Bournemouth University

KEY PROGRAMME INFORMATION

Originating institution(s) Bournemouth University	**Faculty responsible for the programme** Faculty of Media and Communication
Final award(s), title(s) and credits BSc (Hons) Virtual and Augmented Reality (120 Credits, ECTS 60 Level 4 / 120 Credits, ECTS 60 Level 5 / 120 Credits, ECTS 60 Level 6)	
Intermediate award(s), title(s) and credits Cert HE Virtual and Augmented Reality (120 Credits, ECTS 60 Level 4) Dip HE Virtual and Augmented Reality (120 Credits, ECTS 60 Level 4 / 120 Credits, ECTS 60 Level 5)	
UCAS Programme Code(s) (where applicable and if known) Click here to enter text.	**HECoS Code(s) and percentage split per programme/pathway** 100363 (50%) computer animation and visual effects 101020 (40%) computer games programming 100812 (10%) project management
External reference points The UK Quality Code for Higher Education - Subject Benchmark Statements-computing 2019 - QAA Art & Design UG Benchmarks, 2016 - QAA Computing UG Benchmarks, 2016 Screen Skills - Course Accreditation Guidelines - National Occupational Standards for Animation 2013 - The Core Skills of VFX Handbook	
Professional, Statutory and Regulatory Body (PSRB) links Eligible for accreditation by Screen skills. Not yet approved.	
Places of delivery Bournemouth University	
Mode(s) of delivery Full-time, Full-time sandwich (placement)	**Language of delivery** English
Typical duration 3 years, or 4 years with a placement 1 year per level	
Date of first intake September 2021	**Expected start dates** September
Maximum student numbers Not applicable	**Placements** Optional short placement (4-8 weeks).
Partner(s) Not applicable	**Partnership model** Not applicable
Date of this Programme Specification September 2020 Students enrolling at Level 4 on or after September 2021 will follow this version.	
Version number v1.0-0921	
Approval, review or modification reference numbers Click here to enter text.	
Author H. Yu and A. Sarafopoulos	

PROGRAMME STRUCTURE

Level 4		Level 5		Level 6	
S1	S2	S1	S2	S1	S2
Introduction to Production Tools (Comm.) 20	Mathematics for Computer Graphics 20	Modelling and Dynamics for Computer Graphics (VR/AR) 20	Group Project (Comm.) 20		Major project and Dissertation (Comm.) 60
Programming Principles 20	Technical Arts Production 20	Fundamentals of Computer Vision (VR/AR) 20	Fundamentals of 3D engines (VR/AR) 20	Masterclass (Comm.) 20	
Introduction of Virtual and Augmented Reality Context and Technology (VR/AR) 20	Object Oriented Software Development (VR/AR) 20	Option 1 20	Option 2 20	Simulation Techniques (VR/AR) 20	Option 3 20

This map shows the order in which the units (listed in detail below) will be delivered across Levels 4, 5 and 6.

Programme Award and Title: BSc (Hons) Virtual and Augmented Reality

Year 1/Level 4
Students are required to complete 6 core units.

Unit Name	Core/ Option	No of credits	Assessment Element Weightings			Expected contact hours per unit	Unit version no.	HECoS Subject Code Link to valid HECoS codes
			Exam 1	Cwk 1	Cwk 2			
Introduction to Production Tools	Core	20		100%		72	FMC V1.1	615100363
Programming Principles	Core	20	50%	50%		72	FMC V1.1	101020
Technical Arts Production	Core	20		65%	35%	72	FMC V1.1	100363
Object Oriented Software Development	**Core**	**20**		**100%**		**72**	**FMC 1.1**	**101020**
Mathematics for Computer Graphics	Core	20	100%			72	FMC V1.1	100363
Introduction of Virtual and Augmented Reality Context and Technology	Core	20		50%	50%	48	FMC V1.0	101020

Progression requirements: Requires 120 credits at Level 4.

Exit qualification: Cert HE Virtual and Augmented Reality (requires 120 credits at Level 4).

Year 2/Level 5
Students are required to complete 4 core units and two optional units. There are a number of options; however, from the available optional units only a subset will be offered every year, depending on take-up and availability of appropriate resources.

Unit Name	Core/ Option	No of credits	Assessment Element Weightings			Expected contact hours per unit	Unit version no.	HECoS Subject Code Link to valid HECoS codes
			Exam 1	Cwk 1	Cwk 2			
Fundamentals of Computer Vision	Core	20		100%		48	FMC V1.1	100363
Modelling and Dynamics for Computer Graphics	Core	20	75%	25%		48	FMC V1.1	100363
Fundamentals of 3D engines	Core	20		100%		48	FMC V1.1	101020
Group Project	Core	20		90%	10%	40	FMC V1.1	100363 100812
Character Rigging	Option	20		100%		50	FMC V1.1	100363
Personal Inquiry	Option	20		50%	50%	48	FMC V1.1	100363 100812
Technical Effects	Option	20		100%		48	FMC V1.2	100363
Advanced Animation Techniques	Option	20		100%		50	FMC V1.1	100363
Principles of Rendering	Option	20		50%	50%	48	FMC V1.1	100363

Progression requirements: Requires 120 credits at Level 5.

Exit qualification: Dip HE Virtual and Augmented Reality (requires 120 credits at Level 4 and 120 credits at Level 5).

Year 3/Level P - Optional placement in industry/business

Progression requirements: Requires satisfactory completion of a minimum 30-weeks of work in industry/business, the successful completion of an e-Portfolio summary, and the timely completion of two appraisal forms. Students who do not choose to undertake the optional sandwich placement may progress directly from Level 5 to Level 6.

Year 3/4/Level 6
Students are required to complete 3 core units and one optional units. There are a number of options; however, from the available optional units only a subset will be offered every year, depending on take-up and availability of appropriate resources.

Unit Name	Core/ Option	No of credits	Assessment Element Weightings			Expected contact hours per unit	Unit version no.	HESA JACS code(s) HESA JACS Subject Code and % HESA JACS Subject Code and %
			Exam 1	Cwk 1	Cwk 2			
Final Major Project and Dissertation	Core	60		100%		30	FMC V1.1	100363(major) 101020 (minor)
Masterclass	Core	20		100%		20	FMC V1.1	100363(major) 100812 (minor)
Digital Fabrication	Option	20		100%		40	FMC V1.2	100363 100358
CG and Animation for Cultural Heritage	Option	20		70%	30%	42	FMC V1.2	100363
Simulation Techniques	Core	20		100%		48	FMC V1.2	101020

Exit qualification: BSc (Hons) Virtual and Augmented Reality.

Sandwich UG award: Requires 120 credits at Level 4, 120 credits at Level 5, 120 credits at Level 6 and successful completion of a minimum 30-week placement.

Full-time UG award: Requires 120 credits at Level 4, 120 credits at Level 5 and 120 credits at Level 6.

AIMS OF THE DOCUMENT

The aims of this document are to:

- define the structure of the programme;
- specify the programme award titles;
- identify programme and level learning outcomes;
- articulate the regulations governing the awards defined within the document.

AIMS OF THE PROGRAMME

This section explains the rationale of the Virtual and Augmented Reality (VR/AR) programme. The structure of the VR/AR programme reflects current VR/AR technology and its application in creative industries, medical visualisation, manufacture, robotics etc. The aim of the programme is to produce graduates who are VR/AR developers with strong technical and problem solving skills.

The new BSc VR/AR programme will focus on providing graduates with a deep level of understanding and the critical skills necessary for them to develop new and existing practical applications in Virtual and Augmented Reality applications. The students will use industry-standard software and hardware tools through accessing the latest commercial peripherals, such as the Oculus Rift, HTC Vive, electroencephalograms (brainwave interfaces), heart monitor and facial recognition systems commonly used in VR/AR research and production.

Moreover, the applications of VR/AR are extending beyond the traditional entertainment sectors since VR/AR have evolved the meaning of visual communication, i.e. immersive communication. For example, in workplace communication, effective communication in VR and AR is not only aesthetically engaging but offers a guiding hand as users explore this new world. Logically organized and carefully implemented communication can place your brand/product at the forefront of VR/AR. Another example is VR/AR in treatment of diseases. Training in handling tense situations also benefits from VR and AR by allowing people to work through various scenarios with no consequence and learning experientially how to handle them in the real world. What we learn in VR and AR carries over to real life and we can practice safely as many times as we want.

In such applications the casts include people with a great variety of art and science backgrounds, as well as people with interdisciplinary skills in order to allow for the immersive user experience. End users will typically have a variety of background, while VR/AR developers will have strong professional skills (Interactive Technologies and Multi-sensory Experiences). It is expected that end users and technical teams work together to deliver virtual/augmented reality environments. The cross disciplinary nature of VR/AR applications requires VR/AR design to balance between user experience and interactive technologies.

Virtual and Augmented Reality (VR/AR) is an emerging technology, and VR/AR course is an interdisciplinary programme based on computer graphics and computer vision. We prefer to “Virtual and Augmented Reality” as the title of this new programme since VR/AR is the most well-known abbreviation to public, particularly young people. The programme relies on the common practice and shared technical units across the disciplines (and industries) of computer animation, computer games, and visual effects. Beyond creative industries, VR/AR applications are diverse, e.g. archaeology, museum, psychology etc. However, VR/AR course focuses on the development of immersive experience’s knowledge and technologies, particularly software development, rather than covering all the disciplines. VR/AR graduates are qualified for various VR/AR development work based on their substantial knowledge and strong technical skills of immersive technology.

This programme aims to develop critically informed, agile and resourceful graduates, who:

- are critically aware of user experience and evaluation within VR/AR environment;
- have an in depth understanding of modern computing technology and mathematics used in the field;
- have an in depth understanding of the principles of immersive technologies and experience in VR/AR applications;

- have a good experience in programming and are familiar with VR/AR environment development;
- have highly-developed interpersonal skills and are able to manage their personal development and lifelong learning.

As this is an interdisciplinary programme the type of units taught to achieve the above aims can be classified in three broad categories: (a) technical principles and theory, (b) VR/AR principles, and (c) practices (see illustration 1).

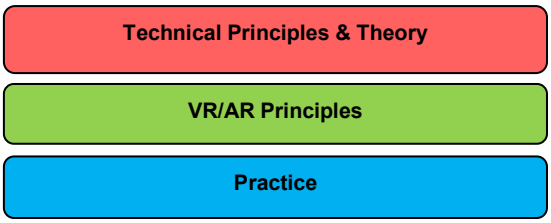

Illustration 1: The type of units taught can be classified in three broad categories

At Level 4 and Level 5 of the framework we deliver subjects that are traditionally taught under the umbrella of engineering and computing as well as subjects that are regularly taught for animation programme. For example, the units at Level 4 covering 'Programming Principles', 'Object Oriented Software Development' and 'Mathematics for Computer Graphics' have a strong computing and mathematical flavour and at the same time units such as 'Technical Arts Production' and 'Introduction to Production Tools' have the equivalent artistic studies flavour.

The VR/AR programme emphasises the common practice and shared technical units across the disciplines (and industries) of computer animation, computer games, and film digital effects. This commonality and shared practice is captured by a set of core units taught to all undergraduate students that join this programme at Level 4 (year 1) and which form a backbone of the production units that run throughout the programme. At Level 5 (year 2) the programme offers an array of more specialised options which focuses on interactive technology development, including 'real-time graphics system', 'computer graphics', 'computer vision', 'principles of rendering', animation and rigging, data and motion capture. At level 5 we also place emphasis at group work and collaboration with the core Group Project unit. Students after Level 5 can opt for a 30-week placement; a placement can provide added focus to their chosen discipline as well as valuable work experience before they return to complete their honours degree. The Level 6 (year 3) of the programme is mostly student lead and culminates in the Final Major Project and Dissertation unit which combines and integrates all previous units (see illustration 2).

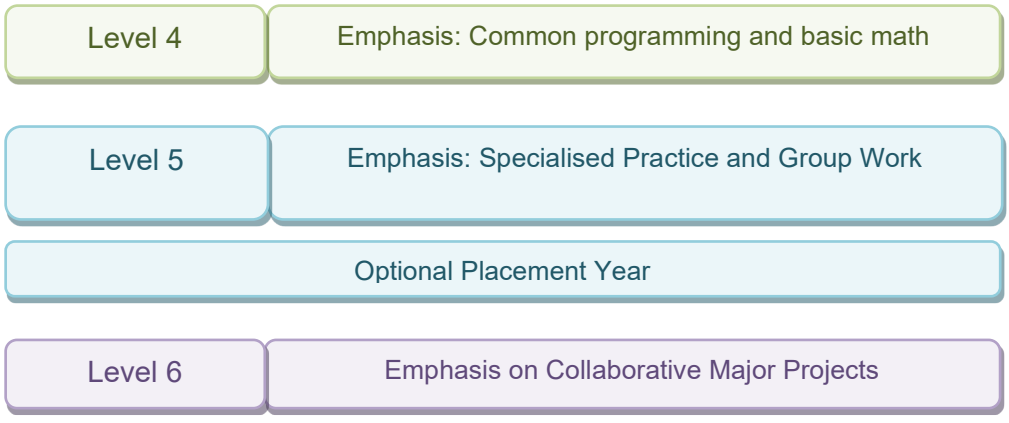

Illustration 2: Organisation of units at different levels.

ALIGNMENT WITH THE UNIVERSITY'S STRATEGIC PLAN

The BSc VR/AR programme develops the NCCA and BU portfolio of industry focused programmes and extends our network of industry links with companies outside the entertainment field. Developing

and running BSc VR/AR will help us consider new avenues in education, research and professional practice that keep our students at the cutting edge of their chosen professions. Moreover, it aims to improve our research and practice through delivering world-class education. The new programme will provide an environment that directly engages and attracts NCCA staff, students and external stakeholders and builds capacity and capability to deliver the BU2025 SIA-"Animation, Simulation & Visualization" outcomes as future strengths.

For example, it will scale the existing success of the VFX hub (led by NCCA staff Peter Truckel). Indirectly, this programme will form an enabler and catalyser for education and research on digital creation through developing a cross-faculty teaching and research cohort, which will cross multiple disciplines within the university and be in line with the fusion strategy and BU2025 the other SIAs, i.e. medical science, sustainability & low carbon technology, and assistive technology. For example, Centre for Fusion Learning, Innovation and Excellence (CFLIE) currently focuses on designing and operationalising a flipped learning framework using VR and other low-cost tools and evaluating the learning potential for sustainable and scalable student learning. It is likely that the new programme will provide teaching activities as samples to support CFLIE related research.

NCCA is well placed to introduce a new and novel UG BSc programme in Virtual and Augmented Reality (BSc VR/AR) based on its strong research expertise in the computer graphics and animation field, as well as its longstanding reputation of outstanding education in the area of computer graphics with applications to computer animation, games and VFX over the past 3 decades. The NCCA accolades include The 2011 Queens Anniversary Award as well as alumni wining three (3) VFX Oscars; more recently Mark Ardington (an NCCA alumni) winning the 2016 VFX Oscar for "Ex Machina" (BU VFX Oscars, 2019).

This programme places strong emphasis in fusion of teaching and research in NCCA and BU as well as research informed teaching. We aim to enrich the student's education experience through the impact of BU and NCCA. Medical and engineering research in VR/AR is a major strength of the NCCA academic team. Examples include the NCCA VR based "Surgery Simulation" project headed by Prof Jian J. Zhang which featured in the BU Digital Futures event (BU Digital Futures, 2019). Another example is the VISTA AR project (VISTA AR, 2019) with applications of VR/AR in heritage and archaeology headed for BU by Prof Jian Chang.

Current NCCA research mainly focuses on VR/AR engineering and healthcare applications, however NCCA and BU research are also involved in psychology or experiential applications. For example, the EPSRC project ''Visual and Behavioural Fidelity of Virtual Humans with Applications Bystander Intervention in Violent Emergencies", led by Prof Jian J Zhang and Dr Richard Southern (UK Research and Innovation, 2011), studies the conditions under that a bystander intervene to try to stop a violent attack by one person on another. Another project AniAge, led by Dr Hongchuan Yu and Prof Jian J Zhang (AniAge, 2019), also focuses on the user experiences in a virtual dance and performing arts.

Development of graduate attributes including the following areas have been considered in the design of the course:

- Education including technology enhanced learning
- Employability, work-based learning and professional practice
- Research informed education
- Student engagement and co-creation
- Innovation, entrepreneurship and creativity
- Globalisation, internationalisation and sustainability
- Personal and professional development

At the very heart of the course is the concept of education, professional practice and research. All of the delivery is underpinned by industry practice in regard to curriculum design, right through to the production pipelines that students learn and consequently develop on their own terms. Research

disciplines are taught and learned in specific units and these skills are utilised on other units throughout each programme. Teaching is at the centre of all of this work, and the NCCA prides itself on the quality of its teaching and organisation of its delivery to maximise student potential.

The NCCA has been at the forefront of utilising technology to enhance teaching and learning. Using platforms such as Shotgun (an industry standard file sharing and monitoring tool) enables staff to offer frame-by-frame feedback and annotation of student work. This happens as part of the ongoing review of student work-in-progress.

Staff also use tools such as Turnitin and video to give students a tailored and personal review of their work, which has been incredibly well received. Moreover, apart from lectures, many units are also supported by demonstrators. They will assist students with their coursework throughout the assignment in optional drop-in sessions on a one-to-one basis or workshops led by academic staff.

The inclusion of weekly visiting speakers enables staff and students to engage with practitioners on a scale that students in other institutions are unable to do. Networks with industry are incredibly strong and the fact that a huge number of people employed in the industry are NCCA graduates makes it very straightforward to maintain and build those networks. There is a huge loyalty to the NCCA and it is important that loyalty remains and is utilised to the benefit of current and future students.

Staff can go and work within some of the companies we regularly deal with, enabling them to come back to the classroom and share the skills that they develop whilst in the professional environment. Industry colleagues and partners make contributions to the NCCA Industry Advisory Board, where many subjects are discussed on a regular basis, including curriculum design.

Curriculum design is informed with feedback from industry partners, including Allen institute for Brain Science (2019), Vancouver Film School (2019), Moving Picture Company (MPC, 2019), AiSolve (2019), Holovis Co. (2019), Epicardio Simulation (2019), and Digital Surgery (2019). We received many valued comments to curriculum design regarding the unit design of math and programming units: “understanding of mathematics for 3D graphics and programming skills in C++ / C# are essential if the course is more biased towards software development. Less so in the case of content creation (animation, modelling etc.)…”; regarding the core skills for VR/AR developers, “an AR/VR developer should have a strong foundation in programming, preferably focused around real-time graphics and computer games technology. Learning VR/AR before these things is running before you can walk…”; regarding what technology or context should be included, “Practical hands on modules based around Unity or Unreal Engine for teaching the basics of 3D programming and how it applies to VR / AR”, “Introduction to the various immersive technologies and how their differences impact the contexts in which they are used” and “Emphasis on the importance of user experience in developing for immersive platforms, e.g. providing feedback and guidance within immersive experiences…”.

Many NCCA programmes already have ScreenSkills (2019) accreditation; the VAR/AR programme will also pursue course accreditation from ScreenSkills (as it also has applications in the entertainment industry). This will enables us to take advantage of their networks and guidance in order to ensure curriculum design is mapping to current and future thinking as far as possible.

Many staff involved in the course are active researchers and have strong networks with industry fields. They have introduced industry partners into the classrooms in the existing programmes. For example, the unit of Masterclass invites some industry partners to jointly supervise students’ projects every year. Through assignments and research oriented units, all students enhance their research ability and are able to see whether further work in that area is something they might develop in the future. Students work in groups for some of their marked assignments, allowing them to see and understand how major productions like those they will eventually work on are made. Teamwork is critical and that part of the student experience is critical to the success of NCCA graduates when they begin their careers.

The Marketing Research data supports an emerging and growing market for VR and AR skills; “These indications imply excellent job opportunities for graduates from a VR/AR degree.” and the VR and AR “market appears to provide more potential for recruitment and employment opportunities”. Particularly, the predicted market growth in AR is phenomenal with a growth of approx. 200% (as shown in the BU Marketing Research). This is likely to result in growth of the global investment in the VR/AR field. Digi-

Capital VR/AR Report 2017 (Digi-Capital, 2017) base case says that Mobile AR could become the primary driver of a $108 billion VR/AR market by 2021 (underperform $94 billion, outperform $122 billion) with AR taking the lion's share of $83 billion and VR $25 billion.

BU has a global agenda and NCCA students come from a wide range of countries and cultures, which does need careful management. However, the mix of cultures is seen as hugely beneficial to the student experience as it creates an incredibly interesting and vibrant student community that only serves to enhance the creativity of the group as a whole. The Global agenda is further enhanced by the opportunities students have to visit events like FMX in Germany and meet with other students and professionals from around the world at our very own BFX Festival.

The NCCA has been engaged with Centre for Fusion Learning, Innovation and Excellence as part of the curriculum design process. More importantly, the Department will continue to work with CFLIE after validation in order to ensure the new courses are delivered and assessed in a way that enables students to have the very best experience they can when they come to BU to learn in the NCCA.

CFLIE has collaborated with the Department to ensure that NCCA programmes have been designed are delivered in a way that is not only appropriate in terms of the discipline, but in such a way as to take advantage of the latest innovations in teaching and learning in Higher Education.

At all times, students are reminded that a professional attitude to their work, their colleagues and their lecturers is critical to their success. Recruiters from major studios go to great lengths to remind them that once they have the requisite skills, the next thing a company looks for in an employee is their ability to fit into their workplace with ease. In the kind of environment that most of the graduates will work, being a productive and valued member of a team is absolutely paramount.

The University's move to a common academic structure (CAS) began in the 2012/13 academic year, with all courses moving wholly into CAS or, in the case of some undergraduate provision, cascading through the period of an entire cohort's time on a course.

As part of this design, all NCCA Undergraduate degrees will move into CAS, with the exception of the Final Major Project and Dissertation Unit which is a recognised exception.

LEARNING HOURS AND ASSESSMENT

Bournemouth University taught programmes are composed of units of study, which are assigned a credit value indicating the amount of learning undertaken. The minimum credit value of a unit is normally 20 credits, above which credit values normally increase at 20-point intervals. 20 credits is the equivalent of 200 study hours required of the student, including lectures, seminars, assessment and independent study. 20 University credits are equivalent to 10 European Credit Transfer System (ECTS) credits.

As a general rule, time devoted to assessment should normally represent approximately 25% of the student learning time for a unit (i.e. 50 hours for a 20-credit unit), leaving the rest for specific programme-related activities, including lectures, seminars, preparatory work, practical activities, reading, critical reflection and independent learning. As a guideline, a 20-credit unit would normally require the equivalent of approximately 3,000 words in total.

STAFF DELIVERING THE PROGRAMME

Students will usually be taught by a combination of senior academic staff with others who have relevant expertise including – where appropriate according to the content of the unit – academic staff, qualified professional practitioners, demonstrators/technicians and research students.

INTENDED LEARNING OUTCOMES – AND HOW THE PROGRAMME ENABLES STUDENTS TO ACHIEVE AND DEMONSTRATE THE INTENDED LEARNING OUTCOMES

The BSc (Hons) Virtual and Augmented Reality provides opportunities for students to develop and demonstrate knowledge, understanding and skills described in this section. After their graduation, students will be expected to demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional level.

After completion of Level 4 of the programme VR/AR students should have knowledge and understanding of software development and practice in computer visualisation, animation and computer games as well as elements and fundamental principles of computing and applied maths required in computer graphics practice. Students at this level will be expected to be able to evaluate and interpret different approaches to visualising, modelling and animating ideas. Students should also be able to implement basic computer graphics and animation work by coding.

After successful completion of Level 5 of the programme students should be able to demonstrate knowledge and critical understanding of well-established principles in immersive technology. The students will be able to apply underlying principles in the context of given graphics, image and vision tasks, and outside the margin within which these principles were initially taught or introduced to them. Students will be expected to understand the importance of practical limitations, in terms of time and the resources required, to successfully complete a given project. They should also be able to demonstrate understanding of the appropriateness of a technique as applied to a given task and research such techniques using publications in magazines, journals, conferences, festivals or other bibliographic sources. Students should be able to manage their own personal development by directing and tailoring their studies according to their choice of specialised options available.

At Level 6 students are expected to demonstrate practice based research skills through the available project-oriented units. Students at this level will focus on specialist theory and practice in one of the available optional units as well as the Masterclass unit. The Major Project & Dissertation unit will act as a platform for cross disciplinary productions and encourage collaboration across programmes.

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PROGRAMME AND LEVEL 6 INTENDED PROGRAMME OUTCOMES

A: Subject knowledge and understanding This programme/level provides opportunities for students to develop and demonstrate knowledge and understanding of*:*	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the programme/level learning outcomes:
A1 critical evaluation of VR/AR project development; **A2** applications of computer vision and computer graphics within VR/AR development **A3** A specialist subject of the student's choice within VR/AR area, including hardware and software tools or platforms; **A4** the analysis and evaluation of VR/AR production, including user experience; **A5** the advanced analytical debates within theoretical discourses within the field of VR/AR and games.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (A1 – A4); • seminars & workshops (A1 – A4); • directed reading (A1, A4); • use of the VLE (A3, A4); • independent research (for dissertation) (A1-A5).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • coursework essays (A1 – A4); • dissertation (A1,A5).
B: Intellectual skills This programme/level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the programme/level outcomes:
B1 develop a greater vocabulary, and critical analytical approaches to, the VR/AR field; **B2** further contextualise and relate the VR/AR to associated technology and practices; **B3** produce creative work that demonstrates an appropriate level of originality and professional quality; **B4** apply appropriate research methodologies in VR/AR development **B5** illustrate the capacity for critical and effective research.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (B4); • seminars (B1 – B4); • directed reading (B1 – B4); • use of the VLE (B4); • independent research (for dissertation) (B1 – B5).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • examinations (B4); • coursework essays (B1 – B4); • dissertation (B1 - B5).
C: Practical skills This programme/level provides opportunities for students to develop practical skills:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the programme/level learning outcomes:
C1 develop expertise in the use of software and tools appropriate to their discipline; **C2** deepen proficiency in the application of VR/AR techniques;	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (C1 – C4);

C3 identify, apply and evaluate the techniques for VR/AR pipelines that involves user experience feedback; **C4** refine existing skills in software design and implementation of VR/AR systems.	• coursework essays (C1 - C4); • independent research for empirical dissertation (C1 – C4).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • coursework essays (C1 – C4).
D: Transferable skills This programme/level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the programme/level learning outcomes:
D1 build upon existing skills in the planning and execution of VR/AR development in a set time-scale; **D2** further develop existing communication skills in mediating between end users, colleagues and clients; **D3** improve effectiveness of working within a VR/AR pipeline; **D4** further develop team work skills **D5** work effectively in the planning and development of critical written reports.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (D1 - D5); • seminars (D1- D5); • directed reading (D1- D5).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • coursework essays (D1 – D5); • dissertation (D2- D5).

LEVEL 5/DipHE INTENDED LEVEL OUTCOMES

A: Knowledge and understanding This level provides opportunities for students to develop and demonstrate knowledge and understanding of*:*	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
A1 the analysis and application of VR/AR and CG techniques; **A2** theories, concepts, and principles of computer vision and computer graphics algorithms and techniques; **A3** Basic VR/AR development platforms, including hardware and software platforms; **A4** the design and implementation of VR/AR production for VR/AR pipeline development.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (A1- A4); • seminars (A1 – A4); • directed reading (A2); • use of the VLE (A1).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • examinations (A2, A4,); coursework essays (A1 – A4).
B: Intellectual skills This level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level learning outcomes:
B1 develop critical analysis of work in the field of VR/AR and games; **B2** contextualise and relate the VR/AR to associated technology and practices; **B3** become familiar with research methodologies and their applications in VR/AR and games; **B4** plan and illustrate the capacity for VR/AR production.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (B1 - B4); • seminars (B1 – B4); • directed reading (B3); • use of the VLE (B3); • independent research (B1 – B4).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • examinations (B3); • coursework essays (B1 – B4).
C: Practical skills This level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
C1 demonstrate the successful use of software and tools appropriate to their discipline; **C2** gain proficiency in the application of immersive techniques; **C3** identify and apply the correct techniques for VR/AR pipeline that involves user experience feedback; **C4** become familiar with software design and implementation of VR/AR systems.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • seminars (C1 – C4); • coursework essays (C1 – C4); • lectures (C4).
	Assessment strategies and methods (referring to numbered Intended

	Learning Outcomes): • coursework essays (C1-C4); • examination (C4).
D: Transferable skills This level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
D1 plan and execute VR/AR development to a given time-scale; **D2** develop communication techniques to convey end users' intent to colleagues and clients; **D3** work effectively within a VR/AR pipeline; **D4** work effectively as a member of a team;	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • seminars (D1- D4); • use of the VLE (D1 - D4); • directed reading (D1- D4). Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • coursework essays (D1 - D4).

LEVEL 4/Cert HE INTENDED LEVEL OUTCOMES

A: Knowledge and understanding This level provides opportunities for students to develop and demonstrate knowledge and understanding of:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
A1 basic research methods and languages used in VR/AR development; **A2** basic theories, concepts, and principles of algorithms and software development; **A3** the principles and practice of VR/AR production; **A4** the research, design and implementation of VR/AR pipeline development.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (A1- A4); • seminars (A1 – A4); • use of the VLE (A3, A4).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • examinations (A1- A3); • coursework essays (A2 – A4).
B: Intellectual skills This level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
B1 develop a familiarity with the fields of VR/AR; **B2** understand and engage with discussions surrounding innovations and originality within the field of VR/AR and games; **B3** demonstrate a sound understanding of the theory that underpins VR/AR technology;	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (B1 – B3); • seminars (B1 – B3); • use of the VLE (B2).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • examinations (B3); • coursework essays (B1 – B3).
C: Practical skills This programme/level provides opportunities for students to develop practical skills:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
C1 in the successful use of software and tools appropriate to their discipline; **C2** become familiar with VR/AR techniques; **C3** demonstrate an understating of VR/AR pipelines that involve use experience feedback; **C4** demonstrate an understating of software tools for VR/AR system development.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • lectures (C1 – C4); • coursework essays (C1 – C4).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes):

	• examinations (C4); • coursework essays (C1 – C4).
D: Transferable skills This level provides opportunities for students to:	The following learning and teaching and assessment strategies and methods enable students to achieve and to demonstrate the level/stage learning outcomes:
D1 execute VR/AR development to a given time-scale; **D2** learn communication skills to convey end users' intent to colleagues and clients; **D3** work within a VR/AR pipeline.	Learning and teaching strategies and methods (referring to numbered Intended Learning Outcomes): • seminars (D1- D3); • use of the VLE (D1 – D3).
	Assessment strategies and methods (referring to numbered Intended Learning Outcomes): • coursework essays (D1 – D3).

ADMISSION REGULATIONS

The regulations for this programme are the University's Standard Undergraduate Admission Regulations with the following exception:

- Applicants whose mother tongue is not English must offer evidence of qualifications in written and spoken English, equivalent to IELTS (Academic) with an overall score of 6.0 or above, with a minimum of 5.5 in each of the four component scores.

PROGRESSION ROUTES

Not applicable.

ASSESSMENT REGULATIONS

The regulations for this programme are the University's Standard Undergraduate Assessment Regulations. The University's Standard Undergraduate Assessment Regulations are available from: https://intranetsp.bournemouth.ac.uk/pandptest/6a-standard-assessment-regulations-undergraduate.pdf

WORK BASED LEARNING (WBL) AND PLACEMENT ELEMENTS

This programme incorporates a one-year (30 week) optional placement. Those students who successfully complete a one-year placement will be eligible for the award of full-time sandwich degree. Those students who do not opt for the one-year placement may still undertake some form of short-term placement during their three-year programme. Short placement is typically between four to eight weeks. Short-term placements are not credit bearing and are not required for the award of intermediate qualifications.

Programme Skills Matrix

Core units in bold. All other units are options available to this programme.

	Units	Programme Intended Learning Outcomes																	
		A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3	D4	D5
LEVEL 6	**Final Major Project and Dissertation**	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Masterclass						x	x	x	x	x	x	x	x	x					
	Digital Fabrication	x			x	x										x	x	x	x	x
	CG and Animation for Cultural Heritage	x		x	x							X	x	x	x	x	x	x	x	x
	Simulation techniques	x	x	x	x	x						x	x	x	x					
LEVEL 5	**Fundamentals of 3D engines**	x	x	x	x		x	x	x	x										
	Modelling and Dynamics for Computer Graphics	x	x	x	x		x	x	x	x										
	Fundamentals of Computer Vision	x	x	x	x		x	x	x	x										
	Group Project											x	x	x	x	x	x	x	x	
	Technical Effects						x	x	x	x		x	x	x	X					
	Personal Inquiry											x	x	x	X	x	x	x	x	
	Advanced Animation Techniques	x	x	x	x							x	x	x	x					
	Character Rigging	x	x	x	x		x	x	x	x										
	Principles of Rendering	x	x	x	x		x	x	x	x										
LEVEL 4	**Introduction to Production Tools**	x	x	x	x		x	x	x					x	X	x	x	x		
	Programming Principles	x	x	x	x		x	x	x				x	x	X					
	Technical Arts Production	x	x	x	x		x	x	x					X	x	x	x	x		

	Introduction of Virtual and Augmented Reality Context and Technology	x	x	x	x		x	x	x			x	X			x	x			
	Mathematics for Computer Graphics	x	x	x	x		x	x	x											
	Object Oriented Software Development	x	x	x	x		x	x	x								x	x		

A – Subject Knowledge and Understanding
This programme provides opportunities for students to develop and demonstrate knowledge and understanding:

Level 6:
- A1 critical evaluation of VR/AR project development;
- A2 applications of computer vision and computer graphics within VR/AR development
- A3 A specialist subject of the student's choice within VR/AR and game areas, including hardware and software tools or platforms;
- A4 the analysis and evaluation of VR/AR production, including user experience;
- A5 the advanced analytical debates within theoretical discourses within the field of VR/AR and games.

Level 5:
- A1 the analysis and application of VR/AR and CG techniques;
- A2 theories, concepts, and principles of computer vision and computer graphics algorithms and techniques;
- A3 Basic VR/AR development platforms, including hardware and software platforms;
- A4 the design and implementation of VR/AR production for VR/AR pipeline development.

Level 4:
- A1 basic research methods and languages used in VR/AR development;
- A2 basic theories, concepts, and principles of algorithms and programming;
- A3 the principles and practice of VR/AR production;
- A4 the research, design and implementation of VR/AR pipeline development.

C – Practical Skills
This programme provides opportunities:

Level 6:
- C1 in the expert use of software and tools appropriate to their discipline;
- C2 in the proficiency of the applications of VR/AR techniques;
- C3 identify and evaluate the techniques for VR/AR pipelines that involves user experience feedback;
- C4 software design and implementation of VR/AR systems.

Level 5:
- C1 demonstrate the successful use of software and tools appropriate to their discipline;
- C2 gain proficiency in the application of immersive techniques;
- C3 identify and apply the correct techniques for VR/AR pipeline that involves user experience feedback;
- C4 become familiar with software design and implementation of VR/AR systems.

Level 4:
- C1 in the successful use of software and tools appropriate to their discipline;
- C2 become familiar with VR/AR techniques;
- C3 demonstrate an understating of VR/AR pipelines that involve use experience feedback;
- C4 demonstrate an understating of software tools for VR/AR system development.

B – Intellectual Skills
This programme provides opportunities:

Level 6:
- B1 develop critical analysis of work in the field of VR/AR and games;
- B2 contextualise and relate the VR/AR to associated technology and practices;
- B3 produce creative work that demonstrates an appropriate level of

D – Transferable Skills
This programme provides opportunities:
Level 6:
- D1 plan and execute VR/AR development to a given time-scale;
- D2 communicate end users' intent to colleagues and clients;
- D3 work effectively within a VR/AR pipeline;
- D4 work effectively as a member of a team;
- D5 work effectively in the planning and development of critical written reports.

originality and professional quality; B4 apply appropriate research methodologies in VR/AR development B5 illustrate the capacity for critical and effective research. Level 5: B1 develop critical analysis of work in the field of VR/AR and games; B2 contextualise and relate the VR/AR to associated technology and practices; B3 become familiar with research methodologies and their applications in VR/AR and games; B4 plan and illustrate the capacity for VR/AR production. Level 4: B1 develop a familiarity with the fields of VR/AR; B2 understand and engage with discussions surrounding innovations and originality within the field of VR/AR and games; B3 demonstrate a sound understanding of the theory that underpins VR/AR technology;	Level 5: D1 plan and execute VR/AR development to a given time-scale; D2 develop communication techniques to convey end users' intent to colleagues and clients; D3 work effectively within a VR/AR pipeline; D4 work effectively as a member of a team; Level 4: D1 execute VR/AR development to a given time-scale; D2 learn communication skills to convey end users' intent to colleagues and clients; D3 work within a VR/AR pipeline.