1.1 Module 12: Shaders and Technical Art

1.1.1 Headline information about the module

Module title	Shaders and Technical Art
Module NFQ level (only if an NFQ level can be demonstrated)	7
Module number / reference	CT012
Parent programme(s) the plural arises if there are embedded programmes to be validated	BA (Hons) in Creative Technologies and Digital Art
Stage of parent programme	2
Semester (semester1/semester2 if applicable)	Semester 1
Module credit units (FET/HET/ECTS)	ECTS
Module credit number of units	10
List the teaching and learning modes	Full-Time, Direct Contact / Blended
Entry requirements (statement of knowledge, skill and competence)	Learners must have achieved the programme entry requirements
Pre-requisite module titles	N/A
Co-requisite module titles	N/A
Is this a capstone module? (Yes/no)	No
Specification of the qualifications (academic, pedagogical and professional/occupational) and experience required of staff (staff includes workplace personnel who are responsible for learners such as apprentices, trainees and learners in clinical placements)	Lecturing staff must be qualified to a minimum of NFQ Level 9 in games, or related discipline, or hold an equivalent professional qualification. Experience in the games or animation industry would be desirable. Ideally, they would also hold a third level teaching qualification (e.g. the Griffith College Certificate in Education, Learning and Development).
Maximum number of learners per centre (or instance of the module)	25
Duration of the module	12 weeks
Average (over the duration of the module) of the contact hours per week	4
Module-specific physical resources and support required per centre (or instance of the module)	• Computer lab with capacity for 25 learners equipped with a projector • Access to Unity 3D software and user licences for Photoshop.

Analysis of required learning effort		
***Effort while in contact with staff**	**Minimum ratio teacher / learner**	**Hours**
Classroom and demonstrations	1:25	48
Monitoring and small-group teaching	-	-
Other (specify)	-	-
Independent Learning		
Directed e-learning (hours)		-
Independent learning (hours)		135
Assignment		67
Work-based learning hours of learning effort		-
Total Effort (hours)		250

Allocation of marks (within the module)					
	Continuous assessment	**Supervised project**	**Proctored practical examination**	**Proctored written examination**	**Total**
Percentage contribution	**100%**	**-**	**-**	**-**	**100%**

1.1.2 Module aims and objectives

The aim of this module is to equip the learner with the necessary skills to design and create custom shaders, particle systems and VFX for games that add to the overall aesthetic of the game. The module exposes the learner to visual scripting used in both shader graphs and VFX graphs inside a game engine. The learner also develops an understanding of the workflow and process for optimisation to refine said effects.

1.1.3 Minimum intended module learning outcomes

Upon successful completion of this module, the learners are able to:

(i) describe basic node based scripting;
(ii) create high-quality custom shaders;
(iii) create particle systems, and VFX, and understand their use cases;
(iv) discuss technical art using industry terminology.

1.1.4 Rationale for inclusion of the module in the programme and its contribution to the overall MIPLOs

Learners undertaking this module emerge with the newly acquired ability to develop shaders and particle systems for the creation of more realistic and stylised graphics. The learner also gains an insight into using node based scripting methods and syntax. These skills have cross-industry application, such as creating realistic fluid simulations for engineering and hyper-realistic graphics for medical research. The minimum intended module learning outcomes address programme learning outcomes (i), (iii), (vi) and (viii).

1.1.5 Information provided to learners about the module

Learners are provided with a number of sources of information about this module, such as the induction session which presents learners with an overview of the modules. The induction session touches upon key areas of study such as the module aims, expectations and supports available. At the commencement of each module, the learner is provided with a detailed overview of the module, the assessment strategy and schedule. The learner is then issued assignment briefs that fall in line with the deliverables outlined in the module objectives / outcomes.

The Learner Handbook, included with this submission, demonstrates how the learning in this module fits in to the overall structure of the programme. The handbook contains detailed module descriptors including teaching, learning and assessment strategies. Learners are provided with access to a learner Google account and to Google Classroom. Here, information regarding module descriptors, programme timetables and assessment information is uploaded. Google Classroom is for use by both learners and staff for the presentation of class notes and content as well as a point for assignments to be issued and submitted to.

1.1.6 Module content, organization and structure

Learners are provided with notes, sample code and projects for each class. They are expected to review, extend and build upon this content on an independent basis, outside of contact hours.

Shaders (50%)

- Shaders and terminology
- Unity standard shaders
- Node based scripting (variables and functions)
- Different node functions
- Creating your own shaders
- Changing parameters with scripts

Particles (50%)

- Particles and terminology
- Shuriken and VFX
- Shuriken setup and use
- VFX breakdown of main nodes
- VFX nodes
- Changing parameters with scripts.

1.1.7 Module teaching and learning (including formative assessment) strategy

The module is delivered through a combination of lectures and lab sessions. The learner is instructed on how to develop technical art assets using particle systems and custom shaders. In lectures and labs learners take ideas that could not be realised through 3D modelling and use technical art instead to express them. In terms of structure, the module is divided broadly into two parts: the first six weeks deal with shaders, the latter six with particles. Both 'parts' open with introductory lectures, familiarising learners with relevant terminology. Thereafter, a different theme is discussed in lectures each week, with learners implementing the techniques discussed in lectures in practical lab sessions.

Activity	Teaching / Learning Strategy	Learning Environment

Lectures and demonstrations (48 hours)	Formal lectures and demonstrations on various aspects of shaders and technical art.	College
Independent work (135 hours)	Self-directed work	College / Home
Assignment (67 hours)	Excluding continuous assessment assignments (40%); there are two deliverables: (i) creation of a scene that uses custom shaders to create effects and assets, (ii) a scene that requires Shuriken and VFX particle effects to create effects and assets.	College / Home

1.1.8 Work-based learning and practice-placement

There is no work-based learning or practice-placement within this module.

1.1.9 E-Learning

Google Classroom acts as a reference point for the learner where all relevant information regarding the module is compiled. It also provides the learner with a messaging service between classmates and staff. Any changes or updates to module content is reflected on the platform along with a notification of change / messaging service. Google Classroom also accommodates for the submission of larger file types, a common feature of this programme. Learners also have access to additional academic material and supports through the Moodle virtual learning environment (VLE).

1.1.10 Module physical resource requirements

The module requires a computer lab with capacity for 25 learners, equipped with a projector, access to Unity 3D software, as well as user licences for Photoshop.

1.1.11 Reading lists and other information resources

Primary reading

Engel, W. (2017) *GPU Zen 2: Advanced Rendering Techniques*. Encinitas, CA: Black Cat Publishing.

Thorn, A. (2017) *Mastering Unity 2017 Game Development with C#,* (2nd revised edition). Birmingham: Packt Publishing.

Online resources

https://docs.unity3d.com/Packages/com.unity.shadergraph@6.9/manual/Getting-Started.html

https://unity.com/shader-graph

https://unity.com/visual-effect-graph

1.1.12 Specifications for module staffing requirements

For each instance of the module, one lecturer must be qualified to at least master's level (NFQ Level 9) in games, or related discipline, or hold an equivalent professional qualification. Experience in the games industry would be desirable.

Ideally, they would also hold a third level teaching qualification (e.g. the Griffith College Certificate in Education, Learning and Development).

1.1.13 Module summative assessment strategy

There are two methods employed as part of the assessment for this module, continuous assessment (worth 40%) and project work (comprising 60% of the overall grade). In respect of the first mode of assessment, learners are assigned a short task on a weekly basis, based on their specific learning at the end of class.

The project work is comprised of two deliverables: the first, a scene that necessitates the use of custom shaders to create certain effects and assets, and the second, a scene which requires custom Shuriken and VFX particle effects to create certain effects and assets. The marking scheme for assessments is set out in detail in the Sample Assessment Handbook.
The assessed work breakdown can be seen in the table below.

No.	Description	MIMLOs	Weighting
1	Weekly Task	(i) – (iv)	40%
2	Shader Scene	(i), (ii), (iv)	30%
3	Particle Scene	(i), (iii), (iv)	30%

1.1.14 Sample assessment materials

Please see sample assessment supplementary document submitted with this proposal.