

PROGRAMME SPECIFICATON

(NOTE: This programme specification is applicable to cohorts taking this programme from September 2018 onwards)

1	Awarding body
	Glyndŵr University
2	Teaching institution
	Glyndŵr University
3	Award title
	BSc (Hons) Computer Game Design & Enterprise
4	Final awards available
	BSc (Ord) Computer Game Design & Enterprise Dip HE Computer Game Design & Enterprise Cert HE Computer Game Design & Enterprise
5	Professional, Statutory or Regulatory Body (PSRB) accreditation
	N/A
	Please list any PSRBs associated with the proposal
	None.
	Accreditation available
	N/A
	Please add details of any conditions that may affect accreditation (eg is it dependent on choices made by a student?)
	N/A
6	<u>JACS3</u> code
	I620 : Computer Games Design
7	<u>UCAS</u> code
	BSc (Hons) Computer Game Design & Enterprise GE17 BSc (Hons) Computer Game Design & Enterprise (with Foundation Year) GEFY
8	Relevant QAA subject benchmark statement/s
	Computing (Feb 2016) Business & Management (Feb 2015)
9	Other external and internal reference points used to inform the programme outcomes
	Creative Skillset accreditation guideline descriptors BCS Guidelines on course accreditation
10	Mode of study
	Full time
11	Language of study
	English

Office use only

Date of validation event:	27 January 2017
Date of approval by Academic Board:	21 February 2017
Date of revision:	<i>Enter the date of any subsequent revisions</i>
Date of revision:	<i>Enter the date of any subsequent revisions</i>

12 Criteria for admission to the programme

Standard entry criteria

Applicants for undergraduate bachelor Degrees require 112+ UCAS Tariff Points

Foundation Year / Kickstart:

This programme will also be offered as a four year kick-start degree (an introductory foundation year plus this three year degree programme). The kick-start will be offered where an applicant does not meet the entry requirements for the three year honours degree or where the department / applicants feel they would benefit from an additional year to gain some additional experience before progression to the full three year degree. Upon successful completion of foundation year the student will automatically progress to the BSc (Hons) Computer Game Design and Enterprise degree course. Entrance requirements for the four year kick start programmes are 48 UCAS points or equivalent. In addition passes at GCSE in Maths and English/Welsh Language at grade C or above are normally expected. Entry to the four year kickstart programme will be conditional on interview and review of applications to confirm that students are able to satisfactorily complete the programme. Therefore, this route is aimed at:

- Those who do not meet the entry requirements for a full degree.
- Those who have been out of education for a while and feel they would benefit from the extra year of preparation.
- Those looking to undertake a degree in an entirely new subject area and do not have the subject specific experience necessary to go straight to a degree.

Applicants who are unsure if they meet the criteria should contact Admissions.

International entry qualifications

Qualifications outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the above UK entry qualification.

Programme specific requirements

In addition to the UCAS requirements, Five GCSE passes at grades A, B or C including Mathematics and English/Welsh. All applicants will be invited to attend an admission interview. If appropriate, applicants may also be asked to provide evidence of prior work examples in the form of a portfolio or equivalent presentation format.

Non-standard entry criteria

(e.g. industry experience)

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.

English language requirements

The University's English language requirements are set out at <http://www.glyndwr.ac.uk/en/Howtoapply/Readytoapply/>

✓ Undergraduate

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, with an overall score of 6.0 and no component below 5.5.

International students require a UKVI Approved Secure English Language Test (SELT), achieving an overall score of 6.0 with no component below 5.5 (please see <http://www.glyndwr.ac.uk/en/Internationalstudents/EntryandEnglishLanguageRequirements/> for details). If arranging a test, applicants must ensure they book an 'IELTS for UKVI' test. For further information see: <http://takeielts.britishcouncil.org/ielts-ukvi/book-ielts-ukvi>. Applicants are asked to note that only an *IELTS for UKVI* test result will be accepted.

13 Recognition of Prior (Experiential) Learning

Applicants may enter the programme at various points 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 requirements

N/A

14 Aims of the programme

The BSc (Hons) Computer Game Design & Enterprise is designed to be a hybrid course that balances project management, production and entrepreneurship, with that of industry practice and technical design and development skills.

The programme will provide students with hands-on experience of multidisciplinary project management within the context of both moderate and large-scale game development projects.

This, in combination with knowledge of business start-up processes, innovation and commercialisation of products alongside current digital distribution and crowdfunding technologies, students will be empowered to develop game applications and assets with a view to encapsulating them within a business and marketing strategy. Such a model has the potential to grow and support the local and regional games and media industry through the creation of new businesses and support for entrepreneurial activity.

Specifically, the programme aims to provide students with the following:

- Provide students with knowledge and understanding of the fundamental principles and technologies which underpin game design and development.
- Develop capability in the exploration, critical analysis and evaluation of technical and business issues and concepts including an awareness of the ethical and legal issues pertaining to the games industry.

- Provide students with an awareness of the roles and responsibilities of a professional working within the game development, and wider computing profession.
- Provide the skills necessary to work in and manage diverse and multidisciplinary development teams and the tools and technology that support them.
- Provide a rigorous and scientifically-based course of study, informed by research and industry practise, which successfully balances practical vocational skills with theoretical understanding.
- Equip students with independent learning skills, prepare students for employment and entrepreneurial activity or to prepare students for continued study at an advanced level, either in formal postgraduate study or as continued professional development.
- Produce versatile and resourceful practitioners fostering innovation, enterprise and enthusiasm for excellence in the discipline of game design and development.
- Develop competence, adaptability, self-confidence and critical self-reflection through critical enquiry and independent judgement.

The module diet of the programme has been designed in conjunction with the North Wales Business School to provide a vehicle for these aims and intentions to be met and will equip students with a mixture of theoretical and practical abilities that will allow them to development a rich skillset within the field. In addition to the specialist content, students will develop transferable skills in working multidisciplinary teams with industry standard tools and technologies.

15 Distinctive features of the programme

The proposed programme is designed to build upon the strong foundation of the successful BSc (Hons) Computer Game Development programme based within the department of Computing, which enjoys the benefits of close industry engagement with regular visits and guest speakers as part of an integrated programme of presentations, discussion groups and social events. The existing programme has an excellent track record for graduate employment is the only games programme in the UK to have a final year student prize sponsored by BAFTA (Cymru).

The proposed programme will make innovative use of agile project management methodologies in conjunction with cloud based management tools. Use of these platforms will be mandatory for all students undertaking substantial projects and will require the statistical tracking of all direct study hours completed meaning that students will be trained to manage their time effectively, and provide a detailed statistical analysis of their performance.

The wealth of existing programme team relationships with organisations such as Games Wales, BAFTA Cymru and the British Computing Society will ensure that our students always have access to cutting edge industry related training and knowledge. This knowledge, expertise and industry partnerships will be featured heavily in the newly proposed programme.

Regular internal events along with external events and field trips are made available and as when they are appropriate and practicable, although attendance at internal activities will be expected. 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. Some example activities include:

Global Game Jam 2016

The Global Game Jam (GGJ) is the world's largest game jam event (game creation) taking place around the world simultaneously at physical locations. It is effectively a time constrained hackathon focused on game development. The GGJ philosophy is the growth of an idea that in today's heavily connected world, people can come together, be creative, share experiences and express themselves in a multitude of ways using game technology. Glyndŵr University registered with the GGJ as an official event site in 2011 as part of extra-curricular activities within the games development course. In doing so, we became the first (and only) Welsh representative, and that would continue to be the case for a further 3 years. In 2016, the GGJ had 632 sites around the world, spread across 93 different countries. There were 30,102 registered participants. At our own event site in 2016, a team of 58 participants were able to design and develop 18 individual games within the 48 hour period. We remain the oldest, and largest Welsh representatives in GGJ.

Games Wales

Games Wales is a non-profit industry group made up of Welsh games developers, educational institutions, media partners and industry bodies with a shared interest in growing and promoting the games industry in Wales. It is responsible for organising and running the annual Wales Games Development Show based in Cardiff and the promotion of games related activities across the country.

Games Wales North (GWN) was formed in 2013 by a group of industry professionals based in the region along with the Glyndŵr University game development programme leader (Richard Hebblewhite). Since that time GWN has been delivering a series of regular social and educational events on the 11th of each calendar month, and programme team have been instrumental in establishing the GWN group's core principles:

- to champion Wales as a place to make games
- to grow the North Wales and wider Welsh games industry
- to represent the industry's interests, and act as an advocate on behalf of the Welsh industry
- to introduce students and aspiring entrepreneurs to industry experience and best practice

The GWN now forms a critical part of the student experience and allows them to engage professionally and socially with experienced members of the industry on a regular basis.

InitGame(); Conference

Devised by the Glyndŵr University game development programme leader, and running for the first time in October 2014, the conference is part of our continuing strategy to energise the games and creative industry in North Wales, along with helping students and young people to learn more about the career opportunities and technologies available to them. The event provides a series of inspirational and technical talks designed to give some insight as to the workings of small, medium and large game studios and the challenges and opportunities they embrace.

The third annual conference took place on Saturday October 22nd, 2016 and was supported by Games Wales North, BAFTA Cymru and the British Computing Society. Thanks to the BAFTA partnership, the keynote speech featured the winner of the 2016 BAFTA award for Best Game, Rantmedia Games. Some notable speakers over the last three years are:

Ian Thomas – Programmer & Writer at Frictional Games
Anton Faulconbridge – Director of Rantmedia Games
Rick Vanner - Development Director at The Game Creators
Chris Payne – CEO of Quantum Soup Studios
Ralph Ferneyhough – Lead Engine Programmer at TT Games
Steffen Gronning - CEO of BetaDwarf
Dan Harris – Media Manage at Atticus Digital
Llio Wyn - Event Manager at BAFTA Cymru
Claire Heat – Awards & Events Manager at BAFTA Cymru
Murty Schofield – Freelance Artist & Writer on the Tomb Raider franchise
Carl Dalton – CEO at Brain In A Jar
Ella Romanos – Commercial Director at Strike Game Labs

The proposed BSc (Hons) programme brings together a range of modules that will equip students to build a strong set of core skills that will enable them to develop well designed game applications and assets, facilitated by the acquisition and application of theory through practical sessions and problem-based learning. In the first year of the new programme, students will be introduced to the fundamentals of game and media design, graphical rendering, agile methods and the workings of cutting-edge gaming hardware and software technology. They will also be introduced to business practise and the processes involved in starting a company.

As the degree progresses, students will be presented with opportunities to apply industry standard management techniques such as the scrum methodology in relation to live development projects within a multidisciplinary team. They will also further develop their games and media design skills by working with industry standard 3D design tools along with a variety of other supporting technologies and tools.

A key element of the course is its emphasis on blending advanced technical design with strong management and business skills. The business modules on the programme aim to focus on the practical application of business start-up, management and growth, empowering students to directly apply their business knowledge in support of the work produced in other modules on the programme. In addition, the programme itself will be supported by our unique Business Accelerator initiative, which will allow students to gain valuable experience of business planning and finance along with the potential creation and management of a game studio.

The Accelerator programme is a new scheme for 16/17 that has been integrated into the existing undergraduate programme at levels 5 and 6 respectively. The scheme is a joint initiative between the department of computing and the North Wales Business School. It is designed to combine business and computer game development students together to further encapsulate the technical development work done in projects with a professional business strategy.

The proposed programme will also feature this initiative with a view to further increasing the number of successful start-up companies within the university incubation centre called the Enterprise Lounge (there are 3 active undergraduate Accelerator groups in 16/17). The spin out studios are also supported by the university Zone enterprise centre with a view to seeking and applying for potential investment, business mentoring and a range of other associated facilities.

It is widely recognised that many start-up companies fail within the first year due to a lack of management, business and financial stability. This scheme aims to fill that gap

by addressing these such issues and exposing students to real world problems and development issues.

The programme team believe that this particular blend of creative technical skills and entrepreneurship is fairly unique within the context of UK undergraduate games courses and will further help to grow the local industry by way of spin out projects and social enterprise.

Finally, throughout the course, students develop a number of practical skills which are useful in any field of business or working environment such as self-motivation, time management, problem solving and the application of management methodologies, personal development and critical reflection. In addition, other critical skills including research, analysis and presentation will be developed along with knowledge of specialised software skills.

It is anticipated the graduates will go into careers in the games and media sectors, but also within mainstream computing and technology fields of: technical design and artistry, user experience evaluation, scrum certification, software development, or continuing study as master's level. Additionally, it is expected that the programme will lead to the creation of local SMEs within the field of game development, software and media design.

16 Programme structure narrative

The programme consists of three full years of study, each consisting of 120 credits of taught modules. The Certificate of Higher Education in Computer Game Design & Enterprise is an exit award available for a student who has completed 120 credits at level 4 or above who is either unable, or chooses not to continue on the programme.

The Diploma of Higher Education in Computer Game Design & Enterprise is an exit award available for a student who has completed 240 credits of which 120 credits were studied at level 5 or above and who is unable or chooses not to continue on the programme. The Ordinary Degree in Computer Game Design & Enterprise is an exit award available for a student who has completed 300 credits, of which 120 credits were studied at level 5 or above and a further 60 credits at level 6.

Finally, the full Honours Degree in Computer Game Design & Enterprise is an award available for a student who has completed 360 credits, of which 120 credits were studied at levels 4, 5 and 6 respectively, including a 40 credit project module.

Overall, only 3 of the programmes 17 modules have been newly developed, with a further 3 modules made up of pre-existing modules from within the North Wales Business School. All remaining 11 modules are shared between this programme and the University's other Computing courses (including BSc (Hons) Computer Game Development), which makes the delivery more efficient and provides students with the opportunity to engage with a wider, more diverse, peer group. Indeed, the multidisciplinary nature of the programme is one of its key strengths.

The programme is to be offered in the full-time mode of attendance only. Students will typically be expected to attend the University for three or four days a week in addition to studying in their own time.

Full-time students will pursue each level of the programme over the two main teaching semesters of each academic year, with the potential of completing referral work over

the following summer period if necessary. At level 4, students will typically study 60 credits per semester, with 40 of those credits being delivered “long and thin” i.e. over the course of the both taught semesters, and the remaining 20 credits being delivered in each consecutive semester only. This structure falls in line with the delivery pattern adopted by the wider computing department.

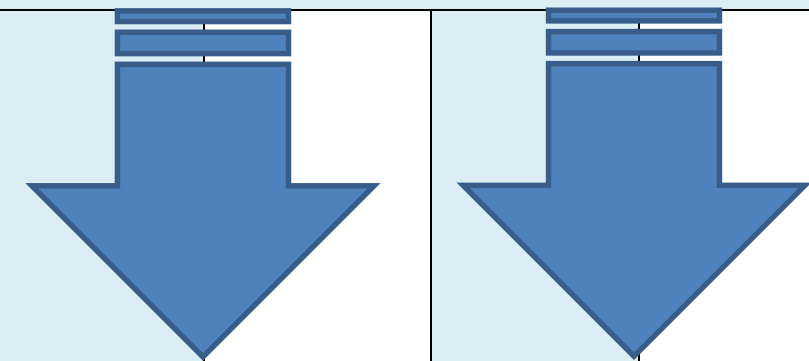
At level 5, the programme returns to a more standard delivery pattern of 60 taught credits per semester. At level 6, students will study 80 credits in semester one, with the 40 credit project module being delivered “long and thin”, alongside 3 conventionally taught subjects. The second semester of level 6 sees the introduction of a final 20 credit module along with the continuation of the project.

At a glance, the structure of level 6 may appear to be congested, particularly in semester one, however, in reality this delivery mode has proven very popular with students with the existing BSc (Hons) Computer Game Development programme enjoying some of the highest NSS ratings across the UK for several years, along with retention and completion statistics of over 90%.

Finally, all students, having successfully completed the taught components at each level, will then progress to the next level of the programme.

17 Programme structure diagram

Full-time Mode Level 4:

Level 4								
Semester 1	Mod title	Interactive Design	Mod title	Computer Systems	Mod title	Professional Development in Computing	Mod title	Agile Production Methodologies
	Mod code	COM419	Mod code	COM424	Mod code	COM427	Mod code	COM433
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing	New/Existing	New
	Credit value	20	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core	Core/Option	Core
Mod leader	Richard Hebblewhite	Mod leader	Stuart Cunningham	Mod leader	Denise Oram	Mod leader	Nathan Roberts	
Semester 2	Mod title	Digital Media Principles	Mod title	Introduction to Management & Organisation				
	Mod code	COM405	Mod code	BUS446				
	New/Existing	Existing	New/Existing	Existing				
	Credit value	20	Credit value	20				
	Core/Option	Core	Core/Option	Core				
Mod leader	Nathan Roberts	Mod leader	Kelvin Leong					

Note: "Professional Development in Computing" and "Agile Production Methodologies" are delivered in semesters 1 & 2.

Full-time Mode Level 5:

Level 5						
Semester 1	Mod title	Digital Distribution Technology	Mod title	3D Modelling & Animation	Mod title	Innovation Commercialisation
	Mod code	COM535	Mod code	COM505	Mod code	BUS569
	New/Existing	New	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
Mod leader	Richard Hebblewhite	Mod leader	Nathan Roberts	Mod leader	Anna Sung	
Semester 2	Mod title	Group Project Design	Mod title	Group Project Implementation	Mod title	Serious Games Technology
	Mod code	COM529	Mod code	COM530	Mod code	COM522
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	John Worden	Mod leader	John Worden	Mod leader	Nathan Roberts

Full-time Mode Level 6:

Level 6								
Semester 1	Mod title	Digital Marketing & Monetisation Technology	Mod title	Advanced 3D Modelling & Animation	Mod title	Business Sustainability & Growth	Mod title	Project
	Mod code	COM639	Mod code	COM632	Mod code	BUS639	Mod code	COM625
	New/Existing	New	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20	Credit value	40
	Core/Option	Core	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Richard Hebblewhite	Mod leader	Nathan Roberts	Mod leader	Anna Sung	Mod leader	Vic Grout
	Mod title	21 st Century Computing	Mod title					
	Mod code	COM623	Mod code					
	New/Existing	Existing	New/Existing					
	Credit value	20	Credit value					
	Core/Option	Core	Core/Option					
Mod leader	Vic Grout	Mod leader						

Note: "Project" is delivered in semesters 1 & 2.

18 Intended learning outcomes of the programme

Knowledge and understanding					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
A1	A critical appreciation of the facts, concepts, principles and theories relating to enterprise, computing and computer game applications.	Demonstrate a working understanding of some essential facts, concepts, principles and theories relating to computing, game development, computer game applications and business practise. Shows competence in basic IT and communication skills, workshop practice and laboratory investigations.	Demonstrate a widening appreciation of the significance of key concepts, principles, theories and practices that underpin computing and game development as an academic discipline. Explore the extent and boundaries of game design and business through practical work, design exercises and case studies.	Show a confident familiarity with the broad areas of the knowledge bases of the discipline of computing and business, including the management and an appreciation of the principles, theories and practices that underpin game design and development as an academic discipline. Reveal a working understanding of current technology and of its limits.	Demonstrate confidence and reveal 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, game development and business professionals.
A2	Knowledge and understanding of the range of tools necessary to develop computational and business solutions.	Evaluate the appropriateness of a range of development tools for the creation of software applications.	Demonstrate an ability to apply a range of development tools and techniques in new contexts from that in which they were first studied at level 4, in the design of applications for games and business.	Select and deploy accurately established techniques and tools to develop applications for selected game design and business problems, and choose appropriate theory for analysis, with only general guidance.	Demonstrate increasingly independent, confidence and flexibility in applying a range of development tools for the creation of applications for selected game design and business problems, and in the application of knowledge and skills appropriate to their solution.
A3	Knowledge and understanding of industry standards for game development, operation and testing.	Demonstrate a working knowledge of some of the tools, practices and methodologies used in the specification, design,	Demonstrate a widening appreciation of of some of the tools, practices and methodologies used in the	Select and deploy accurately established techniques and methods used in defining and assessing criteria for measuring the extent to	Demonstrate increasingly independent, confidence and flexibility in applying a range of methods used in defining and assessing

Knowledge and understanding					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
		implementation and testing of computer game systems; understand some of the risks of software implementation.	specification, design, implementation and testing of game systems; understand the risks of software design and implementation. Demonstrate a working knowledge of the general rules and best practices adopted in game and software testing techniques.	which a game system is appropriate for its current deployment; understand the risks of game design implementation and apply risk-based strategies and policies for game and software testing.	criteria for measuring the extent to which a computer game system is appropriate for its current deployment and future evolution; understand the risks of game and software implementation, and apply risk-based strategies and policies for game and software testing.
A4	Recognition of the appropriate professional, ethical and legal practices relating to business practise, and the design and development of computer game systems.	Demonstrate a basic knowledge and understanding of the professional, economic, social, moral and ethical issues involved in the exploitation of computing and computer game technology.	Demonstrate knowledge and deeper understanding of professional, economic, social, moral and ethical issues involved in the exploitation of computing and computer game technology.	Demonstrate knowledge and a comprehensive understanding of the legal, professional, economic, social, moral and ethical issues involved in the sustainable exploitation of computing and computer game technology.	Demonstrate confidence and reveal a comprehensive understanding of the legal, professional, economic, social, moral and ethical issues involved in the sustainable exploitation of computing and computer game technology.

Intellectual skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
B1	Identify, select and apply appropriate business and computational system development models and processes.	Demonstrate some ability to apply basic concepts, principles and theories when analysing case study examples relating to game development and business	Demonstrate increasing ability to apply the key concepts, principles, theories and practices to game development and associated business	Recognise familiar ideas or principles in new contexts or situations; apply the key concepts, principles, theories and practices, systematically and effectively with minimal guidance.	Identify and classify principles and ideas in new contexts and situations; creatively apply the key concepts, principles, theories and practices, systematically,

Intellectual skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
		with the help of guidance from tutors.	situations, still with some guidance provided.		effectively and critically, working autonomously.
B2	Develop cognitive skills of critical thinking, analysis and synthesis.	Using the tutor as a facilitator, begin to analyse basic problems, identify requirements and propose alternative solutions for computing, computer game development and business systems.	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 computing, computer game development and business systems.	Develop self-reliance and confidence in the analysis of problems, identify requirements and propose and critically evaluate alternative solutions for computing, computer game development and business systems.	Integrate learned theory and techniques with practical experience to analyse problems, identify requirements and propose and critically evaluate alternative solutions for computing, computer game development and business systems with informed understanding.
B3	Select and apply suitable software development models and business processes.	Carry out the rote application of basic computing and game development principles and procedures to standard, simple situations, with considerable guidance provided by tutors.	Apply standard computing and game development principles and procedures to somewhat more demanding situations, still with some guidance provided.	Demonstrate the ability to select and use principles and procedures appropriate to the situation or problem in hand, with minimal guidance provided.	Carry out the confident and accurate selection and application of principles and procedures to the solution of a range of computing, business and game development situations and problems, working autonomously.
B4	Apply industrial standards to software performance, interoperability and evaluation.	Start to form own value judgements of software development etc., based on criteria provided, albeit very reliant on tutors' evaluative opinions.	Start to develop own criteria and ability to form independent judgements, although still dependent on guidance from tutors.	Identify a range of valid alternative solutions; begin to discriminate and evaluate in a reasoned, systematic and increasingly independent way.	Integrate theory with good computing and game development practice; autonomously evaluate theory, process, solutions and outcomes critically and effectively.

Subject skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
C1	Utilise appropriate research methods for presentation, analysis and interpretation of both qualitative and quantitative data, relevant to business practise and game design & development.	Systematically relate a limited number of facts/ideas/elements in an imitative manner, with considerable guidance provided by tutors.	Demonstrate appreciation of need for the relating and collecting of a range of facts/ideas/elements in an argued case; produce new ideas in closely-defined situations with some guidance provided as appropriate.	Demonstrate the ability to apply research methods to relate and collect facts/ ideas/ elements in an argued case; produce new ideas in a wider range of situations, with minimal guidance.	Demonstrate 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	Working in collaborative teams, partnerships and industry networks.	The ability to work effectively with tutors and fellow students; participate in clearly defined group situations.	Demonstrate more improved interaction and group skills, including effective participation with others on a common task or group project in accordance with a methodology.	Demonstrate advanced interaction and group skills, and the ability to work effectively with others on a common task; demonstrate basic negotiation and management skills in line with team objectives and overarching methodology.	Demonstrate advanced interaction and group skills, and the ability to work effectively with others on a common task; take actions which respect the needs and contributions of others; contribute to and accept consensus; negotiate to achieve the objectives of the team; analyse the effectiveness of a methodology when applied utilised within a game development team.
C3	Critically appraise the game design & development sector, and the wider IT industry, identifying opportunities and threats.	Develop the ability to explore and recognise the risks and opportunities that may be involved in game development and the wider IT industry in relation to professional, business, legal, moral, social and	Use a range of established techniques within tutorials, for example, using experiential learning exercises, to explore and recognise the relevance of selected professional, business, legal, moral,	Demonstrate industry technology acumen, with minimum supervision, recognise the relevance of legal, professional, moral, social and ethical issues in the work place and the wider environment. Able to inform	Demonstrate effective self-management in terms of time; ability to conduct research independently or as a team, into legal, professional, moral, social, ethical and business issues. Able to inform and

Subject skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
		ethical issues; communicate the results of work accurately and reliably, and with structured and coherent arguments.	social and ethical issues; communicate the results of work/studies accurately and reliably, and with structured and coherent arguments.	and adapt work to satisfy these issues in relation to game design, development and related business processes.	adapt work to satisfy these issues. Demonstrate an ability to carry out research and critical thinking.
C4	Develop and apply theoretical and technical game design, implementation and agile management skills.	<p>Demonstrate basic skills that underpin good practice in the field of computing and game design and development; design and create of simple game applications, interfaces and business ideas.</p> <p>Demonstrate a basic understanding of hardware issues, including interfacing, graphical rendering, and their impact on the overall design and performance of computer games.</p> <p>Demonstrate a basic awareness and understanding of the concepts, techniques, and processes involved within an agile methodology; apply these techniques to a small development project.</p>	<p>Demonstrate more advanced skills that underpin good practice and elements of professionalism in the field of computing and game design and development.</p> <p>Work as part of a team to design and develop moderately sized game applications, interfaces and business ideas.</p> <p>Co-operate in an effective manner with colleagues and other professionals through the development of interpersonal and communication skills, within in a project and business context using a recognised agile methodology and support tool.</p> <p>Develop and maintain a detailed set of production</p>	<p>Demonstrate an advanced understanding of appropriate practice and professionalism in the field of computing and game design and development.</p> <p>Design and implement interactive game systems that utilise a variety of media types to a professional standard.</p> <p>Design and implement intricate 3D models and animation techniques that incorporate sophisticated production pipelines.</p> <p>Compare and contrast current industry trends and identify potential opportunities for the design and deployment of collaborative technology.</p>	<p>Demonstrate professional use of investigative and design strategies, and integrate them within the utilisation of tools and agile methodologies.</p> <p>Analyse and critically appraise current and emerging technologies within the field of game development and IT.</p> <p>Propose, plan, undertake and report a self-directed individual programme of investigation, design and implementation which will enable the effective use of self-directed investigative, design, business and other technical skills to be demonstrated through the management and development of a large team project.</p>

Subject skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
			<p>documentation that includes design, technical, testing and business rationale.</p> <p>Demonstrate good practice in the development, management and utilisation of 3D models and animation techniques using industry standard software tools.</p>	Demonstrate an in depth understanding of the characteristics, processes and limitations of modern games and media distribution technology.	<p>Demonstrate knowledge and understanding of agile project management techniques and the ability to analyse their effectiveness in line with a business strategy.</p> <p>Work within a team to design and develop effective and efficient game applications and systems that utilise and integrate a variety of media technologies and conform to a specific target market and business plan.</p>

Practical, professional and employability skills					
		Level 4 (L4)	Level 5 (L5)	Level 6 (L6)	Level 6 Hons Degree (L6)
D1	Written communication skills: Research, analyse and interpret information from a variety of sources and synthesise and communicate ideas effectively both orally and in writing.	Communicate in a clear and concise way in writing and orally, in relatively informal and limited-length pieces of work. In particular, demonstrate competence in technical reporting.	Communicate 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.	Engage effectively in a variety of roles and debates; produce clear, well-structured technical reports and other extended pieces of work; deliver clear, subject-specific presentations in a variety of contexts.	Engage effectively in independent roles and debates in a professional manner; produce detailed critiques and coherent technical and project reports; deliver confident oral and other presentations in a wide range of contexts.

D2	Numeracy	Demonstrate basic numeracy and algebraic competence; ability to manipulate data related to simple business problems.	Demonstrate more advanced standard numerical/mathematical skills as appropriate to game design, development and associated business practise.	Apply a range of more specialist numerical/mathematical skills as appropriate to game design, development and associated business practise.	Confidently apply a range of specialist numerical/mathematical skills as appropriate to game design, development and associated business practise.
D3	Multidisciplinary teamwork skills.	Interact effectively with tutors and fellow students; participates in clearly defined group situations alongside students from different academic programmes.	Demonstrate more advanced interactive and multidisciplinary group skills, including effective participation in more demanding group tasks, including a group project.	Interact effectively within a multidisciplinary group, including a work-simulated environment; demonstrate basic negotiation, leadership and group-support skills.	Interact effectively and professionally within a multidisciplinary group; demonstrate appropriate negotiation, leadership, management and group-support skills to an advanced level.
D4	Information and communications technology skills.	Select under guidance and use relevant sources of information to identify potential computing resources for a specific purpose; demonstrate basic skill in using the Internet, digital image manipulation, designing interfaces collation of electronic data.	Demonstrate more advanced IT skills; demonstrate competent use and application of business databases, additional specialist subject packages and produce reports to business standard; demonstrate use of online databases effectively to gain information; demonstrate use of appropriate tools to plan and manage workloads.	Demonstrate, utilise and access a limited selection of more specialist IT skills related to subject specific software; conduct effective searches for information to identify potential computing resources for a specific purpose and critically evaluate their merit; demonstrate advanced use of management, presentation and business software.	Utilise and access a limited selection of more specialist IT skills related to subject specific software for analysing technical and business data; Conduct large scale, detailed searches for information to identify potential computing resources for a specific purpose and critically evaluate their merit; demonstrate advanced use of data management, presentation, business software.

D5	Cognitive skills: Critically assess the relevance and importance of ideas of others.	Show an understanding of the opinions of other people; flexibility in considering alternatives and opinions.	Demonstrate the ability to take the perspective of others; identify the similarities and differences between two approaches to the solution of a given problem.	Demonstrate the ability to take the perspective of others; comparing the strengths and weaknesses of alternative interpretations determining the credibility of a source of information.	Demonstrate 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.
D6	Managing own learning: evaluate own performance, working standards and continuing professional development; develop lifelong learning skills.	Study in a systematic, directed way with the aid of appropriate tutor guidance.	Learn in an increasingly effective and purposeful way, with the beginning of development as an autonomous learner.	Adopt a broad-ranging and flexible approach to study; identify learning needs; pursue activities designed to meet these needs in increasingly autonomous ways.	With minimal guidance, manage own learning using a wide range of resources appropriate to the IT profession; seek and make 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.

19 Curriculum matrix

On successful completion of Level Four, students will achieve the following learning outcomes:

	<i>Module Title</i>	<i>Core or option?</i>	<i>A1</i>	<i>A2</i>	<i>A3</i>	<i>A4</i>	<i>B1</i>	<i>B2</i>	<i>B3</i>	<i>B4</i>	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>C4</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	<i>D4</i>	<i>D5</i>	<i>D6</i>	
Level 4	COM419 Interactive Design	Core	■	■	■	□	□	■	■	■	■	■	■	■	■	■	■	■	■	□	■
	COM405 Digital Media Principles	Core	■	■	■	□	□	■	■	■	□	■	□	■	■	■	■	■	■	□	■
	COM427 Professional Development in Computing	Core	■	□	■	■	■	■	□	■	■	□	■	■	■	□	■	■	■	■	■
	COM424 Computer Systems	Core	■	□	■	□	■	■	□	□	■	□	□	■	■	■	■	□	■	■	■
	BUS446 Introduction to Management & Organisation	Core	■	■	□	■	■	■	■	□	■	□	■	□	■	■	■	□	■	■	■
	COM433 Agile Production Methodologies	Core	■	□	■	■	■	■	■	□	■	■	□	■	■	■	■	□	■	□	■

On successful completion of Levels Four and Five, students will achieve the following learning outcomes:

	<i>Module Title</i>	<i>Core or option?</i>	<i>A1</i>	<i>A2</i>	<i>A3</i>	<i>A4</i>	<i>B1</i>	<i>B2</i>	<i>B3</i>	<i>B4</i>	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>C4</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	<i>D4</i>	<i>D5</i>	<i>D6</i>	
Level 4	COM419 Interactive Design	Core	■	■	■	□	□	■	■	■	■	■	■	■	■	■	■	■	■	□	■
	COM405 Digital Media Principles	Core	■	■	■	□	□	■	■	■	□	■	□	■	■	■	■	■	■	□	■
	COM427 Professional Development in Computing	Core	■	□	■	■	■	■	□	■	■	□	■	■	■	□	■	■	■	■	■
	COM424 Computer Systems	Core	■	□	■	□	■	■	□	□	■	□	□	■	■	■	■	□	■	■	■
	BUS446 Introduction to Management & Organisation	Core	■	■	□	■	■	■	■	□	■	□	■	□	■	■	■	□	■	■	■
	COM433 Agile Production Methodologies	Core	■	□	■	■	■	■	■	□	■	■	□	■	■	■	■	□	■	□	■
Level 5	COM530 Group Project Implementation	Core	■	■	■	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	COM529 Group Project Design	Core	■	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	COM522 Serious Games Technology	Core	■	■	■	□	■	■	■	■	■	■	□	■	■	■	■	■	■	■	■
	COM505 3D Modelling & Animation	Core	■	■	■	□	■	□	■	□	■	□	□	■	■	■	■	□	■	□	■
	BUS569 Innovation Commercialisation	Core	■	■	□	■	■	■	■	□	■	□	■	□	■	■	■	□	■	□	■
	COM535 Digital Distribution Technology	Core	■	■	■	■	■	■	□	■	■	□	■	□	■	□	□	■	■	■	■

On successful completion of BSc (Hons) Computer Game Design & Enterprise, students will achieve the following learning outcomes:

Note: For successful completion of a BSc (Ord), students will complete any 60 credits at level 6.

	<i>Module Title</i>	<i>Core or option?</i>	<i>A1</i>	<i>A2</i>	<i>A3</i>	<i>A4</i>	<i>B1</i>	<i>B2</i>	<i>B3</i>	<i>B4</i>	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>C4</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	<i>D4</i>	<i>D5</i>	<i>D6</i>	
Level 4	COM419 Interactive Design	Core	■	■	■	□	□	■	■	■	■	■	■	■	■	■	■	■	■	□	■
	COM405 Digital Media Principles	Core	■	■	■	□	□	■	■	■	□	■	□	■	■	■	■	■	■	□	■
	COM427 Professional Development in Computing	Core	■	□	■	■	■	■	□	■	■	□	■	■	■	□	■	■	■	■	■
	COM424 Computer Systems	Core	■	□	■	□	■	■	□	□	■	□	□	■	■	■	□	■	■	■	■
	BUS446 Introduction to Management & Organisation	Core	■	■	□	■	■	■	■	□	■	□	■	□	■	■	□	■	■	■	■
	COM433 Agile Production Methodologies	Core	■	□	■	■	■	■	■	□	■	■	■	■	■	■	■	□	■	□	■
Level 5	COM530 Group Project Implementation	Core	■	■	■	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	COM529 Group Project Design	Core	■	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	COM522 Serious Games Technology	Core	■	■	■	□	■	■	■	■	■	■	□	■	■	■	■	■	■	■	■
	COM505 3D Modelling & Animation	Core	■	■	■	□	■	□	■	□	■	□	□	■	■	■	□	■	■	□	■
	BUS569 Innovation Commercialisation	Core	■	■	□	■	■	■	■	□	■	□	■	□	■	■	□	■	■	□	■
	COM535 Digital Distribution Technology	Core	■	■	■	■	■	■	□	■	■	□	■	□	■	□	□	■	■	■	■

	<i>Module Title</i>	<i>Core or option?</i>	<i>A1</i>	<i>A2</i>	<i>A3</i>	<i>A4</i>	<i>B1</i>	<i>B2</i>	<i>B3</i>	<i>B4</i>	<i>C1</i>	<i>C2</i>	<i>C3</i>	<i>C4</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	<i>D4</i>	<i>D5</i>	<i>D6</i>
Level 6	COM632 Advanced 3D Modelling & Animation	Core	■	■	■	□	■	□	■	□	■	□	□	■	■	■	□	■	□	■
	COM623 21 st Century Computing	Core	■	□	■	■	■	■	□	■	■	□	■	□	■	□	■	■	■	■
	COM639 Digital Marketing & Monetisation Technology	Core	■	■	■	■	■	■	□	■	■	□	■	□	■	□	□	■	■	■
	BUS639 Business Sustainability and Growth	Core	■	■	□	■	■	■	■	□	■	□	■	■	■	■	■	□	■	■
	COM625 Project	Core	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

20 Learning and teaching strategy

The BSc (Hons) Computer Game Design & Enterprise will adopt the Computing subject area Learning, Teaching and Assessment strategy. It seeks to assist the student to become an independent learner while still supporting the students in their transition to postgraduate education. 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.

Students on the programme will gain theoretical and practical experience of working with a range of game development tools and environments in building and managing game applications & assets. Students will also learn about the fast-evolving fields of digital content distribution, marketing and business processes.

The majority of scheduled learning and teaching activities is through attendance at lectures, guest talks, tutorials, and labs.

The course provides students with knowledge in several subject disciplines that support the design, development, and management of computer game applications, assets and projects. The course modules cover the practical skills of computing, necessary to design, develop and manage game applications in conjunction with multidisciplinary teams, supported by learning the theories, investigation techniques, and research skills that allow them to work successfully with emerging technologies and devise solutions that are fit for purpose, and encapsulated within a business strategy.

Subject to cohort size, modules that are delivered by the North Wales Business School will be timetabled exclusively for the proposed programme, for all lecture and tutorial hours. However, if cohort sizes are smaller, then lecture hours for such modules will be timetabled as part of the North Wales Business Schools programmes, but tutorial hours will be timetabled and delivered exclusively for games students only to ensure subject specific knowledge. Regardless of the timetabled format, the assessment strategy for these modules will always conform to the module specifications provided.

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. Staff in Computing operate an Open Door policy in relation to students, ensuring flexibility and responsiveness in dealing with queries and questions that occur outside of the scheduled teaching hours.

The pace of delivery and range of syllabus content to be covered at each level of the programme requires a combination of teaching and learning strategies to be adopted in most areas of study. Modules are in the main divided into 2 types: technical and general. Technical modules cover the specialised subject areas and expertise pertaining to game development, while the more general modules cover other areas of business management, professional development and production methodologies.

Technical modules in level 4 total 80 credits of the academic year and are Interactive Design, Digital Media Principles, Computer Systems and Agile Production

Methodologies. These modules provide students with the theoretical and practical skills to design, build and manage the production of simple game applications and assets.

General modules in level 4 total 40 credits of the academic year and are Professional Development in Computing and Introduction to Management and Organisation. These modules aim to develop critical thinking skills, basic research capability, information handling, ethical awareness, and business skills.

Technical modules in level 5 total 100 credits of the academic year and are Digital Distribution Technology, 3D Modelling & Animation, Serious Games Technology, Group Project Design and Group Project Implementation. These modules provide students with the theoretical and practical skills to work in multidisciplinary teams to design and develop moderately complex game applications and assets along with an understanding of the technology used to distribute them.

There is one general module at level 5 totalling 20 credits of the academic year and it is called Innovation & Commercialisation. This module aims to develop an awareness of processes and frameworks necessary to commercialise a product idea successfully.

Technical modules in level 6 total 80 credits of the academic year and are Advanced 3D Modelling & Animation, Digital Marketing & Monetisation Technology, and the project. These modules provide students with the theoretical and practical skills to work in larger multidisciplinary teams to design and develop advanced game applications and assets along with an understanding of the technology used monetise and market them.

General modules in level 6 total 40 credits of the academic year and are 21st Century Computing and Business Sustainability & Growth. These modules aim to develop a critical awareness of current, emerging future games technology along with the business skills required to sustain and grow a working company.

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.

All of the modules in semester 2 at level 5 of the programme are assessed synoptically as part of an integrated set of group development modules. The modules are core to both the newly proposed BSc (Hons) Computer Game Design & Enterprise and BSc (Hons) Computer Game Development. The module delivery and assessment is closely coordinated by the appropriate module leaders, and the final assessment for all 3 modules is carried out by a panel made up of module leaders and members of the wider programme team.

The level 6 project module on the BSc (Hons) Computer Game Design & Enterprise programme is designed to be group oriented and is driven by a compulsory 4 hour session on the weekly timetable throughout the year. The module is supported by all members of the programme team, and is coordinated and driven by the module leader. This weekly session is broken down into clear two parts:

- 1) A formal lecture/talk aimed delivering all relevant information and subject specific content relating to the project module. The very first session of the year involves the introduction of the specific module outcomes and procedures, followed by the formal organisation and building of project teams. From there, each week is devoted to another aspect of the project such as PEGI ethical analysis, advanced agile management training and supporting platforms, research skills, report writing, data analysis and critical evaluation etc.
- 2) A supervised project workshop where, in the early part of the module schedule, students are guided through specific weekly activities such as brainstorming, team building, and initial work on the project proposal document. As the module progresses, the workshop session switches focus to the next relevant stage of work submission and greater support for management data preparation, refinement and team organisation.

In the final stages of the project, the workshop class hours are dedicated to providing supervised technical and methodology management support for students as they to work towards their final Level Up Expo demonstration and product submission.

The project module is designed to emulate industry standard development and management practices with production data analysis forming a key part of the assessment and general project coordination. Students are guided by their supervisor from the initial proposal phase, with the selection of a suitable team role and appropriate personal research hypothesis, through the several phases of assessment and submission.

Students are also required to encapsulate their project within a business framework with a view to managing their group as a formal enterprise supported by our Business Accelerator programme. However, participation in the accelerator programme itself is optional.

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.

21 Work based/placement learning statement

A work placement is not offered on this programme.

22 Welsh medium provision

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

There is currently no opportunity for any part of the programme to be delivered through the medium of Welsh. It is the responsibility of students who wish to be assessed through the Welsh medium to ensure that they inform the programme team of their intentions. Where a qualified tutor is available, students will then be allocated to a tutor who is able to assess the work in Welsh. At present, the School does not have enough bilingual tutors or full-time academic staff capable of assessing through the medium of Welsh. If no appropriate Welsh speaking tutor/assessor is available, the University's qualified translators will translate the written assessment into English. Due to the technical nature of this programme many of the terms in Welsh are very similar to those in English.

23 Assessment strategy

The methods of assessment used on the programme are designed to prepare students for entry into the industry and as such, primarily revolve around coursework and portfolio development.

Where modules focus on group work, there are strict controls in place to guide students in terms of assessment requirements and management of personal workloads. In addition, online tracking tools play a critical role in ascertaining a student's individual contribution to the collective effort due to the accurate logging of work hours and supporting evidence. This helps to ensure that students are assessed in a fair and transparent way.

Assessment is co-ordinated between modules to ensure diversity and a range of assessment submission dates where possible. This coordination effort also includes staff members from the North Wales Business School to ensure consistency of the student experience. Specific assessment tasks are incorporated into each module guide and relate to specific learning outcomes across all areas of programme assessment.

The number of module assessment elements and their individual assessment word counts are consistent with other programmes across both the department and the school at the same level.

MODULE SPECIFICATION PROFORMA

Module code & title	Assessment type and weighting	Assessment loading	Indicative submission date
COM419 Interactive Design	50% Group Project 50% Portfolio	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
COM405 Digital Media Principles	100% Portfolio	4000 Words	End of Sem 2
COM427 Professional Development in Computing	100% Portfolio (Over 2 semesters)	3000 Words	End of Sem 1 End of Sem 2
COM424 Computer Systems	50% Coursework 50% Class Test	3000 Words 1.5 Hours	End of Sem 1 End of Sem 1
BUS446 Introduction to Management & Organisation	50% Essay 50% Essay	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
COM433 Agile Production Methodologies	100% Portfolio (Over 2 semesters)	4000 Words	End of Sem 1 End of Sem 2
COM530 Group Project Implementation	100% Group Project	4000 Words	End of Sem 2
COM529 Group Project Design	100% Group Project	4000 Words	End of Sem 2
COM522 Serious Games Technology	50% Coursework 50% Coursework	2000 Words 2000 Words	Middle Sem 2 End of Sem 2
COM505 3D Modelling & Animation	100% Coursework	4000 Words	End of Sem 1
BUS569 Innovation Commercialisation	50% Report 50% Report	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
COM535 Digital Distribution Technology	50% Coursework 50% Coursework	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
COM632 Advanced 3D Modelling & Animation	100% Coursework	4000 Words	End of Sem 1
COM623 21 st Century Computing	70% Report 30% Presentation	3000-3500 Words 30-40 Minutes	End of Sem 2 End of Sem 2
COM639 Digital Marketing & Monetisation Technology	50% Coursework 50% Coursework	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
BUS639 Business Sustainability and Growth	50% Essay 50% Report	2000 Words 2000 Words	Middle Sem 1 End of Sem 1
COM625 Project	100% Project	12,000 Words	End of Sem 2

24 Assessment regulations

Regulations for Bachelor Degrees, Diplomas, Certificates and Foundation Degree.

Derogations

None.

Non-credit bearing assessment

None.

Borderline classifications (for undergraduate programmes only)

Borderline classifications will be considered in line with current University regulations. In this case, Regulations for Bachelor Degrees, section 14, "Honours Degree and the Determination Of Awards".

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;
- Deciding module is COM625 -- Project, which is a 40 credit module at level 6. This should fall within the higher classification.

25 Programme Management

Programme leader

Richard Hebblewhite

Programme team

Dr. Stuart Cunningham

Prof. Vic Grout

Nathan Roberts

Dr. Kelvin Leong

Anna Sung

Denise Oram

Supporting team

John Worden

Dr Nigel Houlden

Dr Paul Comerford

Prof. Richard Picking

Bindu Jose

Julie Mayers

Stephen Caulder

Jason Matthews

Quality 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 BSc (Hons) Programme Leader for Computer Game Design & Enterprise 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 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

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 service provision is viewed by its most important group of stakeholders, its students.

Students can provide feedback in a number of ways:

Student Voice Forum (SVF): Chaired by a member of academic staff from outside the programme, will be held at least once per trimester. 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. The BSc (Hons) Computer Game Design & Enterprise programme will have representatives on the Computing Student Voice Forum from all levels of the course.

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.

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 weeks.

Practical work is developed and assessed by having students to demonstrate their work and take part in a form interview process, 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 particular areas were of good quality or be improved upon.

Research and scholarship activity

The programme is taught and assessed by active researchers in the field, who all belong to the University's ARClab (<http://arclabnet.weebly.com/>) group, which is based within the School of Applied Science, Computing and Engineering Research Centre, or the University's Research Centre for Management. 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. In particular, the taught modules within the programme are drawn from the research specialisms and significant industry engagement of each member of the programme team. For instance:

Module Leader & Role	Module(s)
Dr. Stuart Cunningham <i>Reader in Audio and Affective Computing</i>	Computer Systems
Prof. Vic Grout <i>Professor of Computing Futures</i>	21 st Century Computing
Dr Kelvin Leong <i>Senior Lecturer in Accounting & Finance</i>	Introduction to Management & Organisation
Richard Hebblewhite <i>Co-Chair Games Wales (North), BAFTA Cymru</i>	Interactive Design Group Project Implementation Digital Distribution Technology Digital Marketing & Monetisation Technology Project
Nathan Roberts <i>Senior Lecturer in Computing</i>	Agile Production Methodologies Digital Media Principles 3D Modelling & Animation Group Project Design Serious Games Technology Advanced 3D Modelling & Animation
Denise Oram <i>Senior Lecturer in Computing</i>	Professional Development in Computing
Anna Sung <i>Senior Lecturer in Accounting & Finance</i>	Innovation & Commercialisation Business Sustainability & Growth

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.

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. In addition, the emergence of virtual reality and augmented reality systems has given rise to a number of live industry projects that are in some cases, embedded within module assessment or run as extra-curricular activities for students to engage with.

26 Learning support

Institutional level support for students

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

- Zone Enterprise hub
- Enterprise Lounge (Start-up incubation centre)
- Principles House (post-start-up incubation centre)
- Library & IT Resources
- The Assessment Centre
- DisAbility Support Team
- Irlen Centre
- Careers Centre and Job Shop
- Chaplaincy
- Counselling & Wellbeing
- Student Funding and Welfare
- International Welfare
- Student Programmes Centre
- Glyndŵr Students' Union

School support for students

Every student is allocated a personal tutor in the first weeks of the programme. The personal tutor is someone students can contact to discuss any problems of a non-academic nature. These may relate to special needs or personal problems that may affect the student's academic performance. In Computing, the academic staff have been successfully been piloting the use of a virtual personal tutoring space, enabled using the Moodle VLE, to provide students with the opportunity for peer support and for less urgent issues.

Another forum for discussion is the Student Voice Forum. Student representatives, who are elected by the students, meet lecturing staff on the programme once a trimester to exchange ideas about the programme. This allows students to communicate their shared concerns and for the staff to react and respond speedily to address their concerns.

Programme specific support for students

Students on the programme will receive the following forms of student support and guidance:

- Admissions. All students on the programme will have the opportunity to discuss their application with staff, and receive appropriate advice and guidance prior to admission. This will include a review of expectations of the programme and clarification of workload and requirements.
- 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.
- Student Handbook. All students on the programme will receive a Student Handbook which will contain details and guidance on all aspects of the programme and forms of student support and guidance, programme-based, and School-based.
- 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.

Additional support for International students:

There is a network of support that is available at many different levels within the University and these combine to provide a supportive framework for the international students.

Specifically, this includes two main activities:

- The University offers English language classes alongside studies that improve not only spoken and written English but also academic English. Classes take place weekly and are delivered by the University's English language tutors.

They also help students to integrate into the life of the local community as well as helping them develop transferable skills such as practical, research and report-writing skills.

- An induction / orientation course that precedes the start of formal teaching and that allows the international students to become familiar with the University and studying at the University while at the same time outlining some of the cultural differences that exist between their country of origin and the UK.

27 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.

PART THREE MODULE SPECIFICATION PROFORMA

MODULE SPECIFICATION PROFORMA

Module Title:	Agile Production Methodologies	Level:	4	Credit Value:	20
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Module code:	COM433	Is this a new module?	Yes	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I220
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Design & Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval: February 17

Date of revision: *Enter date of approval*

Version: 1

Have any derogations received SQC approval?

Yes No N/A

Module Aims

This module is designed to introduce students to the area of agile project management and production methodologies with particular emphasis on SCRUM. Students will develop an understanding of the tools and practises that facilitate effective team work and project management.

Students will develop an understanding of the theoretical and practical issues relating to SCRUM along with an awareness of the wider subject area and comparable alternative approaches.

Students will be provided with the opportunity to directly apply their knowledge within accompanying technical development modules at level 4 of the programme.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Demonstrate an understanding of the key principles and practises associated with the deployment of an agile development methodology.	KS2	KS3
2	Utilise industry standard tools and technologies in the management and organisation of a small development project.	KS10	KS4
3	Evaluate the impact and effectiveness of agile production methodologies in relation to development projects.	KS1	KS9

Derogations
N/A

Assessment:
<p>The module will be assessed by way of a portfolio of work.</p> <p>As part of the portfolio, students will be given assessment topics through tutorials and case study based coursework (a number of tasks as formative assessment individually graded) to contribute to the portfolio. Students will be required to underpin the development work in other modules with the deployment of an agile methodology and provide evidence of this happening. The use of technology to support the management of a development project by collating and presenting production data (such as sprints and associated burn down) will be key, and this will form a large part of the assessment portfolio. Other elements of the portfolio will reflect documentation such as minutes of meetings, agendas and other associated production documents.</p> <p>The portfolio will also contain an evaluation component where students will be required to provide a reflective overview and basic analysis of the work completed.</p>

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Portfolio	100%		4000

Learning and Teaching Strategies:
<p>Lectures, supported by tutorials and practical sessions where students get the opportunity to put theory into practice and experiment with current techniques and technologies relating to modern agile production methodologies.</p> <p>The lectures will focus on presenting key topics and concepts, whereas the practical/tutorial based learning will provide directed training in industry platforms designed to manage and support development projects.</p> <p>As the module progresses, students will be supported by way of supervised lab support and regular meetings to support planning, time management and portfolio content.</p> <p>Formative, self-directed exercises will be used to support transfer of knowledge and understanding. The Moodle VLE system will form the primary platform for the dissemination of training videos, tutorials, lecture notes and reading material. Assessment material and supporting documentation will also be made available.</p>

Syllabus outline:

Introduction to Production Methodologies

- Adaptive vs Predictive

SCRUM management processes

Sprint Management and Transitions

Retrospectives and Daily Stand Ups

Project Planning & Evaluation

Brainstorming

Task & Issue Generation

Production Scheduling (GANTTs and Milestones)

Managing Priorities & Scope

Production Management Tools (JIRA, PlanBox, LeanKit)

Agile Management Data

- Sprints, Epics and Versions
- Story Points
- Burndown Data and Sprint Scoping
- Timesheets & Productivity

Bibliography:

Essential reading

Green, M.D. (2016) *Scrum: Novice to Ninja*, SitePoint.

Other indicative reading

Cooke, J.L. (2015) *Agile Productivity Unleashed, Second Edition*, 2nd ed. IT Governance Publishing.

Linz, T. (2014) *Testing in Scrum: A Guide for Software Quality Assurance in the Agile World*, Rocky Nook, Santa Barbara, CA.

Viscardi, S. (2013) *The Professional ScrumMaster's Handbook*. Packt Publishing, Birmingham, U.K.

Professional Body Websites:

UK Interactive Entertainment (UKIE): <http://ukie.org.uk/>

International Game Developers Association (IGDA): <https://www.igda.org/>

Creative Skillset: <https://creativeskillset.org/>

The British Computer Society (BCS): <http://www.bcs.org/>

MODULE SPECIFICATION PROFORMA

Module Title:	Digital Media Principles	Level:	4	Credit Value:	20
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Module code:	COM405	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I630
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	72 hrs
Guided independent study	128 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Creative Computing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Networks & Security	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Cyber Security	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Artificial Intelligence	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computing Philosophy	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Science	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HND Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HNC Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 2

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

This module aims to introduce the skills required for communicating concepts and ideas in computer game and media design. By providing practical experience in the application of principles that are integral to solving design problems within computer game design and media applications.

Through the above process, the module will enable an understanding of the student's own creative process and work flow through engagement in one or more production practices.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Demonstrate and evaluate key principles in the effectiveness of solutions to design problems.	KS1	KS2
		KS3	KS4
		KS5	KS6
		KS9	KS10
2	Apply both digital and non-digital methods in the conceptualisation and development of design solutions.	KS1	KS2
		KS3	KS4
		KS5	KS6
		KS9	KS10
3	Utilise industry standard software in the development of manipulation of digital imagery and graphical content.	KS1	KS4
		KS5	
4		KS1	KS4

Engage in reflective practice using appropriate tools and technologies (such as blogging and social media).	KS5	
Transferable skills and other attributes		

Derogations
N/A

Assessment:					
Indicative Assessment					
<p>The assessment will take the form of a portfolio of work which should be organised and presented digitally as a chronological, reflective design journal or blog. The portfolio will have two main content areas:</p> <p>Firstly, the students will be asked to document their solutions to weekly tasks and design challenges which serve as a training tool and preparation for a larger assignment topic. Secondly, the students will be given a design brief that will require a more detailed solution consisting of several key areas designed to assess various skills.</p> <p>To finalise the assessment, the students will be asked to attend an assessment meeting where they will be given the opportunity to demonstrate their work and discuss areas of success and possible improvement. Indicative grades will be issued at the conclusion of this meeting.</p>					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3,4	Portfolio	100		4000

Learning and Teaching Strategies:
<p>The primary skill base of this module will be delivered through a series of lectures, demonstrations and studio workshops which will equip the students with the practical means to comprehend the principles guiding computer game and media design.</p> <p>The main assessment method is through the use of critical reflection, and as such the students will be introduced to methods that best enable this practice.</p> <p>Topics will be introduced on a weekly basis through lectures and practical demonstrations, and then further supported with the use of weekly class tutorial tasks and design challenges. It is expected that students will continue to work on these tasks and challenges outside of class time and demonstrate evidence of completion through regular reflective journal entries. Some supervised class time will be available for additional support of this process.</p>

Syllabus outline:

- Introduction to drawing and graphical design techniques.
- Introduction to pixel art, illustration.
- Interactive media design techniques and methodologies.
- Media production cycle.
- Effective brainstorming, rapid application design and conceptualization.
- Research, design and planning.
- Critical reflection and portfolio development.
- Graphical image manipulation and layer based images.
- File resolution, file sizing and portability.
- Colour systems & standardisation

Industry standard development and design environments such as:

- Adobe Creative Suite
- Popplet

Bibliography:

Essential reading

Adobe Systems. (2013) *Adobe Photoshop CC classroom in a book the official training book*. Peachpit, San Francisco, CA.

Adobe Systems. (2014) *Adobe Premiere Pro CC classroom in a book: the official training workbook from Adobe Systems*. Adobe Press, San Jose, CA.

Chavez, C. (2014) *Design with Adobe Creative Cloud: basic projects using Photoshop, InDesign, Muse, and more*. Adobe Press, San Jose, Calif.

Other indicative reading

MODULE SPECIFICATION PROFORMA

Module Title:	Interactive Design	Level:	4	Credit Value:	20
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Module code:	COM419	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I620
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Richard Hebblewhite
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Scheduled learning and teaching hours	72 hrs
Guided independent study	128 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HNC Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HND Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
N/A

Office use only	
Initial approval:	September 14
Date of revision:	February 17 (to incorporate Comp Game Design and Enterprise)
Version:	2
Have any derogations received Academic Board approval?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>

<p>Module Aims</p> <p>This module aims to introduce practical experience in working with industry standard game and media development environments as part of a small professional team. Students will develop an awareness of the agile management processes required in small size games and media projects, as well as a practical application of the media production cycle.</p>

<p>Intended Learning Outcomes</p>			
<p>Key skills for employability</p> <p>KS1 Written, oral and media communication skills</p> <p>KS2 Leadership, team working and networking skills</p> <p>KS3 Opportunity, creativity and problem solving skills</p> <p>KS4 Information technology skills and digital literacy</p> <p>KS5 Information management skills</p> <p>KS6 Research skills</p> <p>KS7 Intercultural and sustainability skills</p> <p>KS8 Career management skills</p> <p>KS9 Learning to learn (managing personal and professional development, self-management)</p> <p>KS10 Numeracy</p>			
<p>At the end of this module, students will be able to</p>		<p>Key Skills</p>	
<p>1</p>	<p>Manage and implement small scale game or media project.</p>	<p>KS1</p>	<p>KS2</p>
		<p>KS3</p>	<p>KS4</p>
		<p>KS5</p>	
<p>2</p>	<p>Identify and apply agile development methodologies as part of a team based development scenario.</p>	<p>KS1</p>	<p>KS2</p>
		<p>KS3</p>	<p>KS4</p>
		<p>KS5</p>	
<p>3</p>	<p>Engage with industry standard development environments and tools in the development of a small game or media project.</p>	<p>KS1</p>	<p>KS2</p>
		<p>KS3</p>	<p>KS4</p>
		<p>KS5</p>	
<p>Transferable skills and other attributes</p>			
<p> </p>			

<p>Derogations</p>
<p> </p>

Assessment:

Indicative Assessment

The will be two major assessment components:

The first assessment will take the form of a game or media product that will be developed in small teams.

The second component will take the form of a small portfolio of work that clearly evidences the use of SCRUM methodology as part of the completion of component 1. This should reflect individual student contributions with evidence of time and task management using a professional tool such as JiRA.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,3	Group Project	50		2000
2	1,2	Portfolio	50		2000

Learning and Teaching Strategies:

The primary skill base of this module will be delivered through a series of lectures, demonstrations and studio workshops which will equip the students with the practical means to develop small scale games and media products.

The primary teaching will revolve around the development of a central game product in small teams. This product will then be deployed on the Android or Flash systems. The students will be expected to develop an appreciation for the use of such hardware (such as tablets and smart phones) as well as underpin their development process with a recognized methodology such as SCRUM.

Syllabus outline:

Agile development methodologies – SCRUM.

Team based development.

Effective brainstorming, rapid application design and conceptualization.

Media production cycle.

Research, design and planning.

Game and media design principles.

Testing and quality assurance.

Development cycle and testing for smart phones and tablets.

Industry standard development environments and tools such as:

- Multimedia Fusion
- Torque2D
- Arduino
- JiRA & Agile

Bibliography:

Essential reading

Brunner, J. (2014) *Getting Started with Multimedia Fusion 2*, Packt Publishing.

England, A, Finney E. (2007) *Managing Interactive Media: Project Management for Web and Digital Media*. Addison Wesley, 4th Ed.

Rubin, K. (2012) *Essential Scrum: A Practical Guide to the Most Popular Agile Process*, Packt Publishing. Addison Wesley, 1st Ed.

Other indicative reading

MODULE SPECIFICATION PROFORMA

Module Title:	Computer Systems	Level:	4	Credit Value:	20
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Module code:	COM424	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	G420
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Dr Stuart Cunningham
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Scheduled learning and teaching hours	72 hrs
Guided independent study	128 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
HNC Computing	✓	<input type="checkbox"/>
HND Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 3

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

This module aims to provide students with experience and understanding of the core technology and architecture associated with computer systems.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

		Key Skills	
1	Describe the major sub-systems components and operation computer systems.	KS1	KS5
2	Describe the components of a modern operating system, using real operating systems to provide examples.	KS1	KS3
		KS5	
3	Discuss the interaction between the hardware, the operating system, the application software and the user of a modern computer system.	KS1	KS3
		KS5	
4	Discuss different architecture for different computer technologies	KS1	KS5
		KS3	

Transferable skills and other attributes

Derogations

N/A

Assessment:

Indicative Assessment

The module features two assessment components: The first requires students to explore and describe a historical or contemporary piece of computing technology, be it hardware or software, and provide a detailed account of its underpinning mechanisms and operations; the second component will be a closed-book class test, normally facilitated electronically via the University's VLE.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3,4	Coursework	50		3000
2	1,2,3,4	In-class test	50	1.5 hrs	

Learning and Teaching Strategies:

The module will be delivered through a combination of formal lectures, tutorials, practical demonstrations and student labs. All material delivered formally will be available through the Internet in addition to its classroom use. Students will have access to state-of-the-art computing laboratories for practical work with hardware and software elements.

Syllabus outline:

- Computer architecture
- Binary, hexadecimal and computer arithmetic
- Logic gate application
- Processors
- Memory
- Selection and Evaluation
- Configuration Management
- Peripherals
- Interfaces
- Concurrent processes
- Operating systems
- Networks

Bibliography:

Essential reading

Null, L; Lobur, J (2014). Computer Organization and Architecture. 4th ed. Burlington: Jones and Bartlett.

Other indicative reading:

Links to resources related to current technology will be made available in the University VLE

Other indicative reading

MODULE SPECIFICATION PROFORMA

Module Title:	Professional Development in Computing: Information Engineering	Level:	4	Credit Value:	20
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Module code:	COM427	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	1420
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Denise Oram
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Scheduled learning and teaching hours	72 hrs
Guided independent study	128 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
HND Computing	✓	<input type="checkbox"/>
HNC Computing	✓	<input type="checkbox"/>
BA (Hons) Business Management and IT – NPTC	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 3

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

The module aims to introduce students to professional development within the discipline of Computing. To gain an understanding of the science of information, information engineering and the principles of requirements determination and documentation.

The module will introduce concepts of analysis and design and a range of methodologies to enable the student to appreciate the nature of information and its role in the system design, development and implementation process.

Students will also develop a professional approach to practice and evaluate the impact of systems design and development on Society and identify how these systems can be designed to consider professional, legal, ethical and sustainability issues.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Research and appraise professional skills related to Computing and develop a professional approach to practice.	KS2	KS4
		KS6	KS7
		KS8	KS9
2	Provide a range of evidence to demonstrate ongoing development and achievement within the field of Computing.	KS1	KS5
		KS6	
3	Appreciate and assess the concepts of information engineering and system requirements.	KS1	KS2
		KS3	KS5
		KS6	
4		KS1	KS2

MODULE SPECIFICATION PROFORMA

	Examine a range of tools, techniques, knowledge and technologies in the development of computing applications.	KS3	KS5
5	Evaluate the impact of systems design and development in Society.	KS1	KS2
		KS3	KS7
Transferable skills and other attributes			

Derogations

N/A

Assessment:

Indicative Assessment

The development of a Portfolio whereby students will be given assessment topics through tutorials and case study based coursework (a number of tasks as formative assessment individually graded) to contribute to the portfolio.

Example: a group project using a consulting case study and presentation.

An individual critical reflection on the systems design and development process and professional approach to practice.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3,4,5	Portfolio	100		3000

Learning and Teaching Strategies:

Lectures will be used to deliver key concepts, ideas, theories and examples. Tutorials and workshops will allow the further exploration of the lectures and use scenarios, exercises, case studies etc. to give students the opportunity to investigate, discuss and acquire further subject specific knowledge through individual and group work.

Self-study exercises and reading will also be given.

All assessments for the module will allow students the opportunity to explore key concepts and theories whilst developing an appreciation of 'real-life' issues and situations.

Syllabus outline:

- Professionalism within the discipline of Computing and professional approach to practice
- The science of information and computing systems

- Information engineering and requirements determination processes
- Analysis and design
- Development methodologies
- Modeling techniques
- Systems design and development process
- System Implementation, support and security
- The impact of new technologies on computing applications and society
- Professionalism and social responsibility – Ethical, social, sustainability, political aspects; usability, security, accountability.

Bibliography:

Essential reading

Other indicative reading

Reynolds. G. (2014) *Principles of Information Systems, International Edition*. Cengage Learning
 Rubin, K. (2012) *Essential Scrum: A Practical Guide to the Most Popular Agile Process*, Packt Publishing. Addison Wesley, 1st Ed.
 Sommerville, I. (2006), *Software Engineering*, 8/Ed. Addison Wesley
 Avison, D and Fitzgerald G (2006) *Information Systems Development: Methodologies, techniques and tools* (4th Ed.). McGraw Hill
 Electronic Resources: via Moodle

ACM www.acm.org
 BCS www.bcs.org.uk
 IEEE www.ieee.org

MODULE SPECIFICATION PROFORMA

Module Title:	Introduction to Management and Organisation	Level:	4	Credit Value:	20
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Module code:	BUS446	Is this a new module?	Yes	Code of module being replaced:	n/a
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Cost Centre:	GAMG	JACS3 code:	N100
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Trimester(s) in which to be offered:	2	With effect from:	September 17
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School:	Business	Module Leader:	Kelvin Leong
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Scheduled learning and teaching hours	30hrs
Guided independent study	170hrs
Placement	0hrs
Module duration (total hours)	200hrs

Programme(s) in which to be offered	Core	Option
BA (Hons) in Performance and People Management	✓	<input type="checkbox"/>
BSc (Hons) in Business Decision Making	<input type="checkbox"/>	✓
BA (Hons) Business Development Management	✓	<input type="checkbox"/>
BSc (Hons) Computer Games Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval: February 17

Date of revision: *Enter date of approval*

Have any derogations received SQC approval?

Version 1

N/A

Module Aims

The aim of this module is to provide an introduction to business, management and organisations. Organisations are key to the way in which we organise society, and a study of organisations is central to developing an understanding not only of business and management, but of many other aspects of our lives. The module explores the context of business, the organisation of work and nature of management.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Describe and discuss the nature, characteristics, advantages and disadvantages of different types of business and organisational structure.	KS1	
		KS3	
		KS6	
2	Explain the concepts and importance of business functions and value chain.	KS1	
		KS3	
		KS6	
3	Understand and apply organizational theories.	KS1	KS6
		KS2	
		KS5	
4	Understand and apply management theories.	KS1	KS6
		KS2	
		KS5	
5	Analyse the competitive environment in which organizations operate.	KS1	KS6
		KS2	

MODULE SPECIFICATION PROFORMA

		KS5	
6	Explain the concepts and theories of strategic management.	KS1	KS6
		KS2	
		KS5	
Transferable/key skills and other attributes			

Derogations

N/A

Assessment:

Assessment 1 requires students to undertake a piece of research into relevant issues within organizational theories and practices.

Assessment 2 requires students to undertake a piece of research into relevant issues within management theories and practices.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Essay	50%		2000
2	4,5,6	Essay	50%		2000

Learning and Teaching Strategies:

According to the learning outcomes, lectures will allow concepts, theories and principles to be outlined. Tutorials and activity-based sessions will provide further use of real world business examples in applying relevant concepts, theories and principles into practice. In addition, students will be encouraged to undertake self-directed study and further research on selected topics to acquire additional perspectives which will provide them with a deeper understanding of the topics covered.

Syllabus outline:

1. Introduction to business
2. Types of organisation structures
3. Entrepreneurship
4. Business functions and value chain
5. Management and leadership
6. Organisational Behaviour
7. Business and the environment
8. Strategic management

Bibliography:

Essential reading

Textbooks:

Mullins, L.J. (2013) *Management and Organisational Behaviour*, 9th edition. Essex, UK: Pearson Education.

Boddy, D. (2011) *Management: an introduction*, 5th edition. Harlow: Pearson Education.

Other indicative reading

Textbooks:

Robbins, S., Judge, T. and Campbell, T. (2010) *Organizational Behaviour*, Harlow, UK: Pearson Education.

Slack, N., Brandon-Jones, A. and Johnston, R. (2011) *Essentials of Operations Management*, Essex: Financial Times Prentice Hall.

Clegg, S. Kornberger, M. and Pitsis, T. (2008) *Managing and Organizations: An Introduction to Theory and Practice*, 2nd edition, London: Sage Publishing.

Journals

Journal of Organizational Behaviour

Journal of Management

Journal of Management and Organisation

Strategic Management Journal

MODULE SPECIFICATION PROFORMA

Module Title:	Digital Distribution Technology	Level:	5	Credit Value:	20
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Module code:	COM535	Is this a new module?	Yes	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I161
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Richard Hebblewhite
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Design & Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval: February 17

Date of revision: *Enter date of approval*

Have any derogations received SQC approval?

Version: 1

Yes No N/A

Module Aims

This module aims to develop students' awareness of the key technologies and practises involved in the distribution, publication and maintenance of modern games, media and other forms of digital content.

Students will build knowledge of the design architecture of modern distribution platforms, along with an understanding of legal, ethical and business issues pertaining to their use. The module also aims to provide students with the opportunity to examine the submission procedures and standards associated with digital publication systems, in addition to the analysis of their impact on the industry.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

1	Develop knowledge and practice of the submission standards and procedures used by modern digital publication and distribution platforms.	KS3	
2	Demonstrate a critical awareness of the systems, tools and technologies relating to modern digital publication.	KS4	
3	Critically analyse the impact and effectiveness of digital distribution and publication systems, and the legal, ethical and business issues associated with them.	KS1	KS6

Derogations

N/A

Assessment:

The module will be assessed by way of two distinct pieces of coursework.

Assignment 1:

Students will be required to produce a report that critically evaluates effectiveness of a modern digital distribution platform of their choice. The report will assess the business strategy, technical architecture and range of services offered with respect to legal, ethical and consumer impact. The report should also give some consideration as to the likely evolution of such platforms in the future.

Assignment 2:

Students will conduct a detailed investigation into the submission standards and procedures and guidelines associated with a modern digital distribution platform of their choice. Based on their findings, students will then devise a product design, submission and test strategy to ensure the compliancy and fitness for purpose of a suitable digital prototype application.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2	Coursework	50		2000
2	3	Coursework	50		2000

Learning and Teaching Strategies:

Lectures, supported by tutorial sessions where students get the opportunity to conduct case studies and guided technical research in order to underpin their theoretical knowledge.

The lectures will focus on presenting key topics and concepts, whereas the tutorial based learning will provide directed training in industry standard platforms and tools associated with the publication and distribution of modern applications.

As the module progresses, students will be supported by way of supervised lab support during the investigation and analysis phase of the coursework.

Formative, self-directed exercises will be used to support transfer of knowledge and understanding. The Moodle VLE system will form the primary platform for the dissemination of training videos, tutorials, lecture notes and reading material. Assessment material and supporting documentation will also be made available.

Syllabus outline:

Digital Distribution Systems

- Architecture
- Legal, Ethical & Social Issues
- Services
- Business Processes

E-Business

Publishing Chains

Digital Rights Management (DRM)

In-App Purchasing Models

Submission Standards & Procedures

- Apple
- Android
- Steam/Greenlight

Publication Data & Support

- Managing and Tracking Data
- Managing DLC and Patches

Bibliography:

Essential reading

Evans, N.D. (2017) *Mastering Digital Business: How powerful combinations of disruptive technologies are enabling the next wave of digital transformation*. BCS.

Other indicative reading

Barker, D. (2015) *Web Content Management: Systems, Features, and Best Practices*, O'Reilly Media, Beijing ; Boston.

Chaffey, D. (2014) *Digital Business and E-Commerce Management*, 6th edition. Pearson.

Collins, C. Galpin, M. Kaeppler, M. (2011) *Android in Practice*, Manning Publications, Shelter Island, NY.

Nagle, D. (2014) *HTML5 Game Engines: App Development and Distribution*. A K Peters/CRC Press, Boca Raton.

Professional Body Websites:

UK Interactive Entertainment (UKIE): <http://ukie.org.uk/>

International Game Developers Association (IGDA): <https://www.igda.org/>

Creative Skillset: <https://creativeskillset.org/>

The British Computer Society (BCS): <http://www.bcs.org/>

MODULE SPECIFICATION PROFORMA

Module Title:	3D Modelling and Animation	Level:	4	Credit Value:	20
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Module code:	COM505	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I700
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Creative Computing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Informatics	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HND Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 2

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

This module will introduce the student to the design, modelling and animation techniques used in the production of 3D assets for use within computer games, simulations, immersive environments and other forms of real-time applications.

This module aims to:

- Introduce students to fundamental development practices in the development, management and utilisation of 3D models and animation techniques.
- Provide students with knowledge of specific toolsets within industry leading applications related to the creation and modification of 3D assets.
- Encourage students to develop skills that promote problem-solving abilities to overcome challenges in the creation of 3D related components and their application into different environments.
- Familiarisation of design and animation practices associated to the creation of multiple model types that can be used in conjunction for the creation of scenes with greater complexity.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to		Key Skills	
1	Employ conventional 3D graphic development techniques for the creation of assets that adhere to industry standard practices.	KS1	KS2
		KS3	KS4
		KS5	
2	Differentiate between approaches used for the production of linear (pre-rendered) and dynamic (real-time) content.	KS1	KS2
		KS3	KS4
		KS5	
3	Identify methods that enhance assets through the implementation of multiple media resource types.	KS1	KS2
		KS3	KS4

		KS5	
Transferable skills and other attributes			

Derogations
N/A

Assessment:					
Indicative Assessment					
<p>Assessment will take form as an online reflective journal (blog) of which work will be organised to present a series of briefs chronologically. The reflective journal will serve as part of the student’s personal development towards a portfolio that will also be used in conjunction with other modules.</p> <p>Students will be provided a series of briefs, each one related to specific components taught in the module. Collectively these will provide a breakdown of the areas covered in class and evidenced in the reflective journal.</p> <p>Early briefs will be short and designed to include tasks to substantiate student learning and provide opportunities to assess their competency. As each session progresses the briefs are adapted to encourage opportunities to apply knowledge from across the module and promote the investigation of new approaches and learning outside of the classroom. Deadlines will be fragmented and dependant on the type of brief, imposing varying time frames to evidence efficient management.</p> <p>On occasions briefs will require completion as an individual or team member and provide opportunities to choose from a number of potential solutions. This has been implemented to allow students the ability to specialise in specific areas of 3D development.</p> <p>Work can be assessed concurrently with progression of the module and opportunities provided for feedback as well as offering the potential for students to develop areas further. To finalise the assessment, students will be asked to attend a meeting where they will be given the opportunity to demonstrate work and discuss the processes adopted. This permits the opportunity to provide indicative grades and further feedback once the module has completed.</p>					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Coursework	100		4000

Learning and Teaching Strategies:

This module is supported through a series of practical sessions that are deployed as classroom demonstrations. The module is delivered both by the tutor and through electronic learning resources; demonstrations are recorded and delivered as video tutorials for reference after.

The module is designed to introduce students to the fundamental aspects of 3D development and encourage the resolution of problematic scenarios through the application of solutions devised from knowledge acquired from class sessions; this will be applied as individuals and teams.

Each session will introduce students to a core component of 3D development and encourage application of their knowledge through a series of briefs that introduces a specific problem scenario that requires skills acquired from class sessions.

Progression will dictate the formulation of the briefs, allowing more complex scenarios as the sessions advance and incorporate the application of knowledge from previous ones. To promote the student's learning outside of the classroom each brief will provide scope to apply solutions that can be determined from additional study, found in the recommended reading and online resources associated to the module.

Syllabus outline:

- Project management techniques
- File hierarchy dependencies
- Design practices and topology
- Basic modelling approaches
- Characters development
- Environment design
- Texture application
- Media management
- Rigging and animation
- Asset optimisation
- Rendering and implementation techniques

Bibliography:
Essential reading
<p>Derakhshani, D. (2013) <i>Introducing Autodesk Maya 2014</i>, John Wiley & Sons.</p> <p>Ingrassia, M. (2009) <i>Maya for games modelling and texturing techniques with Maya and Mudbox</i>, Focal Press/Elsevier, Amsterdam; Boston.</p> <p>Lanier, L. (2007) <i>Maya professional tips and techniques</i>, Wiley Pub., Indianapolis, Ind.</p> <p>Watkins, A. (2012) <i>Getting started in 3D with Maya create a project from start to finish: model, texture, rig, animate, and render in Maya</i> Focal Press, Waltham, MA.</p>
Other indicative reading
<p>Palamar, T. (2013) <i>Mastering Autodesk Maya 2014</i>, John Wiley & Sons, Inc., Indianapolis. Indiana.</p> <p>Roland, J. Patel, S. (2012) <i>Mudbox 2013 cookbook</i>, Packt Pub., Birmingham.</p>

MODULE SPECIFICATION PROFORMA

Module Title:	Serious Games Technology	Level:	4	Credit Value:	20
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Module code:	COM522	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I710
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computer Game Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Informatics	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HND Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 2

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

Computer games have an inherent ability to motivate, engage and inspire. Whilst they have been extremely successful within the leisure industry, game technology now underpins a variety of systems in other industries. This module examines the field of serious games, builds knowledge in the application and development of this technology including the key challenges involved in such projects.

This module aims to:

- Demonstrate the versatility and sophistication of game engines to provide innovative solutions within a range of industries.
- Application of programming techniques to create dynamic content through coding or visual scripting.
- Provide students with the knowledge to integrate hardware and software solutions for bespoke interactive content within immersive environments.
- Introduction of flexible electronic prototyping applications.
- Familiarisation into the ethical considerations related to serious games.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Demonstrate knowledge of current and emerging developments in the application of serious games technology.	KS1	KS3
		KS4	KS5
2	Examine current industry trends and identify problems that may be solved using serious games development techniques.	KS1	KS3
		KS4	KS5
3	Design and develop solutions for serious games related issues.	KS1	KS3
		KS4	KS5

MODULE SPECIFICATION PROFORMA

		KS10	
Transferable skills and other attributes			

Derogations
N/A

Assessment:					
Indicative Assessment					
<p>The assessment for this module specifically looks at the application of serious games and innovative uses of technology to provide unique learning/business/training solutions. Progression is managed through the use of online resources, such as a reflective journal (blog) and development of physical/simulated prototypes supported through the completion of learning packs.</p> <p>Students will be provided a series of small scale scenarios across a range of industries (for example, health, entertainment, military and business). It is the task of the student to identify the problem, constraints, and considerations relating to these and implement a solution through the application of serious game technology. Scenarios provided may require tasks to be completed as an individual or team.</p> <p>Work can be assessed concurrently with the progression of the module and opportunities provided for feedback as well as offering the potential for students to develop areas further. To finalise the assessment, students will be asked to attend a meeting where they will be required to demonstrate work and discuss the processes adopted. This permits the opportunity to provide indicative grades and further feedback once the module has completed.</p>					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2	Coursework	50		2000
2	1,3	Coursework	50		2000

Learning and Teaching Strategies:
<p>The primary skill base of this module will be delivered through a series of lectures, demonstrations and studio workshops which will equip the students with the practical means to comprehend the principles guiding serious game design and associated technologies.</p> <p>Sessions will build upon different aspects of technology associated to serious games and opportunities to deploy these will be implemented as classroom activities. The module is delivered both by the tutor and through electronic learning packs; that provide coding examples, demonstrations and mini-projects that exhibit the versatility of dynamic environments and the application of hardware to provide unique interactive solutions.</p>

The module is designed to introduce students to aspects of dynamic immersive environments (simulation) and provide experience through the completion of problematic scenarios which promote the investigation and application of innovative solutions. Development towards these is supported through class demonstrations and guided examples. Programming opportunities are inevitable in order to support dynamic scenarios, and can be deployed through coding or those reluctant to this, visual scripting.

Progression through the module will dictate the formulation of the learning packs, allowing more complex solutions as the sessions advance, incorporating knowledge across all those completed. To promote the student's learning outside of the classroom each learning pack will provide scope to apply solutions provided from additional study, found in recommended reading and associated online resources.

Syllabus outline:

- Game engine utilisation (Unreal, UDK, Unity, Torque)
- Flexible electronic prototype development (e.g. Arduino, Raspberry Pi)
- Immersive hardware: Oculus Rift and Full-Dome utilisation
- Programming approaches: Coding (e.g. C, C++, C#, JavaScript) and/or Visual Scripting (e.g. Kismet, Blueprint)
- Simulation design
- Ethical considerations into serious game deployment

Bibliography:

Essential reading

Boinodiris, P. Fingar, P. (2014) *Serious games for business: using gamification to fully engage customers, employees and partners*. Meghan-Kiffer Press, Tampa, Florida.

Cannon-Bowers, J. Bowers, C. (2010) *Serious Game Design and Development*. Information Science Reference (Isr).

McRoberts, M. (2010). *Beginning Arduino*. Apress, New York.

MODULE SPECIFICATION PROFORMA

Module Title:	Group Project Design	Level:	4	Credit Value:	20
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Module code:	COM529	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I100
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	30 hrs
Guided independent study	170 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
BSc (Hons) Informatics	✓	<input type="checkbox"/>
BA (Hons) Business Management and IT - NPTC	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 3

Have any derogations received Academic Board approval?

Yes No N/A

<p>Module Aims</p> <p>The module aims to provide students with project management techniques, skills, professional and ethical issues of management, which are directly applicable to a group development project. The specific objectives of the group project are that the students learn to organise, communicate and report on a piece of work over a period of several months with emphasis on the documenting and managing the design, development and deployment of a digital product.</p>
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<p>Intended Learning Outcomes</p>			
<p>Key skills for employability</p> <p>KS1 Written, oral and media communication skills</p> <p>KS2 Leadership, team working and networking skills</p> <p>KS3 Opportunity, creativity and problem solving skills</p> <p>KS4 Information technology skills and digital literacy</p> <p>KS5 Information management skills</p> <p>KS6 Research skills</p> <p>KS7 Intercultural and sustainability skills</p> <p>KS8 Career management skills</p> <p>KS9 Learning to learn (managing personal and professional development, self-management)</p> <p>KS10 Numeracy</p>			
<p>At the end of this module, students will be able to</p>		<p>Key Skills</p>	
1	<p>Work within a team to design solutions for current computing related issues.</p>	KS1	KS2
		KS8	
2	<p>Identify and apply appropriate development methodologies as part of a team based development scenario.</p>	KS5	KS6
3	<p>Consider legal, ethical and professional issues that are appropriate to modern professional developer environments.</p>	KS1	KS7
<p>Transferable skills and other attributes</p>			
<p> </p>			

<p>Derogations</p>

N/A

Assessment:

Indicative Assessment

Assessment will be based on the quality of group design documentation which will be broken down into specific elements such as: requirements gathering, feasibility and market research, evidence of professional conduct and methodology and oral presentation/demonstration or interview used to assess effort, contribution and ability. Students will be assessed individually, although they will be working together in a group project.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Group Project	100		4000

Learning and Teaching Strategies:

Students work in groups and will design and develop a project plan around a computing problem. The groups are self-managed, although the supervisor provides help and advice both on scientific and on management and organizational issues. The problem to be tackled is a real computing problem. The students are expected to document their specification into a design with interim deliverables appropriate to accepted System/ Software Engineering practice. Students work from a briefing on the problem by a client, which may be a real client. The planning and management of the work to address the problem is part of the assessed outcomes. The available project topics vary from year to year depending on the availability of supervisors and clients.

Syllabus outline:

There is no specific syllabus for this module as the module focuses on exploring an idea from conception through to realisation. Nonetheless, elements of the project process are covered in a lecture series at the start of the academic year.

The lectures will include design and development methodologies and will look to develop practical leadership and team working skills, within the rapidly changing working environment. Students will consider how some of the leadership theories and models can be applied to specific situations and how leadership skills can be developed. The intended outcomes will enhance the ability of the student to motivate individuals and maximize the contributions that teams can make within a project management work place.

Bibliography:

Other indicative reading

Texts are recommended for specific projects as appropriate, depending on the nature of the project.

Dawson, Christian W. (2005) *The Essence of Computing Projects: a Student's Guide* Harlow: Prentice Hall

Sharp, John A., Peters, John & Howard, Keith. (2002) *The Management of a Student Research Project* (3rd edn). Aldershot: Gower

Turk, Christopher & Kirkman, John. (1989) *Effective Writing: Improving Scientific, Technical and Business Communication* (2nd edn). London: E & FN Spon

MODULE SPECIFICATION PROFORMA

Module Title:	Group Project Implementation	Level:	4	Credit Value:	20
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Module code:	COM530	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I100
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	John Worden
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Scheduled learning and teaching hours	30 hrs
Guided independent study	170 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
BSc (Hons) Informatics	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise) Version: 2
Have any derogations received Academic Board approval? Yes No N/A

Module Aims

The module aims to provide students with important practical experience of dealing with implementation issues which are directly applicable to a group development project. The specific objectives of the group project are that the students learn to organise, communicate and effectively coordinate work over a period of several months with emphasis on the practicalities of development and deployment of a digital product.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

		Key Skills	
1	Work within a team to develop, test and deploy a digital product.	KS1	KS2
		KS3	KS4
		KS5	
2	Apply and monitor appropriate development methodologies as part of a team based development scenario.	KS4	KS5
3	Evaluate the technical and professional management factors associated with team based development projects.	KS8	KS9

Transferable skills and other attributes

Derogations

N/A

Assessment:

Indicative Assessment

Assessment will be based on the quality of the final product and its associated technical demonstration. An oral presentation/demonstration or interview used to assess effort, contribution and ability. Students will be assessed individually, although they will be working together in a group project.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Group Project	100		4000

Learning and Teaching Strategies:

Students work in groups and will develop a solution based on their project plan. The groups are self-managed, although the supervisor provides help and advice both on scientific and on management and organizational issues. The problem to be tackled is a real computing problem. The students are expected to implement their specification adhering to specified interim deliverables. Students work from a briefing on the problem by a client, which may be a real client. The planning and management of the work to address the problem is part of the assessed outcomes. The available project topics vary from year to year depending on the availability of supervisors and clients.

Syllabus outline:

There is no specific syllabus for this module as the module focuses on exploring an idea from conception through to realisation. Nonetheless, elements of the project process are covered in a lecture series at the start of the academic year.

The lectures will include design and development methodologies and will look to develop practical leadership and team working skills, within the rapidly changing working environment. Students will consider how some of the leadership theories and models can be applied to specific situations and how leadership skills can be developed. The intended outcomes will enhance the ability of the student to motivate individuals and maximize the contributions that teams can make within a project management work place.

In addition, Students will gain additional programming related skills in relation to their specific project problem.

Bibliography:

Other indicative reading

Texts are recommended for specific projects as appropriate, depending on the nature of the project.

Dawson, Christian W. (2005) *The Essence of Computing Projects: a Student's Guide* Harlow: Prentice Hall

Sharp, John A., Peters, John & Howard, Keith. (2002) *The Management of a Student Research Project* (3rd edn). Aldershot: Gower

Turk, Christopher & Kirkman, John. (1989) *Effective Writing: Improving Scientific, Technical and Business Communication* (2nd edn). London: E & FN Spon

MODULE SPECIFICATION PROFORMA

Module Title:	Innovation Commercialisation	Level:	5	Credit Value:	20
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Module code:	BUS569	Is this a new module?	Yes	Code of module being replaced:	N/A
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Cost Centre:	GAMG	JACS3 code:	N212
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Trimester(s) in which to be offered:	2	With effect from:	September 17
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School:	Business	Module Leader:	Anna SUNG
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Scheduled learning and teaching hours	30hrs
Guided independent study	170hrs
Placement	0hrs
Module duration (total hours)	200hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) in Financial Technology Management	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BA (Hons) Retail Management	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval February 17

Date of revision *Enter date of approval*

Have any derogations received SQC approval?

Version 1

N/A

Module Aims

To provide an environment which encourages the entrepreneurial aspirations of students to undertake research and commercialise innovative products and services by providing an insight into a range of tools, frameworks and mechanisms that support the process of effective innovation commercialization.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Identify the business value of innovation and manage an innovation project.	KS1	KS4
		KS2	KS5
		KS3	KS6
2	Plan, implement, and control the marketing research activities of an innovation project at an operational level.	KS1	KS4
		KS2	KS5
		KS3	KS6, KS10
3	Recognise the implications of cost, price and quality during the innovation commercialization.	KS1	KS4
		KS2	KS5
		KS3	KS6, KS10
4	Design, evaluate and implement different operational plans to commercialise innovation project.	KS1	KS4
		KS2	KS5
		KS3	KS6, KS10

Derogations

N/A

Assessment:

Assessments 1 requests students to prepare an individual report that identifies the value of their proposed innovations and applies marketing analysis to position their innovations. A key component of the assessment will be the interpretation and insight gained from conducting the analysis.

Assessments 2 requests students to prepare an individual report that applies financial analysis to prepare budgets for their innovations and suggests operational plans. A key component of the assessment will be the interpretation and insight gained from conducting the analysis.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2	Report	50%		2000
2	3,4	Report	50%		2000

Learning and Teaching Strategies:

According to the learning outcomes, lectures will allow concepts, theories and principles to be outlined. Tutorials and activity-based sessions will provide further use of real world business examples in applying relevant concepts, theories and principles into practice. In addition, students will be encouraged to undertake self-directed study and further research on selected topics to acquire additional perspectives which will provide them with a deeper understanding of the topics covered.

Syllabus outline:

1. Innovation and business value
2. Commercialisation and project management
3. Research and market analysis for new project
4. Market evaluation for new project
5. Concepts of cost, price, value and quality
6. Cash flow forecasting and budgeting for new project
7. Intellectual property
8. Outsourcing

Bibliography:

Essential reading

Textbooks

Cagan, J. and Vogel, C. (2012) *Creating Breakthrough Products: Revealing the Secrets that Drive Global Innovation*, 2nd edition, Harlow: Financial Times Prentice Hall.

Other indicative reading

Textbooks

Cooper, R. (2011) *Winning at New Products, Creating Value Through Innovation*, 4th Edition., New York: Basic Books.

Kahn, K. (2012) *The PDMA Handbook of New Product Development*, 3rd edition, Chichester: Wiley.

Atrill, P. (2012) *Financial Management for Decision Makers*, 6th edition, Harlow: Financial Times Prentice Hall.

Kono, T. and Lynn, L. (2007) *Strategic New Product Development for the Global Economy*, New York: Palgrave Macmillan.

Trott, P. (2016) *Innovation Management and New Product Development*, 6th edition, Harlow: Pearson Education.

Journals

Harvard Business Review

MIS Quarterly

International Journal of Innovation Management

International Journal of Business Innovation and Research

Websites

www.innovationexcellence.com

www.pdma.org – Product Development and Management Association

MODULE SPECIFICATION PROFORMA

Module Title:	Digital Marketing and Monetisation Technology	Level:	6	Credit Value:	20
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Module code:	COM639	Is this a new module?	Yes	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I161
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Richard Hebblewhite
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc Computer Game Design & Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval: February 17

Date of revision: *Enter date of approval*

Version: 1

Have any derogations received SQC approval?

Yes No N/A

Module Aims

This module is designed to further build on students' knowledge of games, media and software design with emphasis on the tools, techniques and strategies that support the marketing and monetisation of modern applications. The module content will focus on two areas of interest; design & technology.

Design:

Students will explore various themes of modern development such as addiction design, player/user experience, psychology and modelling and the various methods by which they can be exploited to generate income or increase market presence. The legal, ethical and social issues surrounding these techniques will play an importance role.

Technology:

Students will engage with current tools and technologies that support marketing, monetisation and income generation. Crowdfunding platforms, In-app purchasing, Free-to-Play and audience engagement strategies along with tools and systems that support their development will be applied and appraised.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to		Key Skills	
1	Compare and contrast current industry trends and identify potential opportunities for the marketing and monetisation of games, media and software applications.	KS1	KS6
2	Design, develop and deploy solutions for marketing and monetisation related issues.	KS3	KS4
3	Analyse the effectiveness and impact of marketing and monetisation technologies through practical application.	KS10	KS5

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Derogations

N/A

Assessment:

The module will be assessed by way of two distinct pieces of coursework.

During the initial stage of the first assignment, the students will be asked to produce a research report that takes into account current trends and practices regarding the use of marketing and monetisation strategies with respect to modern games, media and software applications. Based on their findings, students will progress to the second stage of the assignment and formulate a design for a game/app along with a full Kickstarter, social media and monetisation strategy. The aim will be to create an “Apprentice” styled exercise aimed at attempting to generate the largest digital marketing footprint possible.

The second piece of coursework will focus on the analysis of the previous campaign. Students will be expected to collate and critically analyse the results of their strategy and decision making processes in terms of the tools, technologies and methods employed. The students will also be expected to provide an overview of this report in a formal presentation.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2	Coursework	50		2000
2	3	Coursework	50		2000

Learning and Teaching Strategies:

Lectures, supported by tutorials and practical sessions where students get the opportunity to put theory into practice and experiment with current techniques and related technology.

The lectures will focus on presenting key topics and concepts, whereas the practical/tutorial based learning will be delivered through tutor supported workshop sessions where students will receive technical support along with advice and guidance in terms of their coursework.

As the module progresses, the workshop sessions will become more important as students develop and deploy their ideas.

Formative, self-directed exercises will be used to support transfer of knowledge and understanding. The Moodle VLE system will form the primary platform for the dissemination of training videos, tutorials, lecture notes and reading material. Assessment material and supporting documentation will also be made available.

Syllabus outline:

Digital Marketing

- Viral Marketing
- Market Awareness & Analysis

Social Media Tools & Techniques

- Trends & Statistics
- Engagements & Impressions
- Audience Engagement
- Content Management & User Messaging Tools

User & Player Modelling

- Player & User Psychology
- Addiction Design
- Flow Theory & Strategic Balancing

Monetisation Strategies & Tools

- Crowdfunding
- Ad Revenue, Ad Placement & Design
- Pay to Win Techniques
- Tools and Platforms (ChartBoost etc.)

Legal, Ethical and Social Issues.

- Localisation Strategy
- Content Classification

Bibliography:

Essential reading

Owen, A. (2016) *A Guide to App Marketing: Take your Smartphone App Viral*. Independently published.

Other indicative reading

Berkowski, G. (2014) *How to Build a Billion Dollar App: Discover the secrets of the most successful entrepreneurs of our time*. Piatkus, London.

Kitchen, M.T., Ivanescu, Y. (2015) *Profitable Social Media Marketing: How To Grow Your Business Using Facebook, Twitter, Instagram, LinkedIn And More*, 2nd ed. CreateSpace Independent Publishing Platform.

Lund, P. (2011) *Massively Networked: How the Convergence of Social Media and Technology Is Changing Your Life*. Pli Media, San Francisco.

Rogers, S. (2014) *Level Up!: The Guide to Great Video Game Design*, 2nd ed. John Wiley & Sons, Hoboken.

Professional Body Websites:

UK Interactive Entertainment (UKIE): <http://ukie.org.uk/>

International Game Developers Association (IGDA): <https://www.igda.org/>

Creative Skillset: <https://creativeskillset.org/>

The British Computer Society (BCS): <http://www.bcs.org/>

MODULE SPECIFICATION PROFORMA

Module Title:	21 st Century Computing	Level:	4	Credit Value:	20
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Module code:	COM623	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I100
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Professor Vic Grout
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
BSc (Hons) Informatics	✓	<input type="checkbox"/>
BA (Hons) Business Management and IT – NPTC	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

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MODULE SPECIFICATION PROFORMA

Initial approval: September 14
Date of revision: February 17 (to incorporate Comp Game Design and Enterprise) Version: 3
Have any derogations received Academic Board approval? Yes No N/A

Module Aims

The aim of the module, always to be scheduled as close to the end of the overall programme as possible, is to allow students to identify, critically examine and debate a range of current and future technical and social issues in computing and technology and, in so doing, develop a critical awareness of the impact of current and emerging technology. It will enable students to gain a broad general knowledge of some current research areas in computing and their application in industry, commerce and further afield. In a general sense, the module will introduce students to the field of 'Futurology'. Both the emphasis on *looking ahead* and the clear balance between technological advancement and social implications are essential features of the module.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to		Key Skills	
1	Identify, critically analyse, and debate current and future issues in computing from both a technical and social perspective.	KS1	KS2
		KS5	KS6
		KS7	KS8
		KS9	
2	Assess emergent technologies at various stages of development.	KS1	KS2
		KS5	KS6
		KS7	KS8
		KS9	
3	Synthesise conflicting opinions on emergent and future technologies.	KS1	KS2
		KS5	KS6
		KS7	KS8

MODULE SPECIFICATION PROFORMA

		KS9	
4	Debate and make informed predictions regarding the directions taken by various aspects of computer technologies and their application and impact in the short, medium and long-term future.	KS1	KS2
		KS5	KS6
		KS7	KS8
		KS9	
Transferable skills and other attributes			

Derogations
N/A

Assessment:					
Indicative Assessment					
<p>There will be a single assignment, with two components, which asks students to conduct an in-depth investigation into a topic within the broad scope of <i>Emerging Computing Technology</i>, and to prepare a group presentation and individual report. Students will, in small groups, choose or be otherwise allocated a topic within the broad scope of <i>Emerging Computing Technology</i>. They will prepare and deliver a 30-40 minute group presentation to the rest of the class and other staff on this topic then, individually, submit a 3,000–3,500 word paper on the topic, possibly on a particular subject/field within it, if they wish. The emphasis throughout will be on the <i>future</i> development of the subject and well-grounded speculation is encouraged. The group element of the assessment will be worth 30% of the overall module mark and the individual report 70%.</p>					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1 (group)	1,2,3,4	Presentation	30	30-40 mins	
2 (ind.)	1,2,3,4	Report	70		3000-3500

Learning and Teaching Strategies:
<p>The module will be delivered through a combination of staff ‘keynotes’, formal lectures, tutorials, practical demonstrations and student labs. Use will be made of the University VLE to direct students to further reading, particularly to introduce students to current issues and topics that arise as the module progresses. Students will also be given reading lists and useful URLs to develop their work on the module. A key element in the learning process will be the independent study component. Industrial contacts will be used wherever possible to strengthen and validate key topics.</p>

Syllabus outline:

The purpose of this module, at level six, is to provide students with a thorough and up-to-date knowledge of current trends in computing and to reinforce this where possible with the involvement of staff 'keynotes' and local industry. By definition the syllabus will be reviewed regularly but the focus for students will always be how to identify and critically analyse current issues in computing and be able to put developed arguments supporting and refuting issues, otherwise known as 'Futurology'.

The syllabus will naturally be reviewed on a regular (probably twice-yearly) basis with redundant material being discarded and new introduced in its place. Typical content, based on current directions, could include:

- The 'Internet of Things'
- Social implications of emerging technology
- Computers and the Environment/Green IT and environmental computing
- Computer Forensics
- Accessibility and Usability
- Optical, Quantum or Biological Computing
- Parallel and Grid Computing
- Interactive Television
- Intelligence in Future Imaging Technology
- Robotics
- Human-Computer Interaction/Evolving interfaces
- Ethics, privacy, etc.,
- Health and safety
- Security and threats
- Political aspects of technology
- Ethical hacking
- Computing in the developing world
- Philosophical principles/Computational philosophy
- Technology adoption
- New aspects of Computer Storage
- New Developments in CPU/Architecture
- New Platforms
- Radio Frequency Identification (RFID) and other technologies

Bibliography:

Essential reading

The British Computer Society (BCS), <http://www.bcs.org.uk>

The Institution of Engineering and Technology (IET), <http://www.theiet.org>

The Institute of Electrical and Electronic Engineers (IEEE), www.ieee.org

IEEE Computer and Communication Societies,
<http://www.computer.org> and <http://www.comsoc.org/>

The Association of Computing Machinery (ACM), <http://www.acm.org>

Media Technology websites such as the BBC, <http://www.bbc.co.uk/news/technology/>

Other indicative reading

N/A

Module Title:	Project	Level:	4	Credit Value:	20
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Module code:	COM625	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I100
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Professor Vic Grout
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Scheduled learning and teaching hours	20 hrs
Guided independent study	380 hrs
Placement	0 hrs
Module duration (total hours)	400 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks & Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Development	✓	<input type="checkbox"/>
BSc (Hons) Creative Computing	✓	<input type="checkbox"/>
BSc (Hons) Artificial Intelligence	✓	<input type="checkbox"/>
BSc (Hons) Computing Philosophy	✓	<input type="checkbox"/>
BSc (Hons) Computer Science	✓	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	✓	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 2

Have any derogations received Academic Board approval?

Yes No N/A ✓

Module Aims

The overall purpose of the project is to prepare the students for the kind of tasks and situations they may encounter in the workplace when they graduate and find their first employment. The specific objectives of the project are that the students learn to organise, sustain and report on a substantial piece of work over a period of several months, to apply the theoretical knowledge they have learned on taught modules to a realistic problem; and to extract relevant information by themselves from manuals, books and research journals. The project also provides the student with an opportunity to specialise in an area of personal interest.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Evaluate the findings of a literature search and apply these findings to a real-world application.	KS1	KS3
		KS4	KS5
		KS6	KS7
		KS8	KS9
2	Synthesise information relevant to a specific task and pertinent to a variety of areas covered by the modules studied.	KS1	KS3
		KS4	KS5
		KS6	KS7
		KS8	KS9
3	Critically analyse and draw up reasoned conclusions based upon an existing knowledge base.	KS1	KS3
		KS4	KS5
		KS6	KS7
		KS8	KS9

MODULE SPECIFICATION PROFORMA

4	Analyse a practical problem and present a solution in the form of an artefact illustrating such reasoned conclusions.	KS1	KS3
		KS4	KS5
		KS6	KS7
		KS8	KS9
5	Present a logical, coherent written project report, and defend such a report orally if requested.	KS1	KS3
		KS4	KS5
		KS6	KS7
		KS8	KS9
Transferable skills and other attributes			

Derogations
N/A

Assessment:					
Indicative Assessment					
Assessment of the project will be based on: the literature review, poster presentation, the final report and artefact, an oral presentation/demonstration and the project tutor's assessment of individual effort, initiative and ability. Students will be assessed individually, although they may be working together in a group on a larger project.					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3,4,5	Coursework	100		12000

Learning and Teaching Strategies:
400 hours of independent study during which students work on their project and dissertation, alongside their group peers if relevant, and supported by a project supervisor. Students choose their project near the beginning of semester 1. Projects are normally selected from a list of suggestions proposed by the department, a number of which may involve industrial collaboration. Alternatively, students (or groups of students) may propose a project of their own if a suitable member of academic staff is available to act as the supervisor. In all cases the particular project must be appropriate for, and relevant to, the student's programme of study.
Support lectures will be provided throughout.

Syllabus outline:

The project consists of an extended period during which students work on a specific piece of project work and a report on this work in the form of a dissertation. Project work is undertaken individually or in a group environment. In either case, an individual dissertation must be submitted, and clarity must be provided in terms of individual contribution to the process.

The project examines the student's ability to research the literature, to understand and expand on a specific technical problem commensurate with their programme of study and relate it to other work, to carry out investigations and practical work generally including programming and describe results and draw conclusions from them and to write a coherent and well organised dissertation.

Bibliography:

Essential reading

N/A.

Other indicative reading

Indicative reading:

Dawson, Christian W. (2005) *The Essence of Computing Projects: a Student's Guide* Harlow: Prentice Hall

Sharp, John A., Peters, John & Howard, Keith. (2002) *The Management of a Student Research Project* (3rd edn). Aldershot: Gower

Turk, Christopher & Kirkman, John. (1989) *Effective Writing: Improving Scientific, Technical and Business Communication* (2nd edn). London: E & FN Spon

MODULE SPECIFICATION PROFORMA

Module Title:	Advanced 3D Modelling & Animation	Level:	4	Credit Value:	20
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Module code:	COM632	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GACP	JACS3 code:	I700
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With effect from:	September 18
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School:	Applied Science, Computing & Engineering	Module Leader:	Nathan Roberts
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Scheduled learning and teaching hours	48 hrs
Guided independent study	152 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Creative Computing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Informatics	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
N/A

Office use only

Initial approval: September 14

Date of revision: February 17 (to incorporate Comp Game Design and Enterprise)

Version: 2

Have any derogations received Academic Board approval?

Yes No N/A

Module Aims

This module will introduce the student to specialist areas within 3D development, physics simulation and scripting techniques to provide proficient production pipelines.

This module aims to:

- Incorporate dynamic special effects that utilise accurate physics simulation to incorporate environments that react naturally to their surroundings
- Application of advanced node systems to provide complex hierarchy texture maps and sophisticated use of animation
- Utilisation of technology applications that provide accurate capture and replication of real-life environments
- Familiarisation of advanced rendering techniques to provide realistic lighting solutions

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
 KS2 Leadership, team working and networking skills
 KS3 Opportunity, creativity and problem solving skills
 KS4 Information technology skills and digital literacy
 KS5 Information management skills
 KS6 Research skills
 KS7 Intercultural and sustainability skills
 KS8 Career management skills
 KS9 Learning to learn (managing personal and professional development, self-management)
 KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Design intricate 3D models and animation techniques that incorporate sophisticated production pipelines.	KS1	KS2
		KS3	KS4
		KS5	
2	Evaluate appropriate applications of physics that accurately simulate dynamic interaction within 3D environments.	KS1	KS2
		KS3	KS4
		KS5	
3	Develop mechanisms that provide efficient implementation of complex processes through automation and scripting.	KS1	KS2
		KS3	KS4
		KS5	
4		KS1	KS2

Formulate proficient rendering solutions that incorporate realistic lighting effects in both real-time and pre-rendered sequences.	KS3	KS4
	KS5	
Transferable skills and other attributes		

Derogations
N/A

Assessment:					
Indicative Assessment					
<p>Assessment will take form as an online reflective journal (blog) of which work will be organised to present a series of briefs chronologically. The reflective journal will serve as part of the student's personal development towards a portfolio that will also be used in conjunction with other modules.</p> <p>Students will be provided a series of briefs, each one related to specific components taught in the module. Collectively these will provide a breakdown of the areas covered in class and evidenced in the reflective journal.</p> <p>Early briefs will be short and designed to include tasks to substantiate student learning and provide opportunities to assess their competency. As each session progresses the briefs are adapted to encourage opportunities to apply knowledge from across the module and promote the investigation of new approaches and learning outside of the classroom. Deadlines will be fragmented and dependant on the type of brief, imposing varying time frames to evidence efficient management.</p> <p>On occasions briefs will require completion as an individual or team member and provide opportunities to choose from a number of potential solutions. This has been implemented to allow students the ability to specialise in specific areas of 3D development.</p> <p>Work can be assessed concurrently with progression of the module and opportunities provided for feedback as well as offering the potential for students to develop areas further. To finalise the assessment, students will be asked to attend a meeting where they will be given the opportunity to demonstrate work and discuss the processes adopted. This permits the opportunity to provide indicative grades and further feedback once the module has completed.</p>					
Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3,4	Coursework	100		4000

Learning and Teaching Strategies:

This module is supported through a series of practical sessions that are deployed as classroom demonstrations. The module is delivered both by the tutor and through electronic learning resources; demonstrations are recorded and delivered as video tutorials for reference after.

The module is designed to introduce students to the fundamental aspects of 3D development and encourage the resolution of problematic scenarios through the application of solutions devised from knowledge acquired from class sessions; this will be applied as individuals and teams.

Each session will introduce students to a core component of 3D development and encourage application of their knowledge through a series of briefs that introduce a specific problem scenario that requires skills acquired from class sessions.

Progression will dictate the formulation of the briefs, allowing more complex scenarios as the sessions advance and incorporate the application of knowledge from previous ones. To promote the student's learning outside of the classroom each brief will provide scope to apply solutions that can be determined from additional study, found in the recommended reading and online resources associated to the module.

Syllabus outline:

- Dynamics and physics simulation
- Kinematic modifiers
- Scripting
- Texture maps
- Motion capture, 3D scanning and synchronisation techniques
- Deformation and control mechanics
- Ray-tracing approaches and lighting effects
- Multifaceted node networks for enhanced asset creation

Bibliography:

Essential reading

Lanier, L. (2008) *Advanced Maya texturing and lighting*. Wiley Technology Pub., Hoboken, NJ.

Lanier, L. (2014) *Creating visual effects in Maya: fire, water, debris, and destruction*. Focal Press.

Mechtley, A., Trowbridge, R. (2012) *Maya Python for games and film a complete reference for the Maya Python and the Maya Python API*. Morgan Kaufmann, Waltham, MA.

Palamar, T. (2013) *Mastering Autodesk Maya 2014*, John Wiley & Sons, Inc., Indianapolis.

Other indicative reading

Ingrassia, M. (2009) *Maya for games modelling and texturing techniques with Maya and Mudbox*, Focal Press/Elsevier, Amsterdam; Boston.

Lanier, L. (2007) *Maya professional tips and techniques*, Wiley Pub., Indianapolis, Ind. Turk, Christopher & Kirkman, John. (1989) *Effective Writing: Improving Scientific, Technical and Business Communication* (2nd edn). London: E & FN Spon

MODULE SPECIFICATION PROFORMA

Module Title:	Business Sustainability and Growth	Level:	6	Credit Value:	20
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Module code:	BUS639	Is this a new module?	Yes	Code of module being replaced:	N/A
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Cost Centre:	GAMG	JACS3 code:	N211
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Trimester(s) in which to be offered:	1	With effect from:	September 17
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School:	Business	Module Leader:	Anna SUNG
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Scheduled learning and teaching hours	30hrs
Guided independent study	170hrs
Placement	0hrs
Module duration (total hours)	200hrs

Programme(s) in which to be offered	Core	Option
Bsc (Hons) in Financial Technology Management	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BA (Hons) Retail Management	<input checked="" type="checkbox"/>	<input type="checkbox"/>
BSc (Hons) Computer Game Design and Enterprise	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval February 17

Date of revision *Enter date of approval*

Have any derogations received SQC approval?

Version 1

N/A

Module Aims

In today's highly competitive environment, survival is a challenge for many businesses. Beyond survival, businesses also face considerable challenges in achieving growth. Understanding the complex influences on businesses and the alternative strategy options available, is essential for the survival, competitive advantage, financial returns and growth of enterprises. This module explores the challenges, growth options and strategies of enterprises. Students will also learn how to use different business performance measures and tools to support decision making in order to achieve business growth and development.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Understand the causes of business failure and the challenges of business survival.	KS1	
		KS3	
		KS6	
2	Discuss and critique the characteristics of the growth stages of developing a business. Critically evaluate alternative strategies and options for growth.	KS1	KS5
		KS3	KS6
		KS4	
3	Understand how different skills and approaches are required at different stages and contexts of an enterprise.	KS1	KS5
		KS3	KS6
		KS4	KS10
4	Analyse business performance. Identifying problems and identifying solutions appropriate to different situations such as; start-up, turnaround, growth, exit.	KS1	KS5
		KS3	KS6
		KS4	KS10

Derogations

N/A

Assessment:

Assessment 1 requests students to undertake a piece of research into relevant issues within business and sustainability.

Assessments 2 requests students to prepare an individual report that applies business analysis to support business growth and development. A key component of the assessment will be the interpretation and insight gained from conducting the analysis.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2	Essay	50%		2000
2	3,4	Report	50%		2000

Learning and Teaching Strategies:

According to the learning outcomes, lectures will allow concepts, theories and principles to be outlined. Tutorials and activity-based sessions will provide further use of real world business examples in applying relevant concepts, theories and principles into practice. In addition, students will be encouraged to undertake self-directed study and further research on selected topics to acquire additional perspectives which will provide them with a deeper understanding of the topics covered.

Syllabus outline:

1. Business and sustainability
2. Sustainability challenges confronting business
3. Managing sustainability
4. Business life-cycle and business growth strategies
5. Sources of finance
6. Managing business growth and capital budgeting decision
7. Business performance measurement

Bibliography:**Essential reading****Textbooks:**

Burke, G., Clarke, L., Barrow, P. and Molian, D. (2008) *Growing your business: A handbook for ambitious owner-managers*, Oxon: Routledge.

Blowfield, M. (2013) *Business and Sustainability*, Oxford: Oxford University Press.

Atrill P, (2016), *Financial Management for Decision Makers*. 7th ed. Pearson Education.

Other indicative reading**Textbooks:**

Burns, P. (2016) *Entrepreneurship & Small Business: Start-up, Growth and Maturity*. 4th ed. Basingstoke: Palgrave.

Kopnina, H. and Blewitt, J. (2014) *Sustainable Business: Key Issues*, Revised edition, Taylor and Francis.

Westhead, P., McElwee, G. and Wright, M. (2011) *Entrepreneurship: Perspectives and Cases*. Harlow: Pearson Education.

Chesbrough, H. (2003) *Open innovation: the new imperative for creating and profiting from technology*, Boston: Harvard Business School Press.

Journals:

International Small Business Journal

Benchmarking: An International Journal

International Journal of Productivity and Performance Management

Website:

<http://www.greatbusiness.gov.uk/businessgrowthservice/>