developed together with supporting guidance to enable students to develop practical skills.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 200 hours of learning. 22% of the time given to contact delivery.</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for one trimester/term.</p>
L	Ethical issues which relate to this module's teaching and assessment	
<p>Ethical approval will be not be required for this module as there are no expected issues, however all work carried out must comply with GDPR and the Computer Misuse Act.</p>		
M	Methods of assessment	<p>This module is compensatable.</p> <p>Concept Development Report (100%) – 3500 words approximately</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	
<p>Concept Development Report</p> <p>Students will research and critically evaluate a range of embedded computing applications and the technology employed in developing solutions. This research will be used as a basis for their proof of concept development.</p> <p>Students will also receive a case study which specifies details of a proposed solution to an automated system. They will analyse the case study and develop a report which demonstrates their design, development, and testing of a simulated proof of concept solution. This solution may make use of automation related to the monitoring and control of mechanical or electro-mechanical process. Students will also be encouraged to explore further development of the solution and how this could be evolved beyond the prototype stage with consideration of manufacturing requirements.</p>		



P	Assessment Mapping				
Assessment	Percentage	LO1	LO2	LO3	LO4
Concept Development Report	100%	X	X	X	X

Q	Indicative content
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**Theoretical elements of the module will include:**

- Introduction to robotics;
- Introduction to mechatronics;
- Embedded Computing devices;
- Feedback loops (monitoring and control);
- Fundamental electronics;
- FPGA development requirements;
- Arduino development requirements;
- PIC development requirements;
- Control system design;
- Raspberry Pi development;

**Practical elements of the module will include:**

- Raspberry Pi development;
- Simulation & Testing of automated systems;

R	Core and indicative reading
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**Core Reading**

Gardner, P., Ed Carne, L. (2017) *Learn to Program Using C++ on the Raspberry Pi: An easy introduction to programming for beginners using Linux and GNU C++*. Revised Edition. Nielsen

Blum, R., Bresnahan, C.(2015) *Python Programming for Raspberry Pi*. 2<sup>nd</sup> Edition. Sams

Upton, E. (2016) *Raspberry Pi User Guide*. 4<sup>th</sup> Edition. Wiley

Wolf, M. (2016) *Computers as Components: Principles of Embedded Computing System Design*. Morgan Kaufmann

**Indicative Reading**

Magda, Y. (2015) *Arduino and FPGAs in Electronic Circuits: A Practical Guide*. Independently Published

**Websites**

Google (2020) *Google AI*. (online) <https://ai.google/>

Honda (2020) *Honda Global*. (online) <https://global.honda/innovation/robotics/ASIMO.html>

**Journals**

Robotics & Mechatronics Journals (online) <https://www.mdpi.com/journal/robotics>

S	Resource needs essential for delivery of this module		
Raspberry Pi units and development tools.			
T	Minor Modifications		
Version	Details of modification	Date of HEQA Approval	Date of approval by AASSC
1			
2			

GIFHE Module Specification		
A	Module title	Major Development Project
B	Credits	40
C	Level	5
D	Professional, statutory or regulatory body requirements	n/a
E	Work Based/ Work Related	Work Related
F	Pre-requisites AND Concurrent Modules	n/a
G	Rationale	
<p>Within the IT industry it is essential that individuals have a full understanding of all aspects of not only the systems development lifecycle, but also professional conduct, liaising with clients/partners, and delivery of high quality products and services.</p> <p>It is also essential that students develop transferrable skills such as communication, time management and project planning, all of which are essential in the successful completion of this module.</p> <p>To this end the module considers the development of a product through the full development cycle from research and planning through to implementation and evaluation of the end product. The module also requires engagement with an identified client/stakeholder ensuring that the project represents the development of a solution to address a real world business problem. The focus should be on the development of a fully functional application to address the identified business need.</p>		
H	Aims and distinctive features	
<p>The aim of this module is to develop students' abilities to liaise with clients and manage medium to large scale projects. Some delivery will be incorporated, reviewing essential aspects of research, planning and project management, and requirements analysis tools, so they can successfully integrate skills they have learned on the course to provide a solution to a business problem.</p> <p>As the student liaises with a real world client they will be expected to work within industry standards throughout all aspects of the project, which will include working within recognised systems development methodologies. This also provides students with valuable real world experience as they effectively take on the role of a freelance contractor in addressing the client/stakeholder's needs.</p> <p>The project also provides an opportunity for students to focus on an area in which they wish to specialise and provides a strong basis for further development through more substantial research projects should they continue studies into and beyond level 6.</p>		
I	Learning outcomes	<p>Upon successful completion of this module a student must be able to:</p> <ol style="list-style-type: none"> <li>1. Conduct research and planning to manage a medium scale business project;</li> </ol>

		<p>2. Critically analyse, and provide a solution to, a real world business problem for an identified client or simulated scenario;</p> <p>3. Demonstrate a proof of concept or working prototype solution to the identified problem;</p> <p>4. Evaluate and reflect upon own performance showing full awareness of continued professional development.</p>
J	Learning and teaching strategy	
<p><b>(a) Lectures/Seminars</b></p> <p>The core delivery of the module will be through traditional lectures to cover underpinning theory however the module is based around independent self-directed study and development and as such contact hours will be limited. To additionally support students, each student will be entitled to 5 hours of one to one academic supervision.</p> <p><b>Workshop</b> As the project is self-directed the module will be primarily supported through workshops and academic supervision.</p> <p><b>Additional Study</b></p> <p>Between sessions students will be expected to carry out independent, self-directed study covering the indicative content of the unit for which guidance will be provided and where appropriate students will also carry out technical/practical exercises to support acquisition of skills.</p>		
K	Direct and indirect contact hours	<p>This module is equivalent to 400 hours of learning. 10% of the time given to whole group contact delivery (40 hours) and 1% support provided through academic supervision (5 hours per student).</p> <p>The remainder is preparation for lessons, independent study and assessment preparation.</p> <p>This module runs for two trimesters/terms.</p>
L	Ethical issues which relate to this module's teaching and assessment	
<p>Ethical approval will be required and all issues will be dealt with here. This is achieved through submission of a detailed ethics proposal to the TEC Partnership's Ethics Committee, which meets monthly throughout the academic year. If the proposal is not directly approved amendments to the project will need to be made and a further ethics proposal completed (this process to be repeated until the ethics committee is satisfied that all ethical issues have been appropriately addressed).</p>		
M	Methods of assessment	<p>This module is non-compensatable.</p> <p>Planning Portfolio (40%)</p> <p>Product Demonstration &amp; Documentation (40%)</p> <p>Reflective Evaluation (20%) – 1000 words</p>
N	Methods of reassessment (if different to M)	Resubmission of failed components only.
O	Rationale for assessment and reassessment	

## Planning Portfolio

The initial stage/s of any systems development lifecycle cover/s activities which include research, planning and design (of a proposed solution) and within standard industrial practice, technical/practical work cannot commence until these activities are effectively documented.

## Product Demonstration & Documentation

On completion of the development of any system and following testing, the implementation of the end product requires that it be fully demonstrated and documented in order for it to be effectively rolled out to both end users and to those responsible for its maintenance; and to ensure that it can be fully evaluated against the original requirements.

## Reflective Evaluation

Self-reflection and continue professional and personal development are now seen as an essential part of everyday working practice within larger organisations. This often includes formal methods or approaches through repeated cycles which require a robust process for evaluating experiences as a basis for planning future personal and professional development.

P	Assessment Mapping				
Assessment	Percentage	LO1	LO2	LO3	LO4
Research & Planning	40%	X	X		
Product Demonstration & Documentation	40%			X	X
Reflective Evaluation	20%				X

Q	Indicative content
	<p><b>This will be a student lead project, supervised by teaching staff. During the project, students will be expected to:</b></p> <ul style="list-style-type: none"> <li>• Conduct secondary and primary research in order to establish a foundation for the project;</li> <li>• Develop a clear project proposal;</li> <li>• Develop an ethics proposal to address any potential risks or concerns raised by the project;</li> <li>• Establish initial requirements using systems such as MoSCoW and incorporating verification methods (test planning);</li> <li>• Produce professional project planning documentation in liaison with a real client;</li> <li>• Plan a project using established professional tools and techniques;</li> <li>• Present prototypes/proof of concept and report on progress when required;</li> <li>• Liaise with an external client in the development of a professional product to address an identified business problem;</li> <li>• Manage time and resource to ensure successful completion of the project and its documentation;</li> <li>• Provide appropriate technical documentation, testing and training resources once the product has been developed;</li> <li>• Reflect on personal development and review milestones when required.</li> </ul>
R	Core and indicative reading
	<p><b>Core Reading</b>  Day, T, (2018). <i>Success in Academic Writing</i>. London: Macmillan Study Skills</p> <p>Dawson, C. (2015). <i>Projects in Computing and Information Systems: A Student's Guide</i>. 3<sup>rd</sup> Edition. Harlow: Pearson</p> <p>Cottrell, S. (2019). <i>The Study Skills Handbook</i> 5<sup>th</sup> Edition. Palgrave Macmillan</p> <p><b>Indicative Reading</b>  Creme, P. &amp; Lea, M. (2008). <i>Writing At University: A Guide For Students</i>. 3<sup>rd</sup> Edition. London: Oxford University Press.</p> <p>Hennessy, B. (2007). <i>Writing An Essay</i>. Oxford: How To Books.</p> <p>Lock, D. (2013). <i>Project Management</i>. 9<sup>th</sup> Edition. Aldershot: Gower Publishing.</p> <p><b>Websites</b>  <a href="https://www.ucas.com/undergraduate/student-life/study-skills-guides">https://www.ucas.com/undergraduate/student-life/study-skills-guides</a></p> <p><b>Journals</b>  Science Direct (<a href="https://www.sciencedirect.com">https://www.sciencedirect.com</a>)</p>
S	Resource needs essential for delivery of this module
	<p>No additional specialist resources are required although individual students may identify specific resource requirements within their individual projects which, where possible and appropriate will be made available to them through the Institute.</p>

T Minor Modifications			
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2			

## Curriculum Map

Key	Work – State WB or WR or blank Comp = Compensatable Y or N																	
	P = Partially achieved Learning Outcome F = Fully achieved Learning Outcome																	
Module name	Level	Work	Module Leader	Assessment and Weighting	Comp	1	2	3	4	5	6	7	8	9	10	11	12	
Professional and Study Skills	4	-		60% - Social Media Report and Reflective Evaluation 40% - Group Presentation	Y		P	P			P					P	P	
Introduction to Programming and Frameworks	4	-		100% - Product Development	N			P		P				P	P			
Database Design and Implementation	4	WR		30% - Report 70% - Product Development	Y	P	P					P	P		P			
IT Infrastructure and Maintenance	4	WR		75% - Action Plan Report 25% - Pitch	Y	P			P		P		P				P	
Web Development	4	-		100% - Portfolio	N	P		P		P		P		P	P	P		
Business Systems & Process Automation	4	-		100% - Report	Y	P			P		P		P					
Advanced Programming	5	WR		70% - Product Development Portfolio 30% - Product Demonstration	N		F	F			F					F	F	
Security and Intrusion Prevention	5	-		100% - Case Study Report	N	F			F				F			F		
Application Development	5	WR		60% - Solution Design and Development 40% - Presentation	N		F	F		F		F		F				
Robotic Process Automation	5	-		100% - Concept Development Report	Y	F			F	F			F	F				
Major Development Project	5	WR		40% - Planning Portfolio, 40% - Product Demonstration & Documentation 20% - Reflective Evaluation	N	F	F	P	P	P	F	F	P	P	P	F	F	



