OFFICE USE ONLY	
Date of validation event:	26 April 2018
Date of approval by Academic Board:	30 August 2018
Approved Validation Period:	*5 years from September 2018*
Date and type of revision:	*Enter the date of any subsequent revisions (Detail the type of revision made and the implementation date)*

PROGRAMME SPECIFICATON

BSc (Hons) Cyber Security

1	**Awarding body**
	Glyndŵr University
2	**Programme delivered by**
	Glyndŵr University
3	**Location of delivery**
	Plas Coch Campus, Wrexham
4	**School/Department**
	Computing and Electrical Engineering School of Applied Science, Computing and Engineering
5	**Exit awards available**
	BSc (Ord) Cyber Security DipHE Cyber Security CertHE Cyber Security
6	**Professional, Statutory or Regulatory Body (PSRB) accreditation**
	The Programme has been designed to align with the requirements of the British Computer Society (BCS) and accreditation will be requested post approval. **The information above is correct at the point of programme validation, refer to university PSRB register and university website for current details of programme accreditation.**
7	**Accreditation available**
	TBC
8	**Please add details of any conditions that may affect accreditation (e.g. is it dependent on choices made by a student?)**
	Students must have studied all years at the WGU campus.
9	JACS3 **code**
	I100
10	UCAS **code**
	8L6D
11	**Relevant QAA subject benchmark statement/s**

Computing (2016)

12	**Other external and internal reference points used to inform the programme outcomes**

BCS: Core requirements for accreditation of honours programmes
BCS: Additional requirements for CITP
BCS: Additional requirements for CEng/CSci
Specification of Apprenticeship Standard for Wales
QAA Quality Assuring Higher Education in Apprenticeships

13	**Mode of study**

Full time
Part time five-year route
Part time 3 year apprenticeship route (aligned with the Applied Cyber Security Management Pathway for Digital Degree Apprenticeship Wales)

14	**Normal length of study**

BSc (Hons) Cyber Security: 3 years full-time / 3 or 5 years part-time

15	**Maximum length of study**

Refer to academic regulations.

16	**Language of study**

English
The programme will be delivered in English with the option for individual students to undertake coursework assessment in welsh upon request.

17 Criteria for admission to the programme

Standard entry criteria

Entry requirements are in accordance with the University's admissions policy https://www.glyndwr.ac.uk/en/media/FINAL%20ADMISSIONS%20POLICY%202020 17.pdf

The University's entry requirements are set out at http://www.glyndwr.ac.uk/en/Undergraduatecourses/UCAStariffchange2017/

International entry qualifications are outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the relevant UK entry qualification.

In addition to the academic entry requirements, all applicants whose first language is not English or Welsh must demonstrate English language proficiency.

European students are able to provide this evidence in a number of ways (please see http://www.glyndwr.ac.uk/en/Europeanstudents/entryrequirements/ for details), including IELTS.

International students require a UKVI Approved Secure English Language Test (SELT) (please see http://www.glyndwr.ac.uk/en/Internationalstudents/EntryandEnglishLanguageRequirements/ for details).

DBS Requirements

No DBS check is required for the BSc (Hons) Cyber Security programme.

Non-standard entry criteria and programme specific requirements

Applicants for this programme are required to hold a minimum of grade C in A-Level Mathematics or equivalent.

Applicants with significant industry or professional experience will be treated on a case-by-case basis and invited for a discussion/interview with a member of the programme team.

Degree Apprenticeship Route
For the three-year degree apprenticeship route applicants must be in full time relevant employment in a role aligned to the framework specification for the Digital Degree Apprenticeships. Decisions on entry for this programme will be made in partnership between the University and the Employer ensuring that the candidate meets the standard academic entry requirements as well as the professional and employer entry requirements which varies between employer. This will be determined pre-application by the relationship manager, industry link within the programme team and employer representative.
All apprentices enter into a three way learning agreement upon acceptance to the programme.

18 Recognition of Prior (Experiential) Learning

Applicants may enter the programme at various levels with Recognition of Prior Learning (RPL) or Recognition of Prior Experiential learning (RPEL) in accordance with the University General Regulations. Any programme specific restrictions are outlined below

Programme specific restrictions

N/A

19 Aims of the programme

The broad field of computing is an exciting, challenging and dynamic discipline. Computers form an integral part of every aspect of society and modern life. New computing technologies are introduced at an enormous rate and the computing field develops and changes continually and rapidly.

Students studying this programmes will be exposed to an education and learning experience that aims to instil knowledge and develops critical and intellectual abilities applicable to problem solving and solution specifying in technologically and socially diverse environments.

The purpose of this programme is to prepare graduates for a career in the computing field. Their educational journey begins by providing them with a solid set subject-specific knowledge and skills, which gradually draws to a narrower focus of Cyber Security subjects over the duration of their studies.

The overall aims of the programmes are to:

- Provide students with knowledge and understanding of the fundamental principles and technologies which underpin the discipline of cyber security;

- Produce independently learning, workplace ready practitioners with a strong set of communication and employment skills who are cognisant of their career trajectory and personal and professional development goals;
- Provide a rigorous and scientifically-based course of study, informed by research, which successfully balances practical vocational skills with theoretical understanding;
- Produce versatile and resourceful practitioners fostering innovation, enterprise and enthusiasm for excellence in the discipline of cyber security;
- Develop capability in the exploration, critical analysis and evaluation of technical, business and professional issues and concepts, including an awareness of ethical and environmental factors;
- Provide students with an awareness of the roles and responsibilities of a professional working within the cyber security profession.

Degree Apprenticeship Route
For the three-year degree apprenticeship route the knowledge outcomes of the programme will remain the same with additional competencies assessed within the workplace by the employer; specifically, professional behaviour, health and safety, and company roles, responsibilities and working practices. This will be evidence within the three-way progress meetings throughout the programme by the personal/industry tutor. These are detailed in the apprenticeship framework mapping document attached to this specification and are required by the Specification of Apprenticeship standards for Wales.

20 Distinctive features of the programme

The demand for graduates with the knowledge, understanding and skills required to analyse, design, develop, test and maintain modern computer systems is high. Organisations rely on the use of computers for information processing and problem solving so the industry requires specialists to create, understand and further advance Cyber Security. This degree will look at the Cyber Security at the core of the underlying technologies that are increasingly infiltrating every element of our society.

Employability skills are at the heart of our computer courses including team working, project management, communication and creative thinking. This degree aims to equip you with the knowledge and skills required to work as professional engineer and/or consultant in the design, configuration and management of computer systems. The main focus is on the more technical aspects and underlying principles of computer systems.

The programme begins at level 4 by providing a solid foundation and introduction to the broad disciplines and that underpin the subject of Cyber Security, resulting in a strong understanding of the subject. This includes developing core knowledge in subjects such as computer systems and professionalism, alongside practical subject skills, such as computer programming. Upon commencement of level 5, a number of these themes are developed further, and to a more advanced level, with a particular emphasis upon enabling students to effectively apply what they have learned to real-world scenarios. During level 6 of the programme, an even sharper focus is provided in terms of the subject-specific material being taught. This happens in tandem with students being provided with the freedom to pursue a project of choice, under supervision. The defining features of level 6 are the encouragement for students to

demonstrate their abilities as independent learners and to exercise critical and analytical thinking and problem solving skills.

Students studying these programmes will be exposed to an education and learning experience that aims to instil knowledge and develops critical and intellectual abilities applicable to problem solving and solution specifying in technologically and socially diverse environments. Students will have opportunities to apply their knowledge on real life projects. This will help ensure that students acquire the necessary knowledge and skills to cope with the astonishing rate of change and to ensure that the programme produces graduates who operate on graduation as autonomous computing professionals.

Degree Apprenticeship Route
For the three-year part time route, students will develop and apply the knowledge and professional skills developed within this programme of learning to their work-place. Developed as a three way learning partnership between the employer, the student and the academic programme team, this route will enable students to develop skills which will be in high demand in the future meeting regional skills gaps. Designed in response to employer need, students will study one day per week with the remaining four days in employment with the same benefits and entitlements as a standard employee. By utilising the full calendar year and applying core tenants of work-based learning, students will achieve their award within the same period as a standard full time student, minimising the opportunity cost for employers and ensuring that the future skills needs of our employers are met as effectively and efficiently as possible. All aspects of this programme and the delivery align with the relevant competencies and outcomes detailed on the Digital Degree Apprenticeship Framework (2017) for the Applied Cyber Security Management Pathway as well as complying with the provisions of the Apprenticeships, Skills, Children and Learning Act (2009), Specification of Apprenticeship Standards for Wales and aligning with the QAA guidance for apprenticeship programmes.

21 Programme structure narrative

The programmes are delivered following the University Academic Calendar, typically consisting of an academic year composed of two semesters, each 12 weeks in length. The majority of modules have duration of one semester, although there are some exceptions to this rule, as shown in the subsequent section.

The BSc (Hons) Cyber Security programme is provided on either a full-time or part-time basis. Full-time students would normally complete their studies in three years and part-time students in five years.

The three-year apprenticeship programme will utilise the extended academic year with three trimesters of delivery enabling students to undertake 40 credits per trimester and 120 credits per extended academic year.

Full-time students are expected to complete 120 credits per academic year, whilst part-time students normally are expected to complete 60 to 80 credits per academic year. In years 1 and 2 of the part-time programme, students will normally complete 60 credits, whilst in years 3 to 5 they will complete 80 credits per year, sometimes spanning levels 5 and 6 within an academic year, facilitated via a module and progression being held at the end of semester 1. The three-year apprenticeship students are expected to complete 120 credits per extended academic year.

Students will normally begin their studies at level 4 of the programme and progress through to completion of level 6. However, students with appropriate advance standing and/or the University Recognition of Prior (Experiential) Learning (RP[E]L) may be able to join the programme at the commencement of level 5 or level 6. In addition, to facilitate student exchange programmes, such as the ERASMUS scheme, it is possible for students to begin their studies at the beginning of the first or second semester, with agreement of the Programme Leader.

The following intended and exit awards are available from this programme, subject to the specified requirements:

Award	**Credit Requirements**
BSc (Hons) Cyber Security	360
BSc (Ord) Cyber Security	300
DipHE Cyber Security	240
CertHE Cyber Security	120

22 Programme structure diagram

FULL-TIME STUDY (INDICATIVE)

	Level 4							
Semester 1	Mod title	Computer Systems	Mod title	Managing Data	Mod title	Problem Solving with Programming	Mod title	Information and Systems Engineering*
	Mod code	COM434	Mod code	COM438				
	Credit value	20	Credit value	20	Mod code	COM439	Mod code	COM437
	Core/Option	Core	Core/Option	Core				
	Mod leader	Jess Muirhead	Mod leader	Bindu Jose	Credit value	20	Credit value	20
Semester 2	Mod title	Computing Mathematics	Mod title	Fundamentals of Networks and Security				
	Mod code	COM435	Mod code	COM436	Core/Option	Core	Core/Option	Core
	Credit value	20	Credit value	20				
	Core/Option	Core	Core/Option	Core	Mod leader	Rich Picking	Module leader	Denise Oram
	Mod leader	Bindu Jose	Mod leader	Paul Comerford				

* Problem Solving with Programming and Information and Systems Engineering modules take place over Semester 1 and Semester 2.

	Level 5					
Semester 1	Mod title	Responsible Computing	Mod title	Operating Systems	Mod title	Data Structures and Algorithms
	Mod code	COM545	Mod code	COM544	Mod code	COM539
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Denise Oram	Mod leader	Stewart Blakeway	Mod leader	Vic Grout
Semester 2	Mod title	Server Technologies	Mod title	Cybersecurity and Forensics	Mod title	Applied Programming
	Mod code	COM546	Mod code	COM538	Mod code	COM537
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	Paul Comerford	Mod leader	John Worden

	Level 6					
Semester 1	Mod title	Network Security	Mod title	Ethical Hacking	Mod title	IT Project Management
	Mod code	COM645	Mod code	COM642	Mod code	COM644
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	Paul Comerford	Mod leader	Denise Oram
Semester 2	Mod title	Future Technologies	Mod title	Project		
	Mod code	COM643	Mod code	COM646		
	Credit value	20	Credit value	40		
	Core/Option	Core	Core/Option	Core		
	Mod leader	Vic Grout	Mod leader	Vic Grout		

PART-TIME STUDY (INDICATIVE) – FIVE YEAR ROUTE

Year 1

	Level 4			
Semester 1	Mod title	Computer Systems	Mod title	Information and Systems Engineering*
	Mod code	COM434	Mod code	COM437
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Jess Muirhead	Module leader	Denise Oram
Semester 2	Mod title	Computer Mathematics		
	Mod code	COM435		
	Credit value	20		
	Core/Option	Core		
	Mod leader	Bindu Jose		

Year 2

	Level 4			
Semester 1	Mod title	Managing Data	Mod title	Problem Solving with Programming
	Mod code	COM438	Mod code	COM439
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Bindu Jose	Module leader	Rich Picking
Semester 2	Mod title	Fundamentals of Networks and Security		
	Mod code	COM436		
	Credit value	20		
	Core/Option	Core		
	Mod leader	Paul Comerford		

* Problem Solving with Programming and Information and Systems Engineering modules take place over Semester 1 and Semester 2.

Year 3

	Level 5			
Semester 1	Mod title	Responsible Computing	Mod title	Operating Systems
	Mod code	COM545	Mod code	COM544
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Denise Oram	Mod leader	Stewart Blakeway
Semester 2	Mod title	Server Technologies	Mod title	Cybersecurity & Forensics
	Mod code	COM546	Mod code	COM538
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	Paul Comerford

Year 4

	Level 5		Level 6	
Semester 1	Mod title	Data Structures & Algorithms	Mod title	Network Security
	Mod code	COM539	Mod code	COM645
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Vic Grout	Mod leader	Paul Comerford
Semester 2	Mod title	Applied Programming	Mod title	Future Technologies
	Mod code	COM537	Mod code	COM643
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	John Worden	Mod leader	Vic Grout

Year 5

	Level 6			
Semester 1	Mod title	Ethical Hacking	Mod title	IT Project Management
	Mod code	COM642	Mod code	COM644
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	Denise Oram
Semester 2	Mod title	Project		
	Mod code	COM646		
	Credit value	40		
	Core/Option	Core		
	Mod leader	Vic Grout		

PART-TIME STUDY (INDICATIVE) – THREE YEAR ROUTE

Year 1

	Level 4			
Trimester 1	Mod title	Computer Systems	Mod title	Managing Data
	Mod code	COM434	Mod code	COM438
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Jess Muirhead	Mod leader	Bindu Jose
Trimester 2	Mod title	Computing Mathematics	Mod title	Fundamentals of Networks and Security
	Mod code	COM435	Mod code	COM436
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Bindu Jose	Mod leader	Paul Comerford
Trimester 3	Mod title	Problem Solving with Programming	Mod title	Information and Systems Engineering
	Mod code	COM439	Mod code	COM437
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Rich Picking	Mod leader	Denise Oram

Year 2

	Level 5			
Trimester 1	Mod title	Responsible Computing	Mod title	Data Structures and Algorithms
	Mod code	COM545	Mod code	COM539
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Denise Oram	Mod leader	Vic Grout
Trimester 2	Mod title	Cybersecurity and Forensics	Mod title	Applied Programming
	Mod code	COM538	Mod code	COM537
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	John Worden
Trimester 3	Mod title	Operating Systems	Mod title	Server Technologies
	Mod code	COM544	Mod code	COM546
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Stewart Blakeway	Mod leader	Paul Comerford

Year 3

	Level 6			
Trimester 1	Mod title	Network Security	Mod title	Ethical Hacking
	Mod code	COM645	Mod code	COM642
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Paul Comerford	Mod leader	Paul Comerford
Trimester 2	Mod title	Future Technologies	Mod title	IT Project Management
	Mod code	COM643	Mod code	COM644
	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core
	Mod leader	Vic Grout	Mod leader	Denise Oram

Trimester 3	Mod title	Project
	Mod code	COM646
	Credit value	40
	Core/Option	Core
	Mod leader	Vic Grout

23 Intended learning outcomes of the programme

Knowledge and understanding					
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
A1	*Demonstrates a working understanding of essential facts, concepts, principles and theories relating to computing and computer applications. Shows competence in basic IT and communication skills, workshop practice and laboratory investigations*	*Demonstrates a widening appreciation of the significance of key concepts, principles, theories and practices that underpin computing as an academic discipline and explores its extent and boundaries through practical work, design exercises and case studies*	*Shows confident familiarity with the broad areas of the knowledge bases of the discipline, including the management and an appreciation of the principles, theories and practices that underpin computing as an academic discipline. Reveals a working understanding of current technology and of its limits*	*Demonstrates confidence and reveals a clear understanding of the boundaries of existing and emerging technology and the limits of its application, and of the range of conventional design methods and the types of judgement employed by computing professionals*	
A2	*The appropriateness of a range of development tools for the creation of software applications*	*Recognise and understand a range of appropriate programming tools and techniques in new contexts in the design of software applications*	*Select and deploy accurately established techniques and tools to develop applications for selected business problems, and choose appropriate theory for analysis, with only general guidance*	*Confidence and flexibility in applying a range of programming tools for the creation of applications for selected business problems, and in the application of knowledge and skills appropriate to their solution*	
A3	*Demonstrate a working knowledge of some of the tools, practices and methodologies used in the specification, design, implementation and testing of computer software systems; understand some of the risks of software implementation*	*Familiarity and ability to choose appropriate methods and tools for the design and implementation of software systems. Outline how software can be evaluated and show a working knowledge of the general rules and best practices adopted and knowledge of software testing techniques*	*Select accurately established techniques and methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment; understand the risks of software implementation and apply risk-based strategies and policies for software testing*	*Critical and reflective about the use of software testing, design and evaluation methodologies and tools, with full understanding of the associated risks, controls and potential impact*	
A4	*Recognise a variety of professional and sustainability considerations that may be encountered in the exploitation of computer-based systems*	*Identify and describe several professional concepts and challenges that will be encountered in the deployment of computer-based systems in*	*Comprehensively appraise professional situations and scenarios where computer-based systems are deployed in terms of social, legal, ethical, moral, economic and sustainability issues.*	*Reflect upon own practices and conduct in carrying out a substantive project and discuss the social, legal, ethical, moral, economic and sustainability issues that are relevant to the project.*	

	Knowledge and understanding				
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
	(social, legal, ethical, moral, economic, etc.)	*response to common, well-defined scenarios*			
A5	*Identify key operations, processes and functions that support the construction of algorithms and computer programs*	*Discuss and identify algorithmic solutions for common computational problems and highlight their performance and functional differences*	*Analyse complex computational problems, contrast algorithmic and data structure solutions, and evaluate their performance*	*Consistently show confidence and independence in understanding and modelling efficient data structures and algorithms to address real world problems*	

	Intellectual skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
B1	*Using the tutor as a facilitator, the student begins to analyse basic problems, identify requirements and propose alternative solutions for computer software systems*	*Starts to develop an understanding of the limits of their knowledge, and how this influences analysis and interpretations based on that knowledge; identify requirements and propose and compare alternative solutions for computer software systems*	*Develops self-reliance and confidence in the analysis of problems, identify requirements and propose and critically evaluate alternative solutions for computer software systems*	*Integrates learned theory and techniques with practical experience to analyse problems, identify requirements and propose and critically evaluate alternative solutions for computer software systems with informed understanding*	
B2	*Demonstrates basic numeracy, literacy and algebraic competence; ability to manipulate data related to simple business problems and describe scenarios*	*Demonstrates more advanced standard numerical/ mathematical skills and literacy as appropriate to their chosen specialist subject*	*Applies a range of more specialist numerical/ mathematical and literacy skills as appropriate to their specialist subject*	*Confidently applies a range of specialist numerical/ mathematical and literacy skills as appropriate to the specialist subject area*	
B3	*Carries out application of basic computing principles and procedures to standard, simple situations, with considerable guidance provided by tutors*	*Applies standard computing principles and procedures to somewhat more demanding situations, still with some guidance provided*	*Demonstrates ability to select and use principles and procedures appropriate to the situation or problem in hand, with minimal guidance provided*	*Carries out confident and accurate selection and application of principles and procedures to the solution of a range of computing situations and problems, working autonomously*	
B4	*Develops an ability to explore and recognise any risks or*	*Uses a range of established techniques within tutorials, for*	*Demonstrates technology industry acumen, with minimum supervision,*	*Effective self-management in terms of time; ability to conduct research*	

Intellectual skills					
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
	safety aspects that may be involved in their work and to the relevance of selected professional, legal, moral, social and ethical issues; communicate the results of their study/work accurately and reliably, and with structured and coherent arguments	*example, using experiential learning exercises, to explore and recognise the relevance of selected professional, legal, moral, social and ethical issues in their work and to communicate the results of their study/work accurately and reliably, and with structured and coherent arguments*	*recognising the relevance of legal, professional, moral, social and ethical issues in the work place and the wider environment. Able to inform and adapt their work to satisfy these issues*	*independently or as a team, into legal, professional, moral, social and ethical issues. Able to inform and adapt their work to satisfy these issues. Demonstrates an ability to carry out research and critical thinking*	

Subject skills					
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
C1	*Systematically relates a limited number of facts/ideas/elements in an imitative manner, with considerable guidance provided by tutors*	*Demonstrates appreciation of need for the relating and collecting of a range of facts/ideas/elements in an argued case; produces new ideas in closely-defined situations with some guidance provided as appropriate*	*The ability to apply research methods to relate and collect facts/ ideas/ elements in an argued case; produces new ideas in a wider range of situations, with minimal guidance*	*The ability to apply appropriate research methods to collate facts/ ideas/ elements in support of a well-structured argument; design solutions to problems and evolve new concepts, working autonomously*	
C2	*Identify and understand the need to manage software and IT development projects*	*Apply appropriate project management and development tools to ensure viable and organised approaches are taken*	*Compare and contrast a range of IT project management methods and employ high-level tools and methods in real-world scenarios*	*Select and evaluate own use of IT project management methods and tools in a self-led and managed project*	
C3	*Implement computer programs for specific and well defined situations*	*Design and write computer programs or software for common applications*	*Specify and write computer programs or software in response to loosely defined problem scenarios*	*Specify and write computer programs or software in response to loosely defined problem scenarios and evaluate the quality of the solution*	
C4	Recognise and work with key datasets and perform basic queries and analysis	*Apply and utilise data sources and processing into application*	*Confidently engage with big data sets and select and apply appropriate analytic techniques*	*Independently integrate big data sets and analytics into specific projects and/or consider their*	

Subject skills					
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
		and development scenarios of constrained forms		*appropriateness in emerging technology scenarios*	

Practical, professional and employability skills					
	Level 4	Level 5	Level 6	Level 6 Honours Degree	
D1	*Be able to provide an account of own actions and activities in a succinct and clear manner in written and oral communication*	*Communicates in a clear, systematic and concise way, in writing and orally, in more formal academic and professional styles, and in longer pieces of work of a technical nature. Be able to draw upon and effectively integrate supporting media*	*Engages effectively in a variety of roles; debates; produces clear, well-structured technical reports and other extended pieces of work; gives clear, subject-specific presentations in a variety of contexts*	*Provide professional levels of information through a variety of verbal and non-verbal communication mediums and reflect upon own interaction and ability to support own opinions and arguments for a variety of audiences*	
D2	*Interacts effectively with tutors and fellow students; participates in clearly defined group situations*	*Demonstrates more advanced interactive and group skills, including effective participation in more demanding group tasks, presentations, or discussions*	*Interacts effectively within a learning or subject-specific group, demonstrates basic negotiating, role, leadership and group-support skills*	*Interacts effectively within learning or professional groups; demonstrates appropriate negotiating, role, leadership and group-support skills to an advanced level*	
D3	*Select under guidance and use relevant sources of information to identify potential computing resources for a specific purpose. Demonstrates basic skill in using the Internet and designing web pages.*	*Demonstrates more advanced IT skills; Demonstrates competent use and application of business databases, additional specialist subject packages and produce reports to business standard. Use of online databases effectively to gain information.*	*Demonstrates, uses and accesses a limited selection of more specialist IT skills related to subject specific software. Conducts effective searches for information to identify potential computing resources for a specific purpose and critically evaluate their merit*	*Uses and accesses a limited selection of more specialist IT skills related to subject specific software for analysing business data. Conducts effective searches for information to identify potential computing resources for a specific purpose and critically evaluate their merit*	
D4	*Studies in a systematic, directed way with the aid of appropriate Tutor guidance*	*Learns in an increasingly effective and purposeful way, with beginnings of development as an autonomous learner*	*Adopts a broad-ranging and flexible approach to study; identifies learning needs; pursues activities designed to meet these needs in increasingly autonomous ways*	*With minimal guidance, manages own learning using a wide range of resources appropriate to the IT profession; seeks and makes effective use of feedback. Self-reflection and criticality including self*	

				-awareness, openness and sensitivity to diversity in terms of people, cultures, business, management and marketing issues	
D5	*Shows an understanding of the opinions of other people; flexibility in considering alternatives and opinions*	*Demonstrates the ability to take the perspective of others; identifying the similarities and differences between two approaches to the solution of a given problem*	*Demonstrates the ability to take the perspective of others; comparing the strengths and weaknesses of alternative interpretations determining the credibility of a source of information*	*Demonstrates the ability to take the perspective of others; articulate the strengths and weaknesses of the suggestions of arguments posed; recognize the underlying agendas and motivations of individuals and groups involved in a given situation*	

24 Curriculum matrix

	Module Title	*Core or option?*	***A1***	***A2***	***A3***	***A4***	***A5***	***B1***	***B2***	***B3***	***B4***	***C1***	***C2***	***C3***	***C4***	***D1***	***D2***	***D3***	***D4***	***D5***
Level 4	Computer Systems	Core	■	□	□	□	□	□	□	■	■	□	■	□	□	□	■	□	□	□
	Managing Data	Core	■	□	■	□	□	□	■	■	■	□	□	□	■	□	■	□	■	□
	Information and Systems Engineering	Core	■	□	■	■	□	□	■	□	□	■	□	■	□	■	■	□	□	■
	Fundamentals of Networks and Security	Core	■	□	■	□	■	■	□	■	■	□	□	□	□	■	■	□	■	□
	Computing Mathematics	Core	■	□	□	□	■	□	■	■	□	■	□	□	□	■	□	□	■	□
	Problem Solving with Programming	Core	■	■	□	□	■	■	■	□	■	□	□	□	□	■	□	□	□	□
Level 5	Operating Systems	Core	■	□	□	■	■	■	■	□	■	□	□	□	□	■	□	□	■	■
	Data Structures and Algorithms	Core	■	■	□	■	■	□	■	■	□	□	□	■	□	□	□	■	□	□
	Cybersecurity and Forensics	Core	■	□	□	■	□	■	■	□	■	□	□	□	□	■	□	■	□	■
	Applied Programming	Core	■	■	■	□	■	□	■	■	□	□	□	■	□	□	□	■	□	□
	Server Technologies	Core	■	□	■	□	■	■	■	■	□	□	□	■	■	■	□	■	□	□
	Responsible Computing	Core	■	■	■	■	□	■	□	■	■	■	■	□	□	■	■	■	■	■
Level 6	Network Security	Core	□	□	■	□	■	■	■	■	□	□	□	□	■	□	□	□	□	□
	Ethical Hacking	Core	■	■	■	□	□	□	■	■	□	□	□	■	□	□	□	□	□	□
	Future Technologies	Core	■	□	□	□	□	□	□	□	■	■	□	□	□	■	■	■	■	■
	IT Project Management	Core	□	□	■	■	□	■	□	■	■	□	■	□	□	■	■	□	□	■
	Project	Core	□	■	■	■	■	■	■	■	■	■	■	■	■	■	□	■	■	■

25 Learning and teaching strategy

The programme is informed and guided by the Computing Learning, Teaching and Assessment strategy. It seeks to assist the student to become an independent learner, delivering subject skills alongside the embedding of skills for employment. The curriculum is designed to encourage an appreciation for learning. Learning is enriched by appropriate underpinnings, current research, industrial applications and the development of transferable skills.

The majority of scheduled learning and teaching activities is through attendance at lectures, guest talks, tutorials, and labs. Attendance at external events and field trips are made available and as when they are appropriate and practicable. These modes of contact provide students with the ability to develop and practice the range of learning outcomes associated with the programme, ranging from the theoretical to the practical.

In the early stages of each module, problems will be well defined and limited in scope and scale. At later stages, problems will become less structured (to encourage reflection on problem issues) and open-ended (to give scope to propose and evaluate alternative solution strategies). Case studies are used when appropriate to integrate study topics and to underline vocational relevance. Coursework assignments are important throughout.

As the programme progresses, students are expected to demonstrate increasing proficiency in use of IT tools and techniques to support production of technical documentation, to enhance oral and written presentations, and to aid organisation of personal study material.

Extensive use is made of the University's Virtual Learning Environment (VLE), Moodle, to provide students with access to a range of delivery, and supporting, materials related to each of the modules featured on the programme. In addition to the materials used during the taught sessions, the VLE is used to provide students with additional content such as quizzes, videos, audio recordings, external links, technical reports, research papers, and so forth. The VLE also provides students with the ability to communicate using discussion forums and is the platform primarily used in the issuing, submission, marking, and feedback of student assessment.

Degree Apprenticeship route
For the three-year degree apprenticeship route in addition to the above learning and teaching strategies, apprentices are expected to demonstrate professional competencies and behaviour within the work-place. A three way learning plan is agreed between employer, apprentice and University which will detail the on the job training and professional competencies detailed within the relevant apprenticeship framework. These will be reviewed as part of the progress update process every two months and is specific to the individual employer (such as working practices, company structure and processes, induction and professional behaviour).

The personal/Industry tutor will be responsible for gathering progress and behaviour information from the academic team and feeding this information into the progress update process. The notes from these meetings will be shared with relevant academic staff if they impact on any aspect of the teaching or learning required.

26 Work based/placement learning statement

Students will gain work-related experience at several points through their academic studies. For example, in the level 6 Project module there is the opportunity to work in collaboration with organisations external to the University on 'live' ventures. The level 5 Responsible Computing and level 6 IT Project Management modules emphasize the importance or professional and workplace skills, through the use of case studies and real-world problem scenarios.

Degree Apprenticeship Route
Within the three-year apprenticeship route, students are expected to be in a relevant full time position and to apply relevant learning to their work-place through applied projects and utilising real-world examples within their assessments.

27 Welsh medium provision

The programmes will be delivered through the medium of English. Students are entitled to submit assessments in the medium of Welsh.

28 Assessment strategy

A range and diversity of assessment is provided on the programme as a way to allow students with multiple types of opportunity to demonstrate the skills and knowledge that they are developing over the duration of the programme and to help support inclusivity. This mixture often makes use of assessment methods where students must document a process or solution to a challenge, but also in the submission of artefacts, such as computer programs, databases, media assets, and practical network implementations.

Module title	Assessment type and weighting	Assessment loading	Indicative submission date
Computer Systems	Presentation (20%) In-class Test (80%)	10 mins present 1.5 hours	Wk 7, Sem 1 Wk 12, Sem 1
Managing Data	Coursework (70%) In-class test (30%)	N/A 1.5 hours	Wk 8, Sem 1 Wk 12, Sem 1
Information and Systems Engineering	Portfolio (100%)	3000	Wk 12, Sem 1
Fundamentals of Networks and Security	Coursework (50%) In-class test (50%)	2000 2 hours	Wk 10, Sem 2 Wk 13, Sem 2
Computer Mathematics	Coursework (20%) Coursework (20%) Coursework (20%) Class Test (40%)	600 600 600 1.5 hours	Wk 4, Sem 2 Wk 8, Sem 2 Wk 12, Sem 2 Wk 13, Sem 2
Problem Solving with Programming	50% Coursework 50% Coursework	N/A N/A	Wk 12, Sem 1 Wk 12, Sem 2
Operating Systems	Coursework (40%) Exam (60%)	2500 2 hours	Ongoing, Sem 2 Wk 13, Sem 2
Data Structures and Algorithms	Portfolio (75%) In-class Test (25%)	3000 5 hours	Ongoing, Sem 1 Wk 13, Sem 1
Cybersecurity and Forensics	In-class test (30%) Coursework (70%)	1 hour 3 hours	Wk 10, Sem 2 Wk 12, Sem 2
Applied Programming	Coursework (100%)	N/A	Wk 12, Sem 2

Server Technologies	Case Study (100%)	4000	Wk 11, Sem 2
Responsible Computing	Coursework (100%)		Wk 12, Sem 1
Ethical Hacking	Report (40%) Practical (60%)	2000 3 hours	Wk 6, Sem 1 Wk 12, Sem 1
Network Security	Coursework (40%) Practical (30%) In-class test (30%)	2500 2 hours 1.5 hours	Wk 6, Sem 1 Wk 10, Sem 1 Wk 12, Sem 1
Future Technologies	Presentation (40%) Report (60%)	40% 60%	Wk 6, Sem 2 Wk 12, Sem2
IT Project Management	Coursework (100%)	4000	Wk 12, Sem 1
Project	Project (100%)	12000	Wk 13, Sem 2

29 Assessment regulations

The University regulations for Bachelor Degrees, Diplomas, Certificates and Foundation Degrees apply.

Derogations

TBC

Non-credit bearing assessment

N/A.

Borderline classifications (for undergraduate programmes only)

In considering borderline cases the Assessment Board shall raise the classification to the next level if all of the following criteria are met:

- At least 50% of the credits at level 6 fall within the higher classification
- All level 6 modules must have been passed at the first attempt;

The mark achieved for COM646 Project (40 credits) falls within the higher classification.

Restrictions for trailing modules (for taught masters programmes only)

N/A

30 Programme Management

Programme leader

Mrs. Julie Mayers

Module Leaders

Dr. Paul Comerford
Prof. Vic Grout
Bindu Jose
Jason Matthews
Julie Mayers
Denise Oram
Prof. Richard Picking
John Worden
Stewart Blakeway
Jess Muirhead

Link to Staff Profiles

31 Quality Management

Programme Management

The programme will be managed under the auspices of the School of Applied Science, Computing and Engineering and the programme will develop and operate within the terms of the overall management of curriculum within the School. However, there will be a designated Programme Leader who will be responsible for the day-to-day running of the programme, including the following:

- The management and development of curriculum and the course portfolio
- Student tracking and student records
- Collation of assessment data and presentation of data at assessment boards
- Management/co-ordination of overall assessment activities across the programme
- Liaison with external bodies and agencies
- Quality assurance and annual monitoring, including compilation of the Annual
- Monitoring Report
- Co-ordination of admissions activities and other recruitment activities, including relevant publicity activities

At module level there is devolved responsibility to Module Leaders for the following:

- The maintenance and development of teaching and learning materials for all students enrolled on the module
- The publishing and updating of module timetables, which shall include a weekly schedule of module sessions and required reading, to be distributed to students at the start of all modules
- The setting, marking and collation of marks for all module assessments and examination papers, including resit assessments, and submission of student results to the Programme Leader
- Tutorial support for students taking the module which they are responsible
- Quality monitoring, including processing of annual student feedback questionnaires and, where appropriate, feedback for individual modules
- Liaison with part-time members of staff involved in module teaching

Degree Apprenticeship Route

For the part time three-year route, each student will be assigned a personal tutor who in partnership with the enterprise relationship manager assigned to the employer will liaise in relation to the individual learning agreement and plan, ensuring that feedback and progress is shared with employer, student and funding body. This is a requirement of the Welsh Apprenticeship guidance. Records will be stored as per the Standard university data protection policy and process.

Student Feedback

The University has procedures for the regular review of its educational provision, including the annual review of modules and programmes, which draw on feedback from such sources as external examiner reports, student evaluation, student achievement, and progression data. In addition, programmes are subject to a programme periodic review (PPR) and re-validation in year 5 that includes external input.

Feedback from students plays a critical part in informing the School's strategic thinking. It also allows the School to evaluate how its most important group of stakeholders, its students, views its service provision. Students can provide feedback in a number of ways, for instance:

Student Voice Forum (SVF): Chaired by a member of academic staff from outside the programme, will be held at least once per semester. The Chair will minute student feedback for action/response by the Programme Leader. Minutes of the
SVFs and the response from the Programme Leader will be posted on the programme pages of Moodle. All programmes have representation at SVFs.

Student Evaluation of Modules (SEM): Module Leaders will distribute SEMs at the end of each module. A summary of the analysis of the SEMs, along with any other feedback (e.g. from the student suggestion box), will be passed to the Programme Leader for action/response.

Feedback on assessed work: Students submit work in a number of different ways depending on the module being studied. Wherever possible Moodle is used for electronic submission and Turnitin to check the similarity score and tutors give feedback via this interface within 3 working weeks. Practical work is developed and assessed by having students demonstrate their work, again immediate feedback is given. At the end of a module, overall feedback is provided along with a clear indication of what area the student needs, if necessary, to resubmit or what areas were good and which areas can be improved on.

Degree Apprenticeship Route
The above process will be followed for the three-year apprenticeship route. In addition for this route, The Enterprise Office will liaise and gather employer feedback relevant to funding body requirements.

32 Research and scholarship activity

Research within the programme team is co-ordinated at a School level via the Applied Science, Computing and Engineering Research Centre. However, at a local level this manifests itself through the Applied Research in Computing Laboratories (ARClab) group. ARClab's research encompasses the broader computing subject and is concentrated in the following areas:

- IoT, Networking and Cybersercurity
- Audio and Affective Computing
- Health and Assisted Living Technologies
- HCI, Augmented and Virtual Reality
- CAD/Engineering software
- MIS/Business
- Ethics/professionalism
- Robotics/AI

ARClab has taken over from the previous Computing research groups of Creative and Applied Research for the Digital Society (CARDS) and the Centre for Applied Internet Research (CAIR), which built up their activities very impressively over the past ten years. The commitment and enthusiasm of the staff is very evident and

significant outputs have been achieved over a whole range of activities, covering publications, grant winning, conference organisation, industrial engagement etc.

In the 2014 Research Excellence Framework (REF 2014), the School's submission to the Computer Science and Informatics category received a grade point average of 2.04, with over two-thirds of all research scoring 2* or higher.

Significant achievements during the recent past include the very professional organisation of a conference to the highest international standards; the development of a large-scale EU-funded research project, the steady production of conference publications, in addition to a sound proportion of academic journal publications; the setting up of a usability laboratory - a relatively unique facility in Wales; the importing of a substantial new base of specialism in wireless technologies and a success in a radio frequency identification tagging (RFID) project, which is intended to be rapidly grown into an additional research theme.

33 Learning support

Institutional level support for students

The University has a range of departments that offer the support for students as:

- Library & IT Resources
- The Assessment Centre
- DisAbility Support Team
- Irlen Centre
- Careers Centre and Job Shop
- Zone Enterprise hub
- Chaplaincy
- Counselling & Wellbeing
- Student Funding and Welfare
- International Welfare
- Student Programmes Centre
- Glyndwr Students' Union

School support for students

All students at Wrexham Glyndŵr University are allocated a Personal Tutor whose main responsibility is to act as the first point of contact for their personal students and to provide pastoral and academic support throughout their studies at the University. It is a vital role to support student engagement and retention, and to help every student to success to the best of his or her ability.

Programme specific support for students

Induction
New students on the programme will undergo an induction programme that will provide them with a full introduction to the programme, and will include elements of work on study skills and professional development. For the three-year part time route, Enterprise Office will provide a similar induction for employers and line supervisors within the workplace.

Student Handbook
All students on the programme will receive a Student Handbook, provided electronically via the VLE, which will contain details and guidance on all aspects of the

programme and forms of student support and guidance, programme-based, and School-based. For the three-year part time route, an employer handbook will be provided.

Computing Labs

The majority of Computing provision is located on the Wrexham campus, including teaching rooms, lecture theatres, staff offices, and specialist labs. There are a number of specialist computer labs on the Wrexham campus, including general purpose computing laboratories that support the teaching. These specialist labs offer access to a range of software that is utilised within the modules defined in the programme.

Open Door Policy

Computing operates an Open Door policy, meaning that academic staff are readily and easily accessible and approachable for students outside of scheduled learning and teaching hours. Staff can be approached without the need for a formal appointment to be made.

Progress Review and Attendance Monitoring

Student attendance will be subject to regular monitoring through registers, and this will be a means of addressing issues of student support. There will also be regular reviews for each student with personal tutors. For the three-year part time route, students will be expected to attend a three way meeting with their personal tutor/relationship manager, and employer every 61 days to review progress as per Welsh Government requirements.

34 Equality and Diversity

Glyndŵr University is committed to providing access to all students and promotes equal opportunities in compliance with the Equality Act 2010 legislation. This programme complies fully with the University's Equal Opportunities Policy (http://www.glyndwr.ac.uk/en/AboutGlyndwrUniversity/Governance/TheFile,64499,en.pdf), ensuring that everyone who has the potential to achieve in higher education is given the chance to do so.