Higher National Unit specification

General information for centres

Unit title: 3D Animation: Environmental Modelling

Unit code: F7BY 34

Unit purpose: This Unit is designed to enable candidates to acquire a better understanding of the techniques of environmental modelling, by creating a 3D world which will include interior and exterior environments and objects. Candidate will also acquire the knowledge and skills to create a richly texturised and fully rendered immersive environment.

On completion of the Unit the candidate should be able to:

1 Create an Interior and complementary Exterior 3D environment.
2 Create or apply surfaces and mapping to Interior and Exterior environments and models.
3 Create lighting demonstrating aesthetic, emotional and atmospheric effects.
4 Produce a short rendered animated overview of interior and exterior environments.

Credit points and level: 2 HN credits at SCQF level 7: (16 SCQF credit points at SCQF level 7*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre. It would be beneficial if the candidate had general knowledge of computer applications along with basic Drawing or Digital imaging skills. In addition the candidate should have an understanding of basic 2D and 3D Computer Animation terminology and a 2D bitmap editing Graphics package. Candidates should be aware of the meaning of the following terminology such as Rotation, Cartesian Co-ordinates Translation, Polygonal Modelling, Vertices, Subdivision, Lathe, Extrusion, Spline Curves, and Booleans.

Core Skills: There are opportunities to develop the Core Skill components, Critical Thinking and Reviewing and Evaluating of the Core Skill *Problem Solving* at SCQF level 6, although there is no automatic certification of Core Skills or Core Skills components

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: This Unit is assessed by the use of practical assessment for all Outcomes.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Create an Interior and complementary Exterior 3D environment

Knowledge and/or Skills

- Navigation within 3D space
- Modelling techniques

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- navigate within 3D space.
- create and demonstrate understanding of how subdivision, lathing, extrusion splines, additive and subtractive Booleans work.
- create a finished 3D interior model or structure which can include additional interior spaces all to be placed within an exterior environment. The interior space should be illuminated by both internal and external light sources.
- create a finished 3D exterior model complimentary to the Interior structure.

Assessment Guidelines

Candidates could create a 3D structure which has interior space/s. Candidates should explore the different techniques of model creation that could best lend themselves to creation of a structure with an interior space/s. These could include lathing, subdivision, extruding, spline curves and /or additive and subtractive Booleans to furnish the interior with a suitable environment.

The structure produced should have an interior, for example a room within a building or a lift within a lift shaft inside a basic building structure and or all of which could have been produced as part of another design Unit. However the space need not be limited to a standard building and candidates should be encouraged to think beyond a standard box in a street, designing interiors for trains, boats, planes, computer games, web worlds like Second Life etc. The models may be created on the basis of a brief supplied by the tutor or initiated by the candidate with the subsequent agreement of the tutor.

The exterior environment should be sympathetically designed to reflect the structure placed within it.

Higher National Unit specification: statement of standards

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It is suggested from the outset that the candidate be encouraged to use a project diary which can contain rough sketches, development ideas, photographs of textures, lighting ideas etc. This document should be updated across each of the Outcomes in this Unit and may be consulted to provide evidence of the problem-solving abilities of the candidates.

Additional models for both interior and exterior environments may be created or sourced externally from the Internet, CD-ROMs etc to populate interior rooms or exterior surfaces.

Outcome 2

Create or apply surfaces and mapping to Interior and Exterior environments and models

Knowledge and/or Skills

- Texturing techniques
- Mapping techniques

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- import textures
- create textures
- use Alpha Maps
- apply Displacements Mapping
- use Procedural Terrain
- use Volumetric Atmosphere
- develop Ecosystems
- use Texturing and Mapping techniques

Assessment Guidelines

Candidates could apply textures to 3D Interior and Exterior models supplied but it is anticipated that they will use the model/s and environment created in the previous Outcome. Candidates should explore the different methods of wrapping the texture to the model, ie using the unwrap UVW mapping using vertex edge and face. Alpha Maps, Bump, Displacement and Parallax mapping may all be considered in producing textures appropriate to the interior and exterior environments being used. The candidate must demonstrate the ability to alter the vertices and geometry of the elements created while the geographical layout of the exterior environment should reflect a degree of texturing and mapping complexity which gives appropriate consideration to depth, reflections, degree of detail, shadowing etc. Procedural terrains, Volumetric atmosphere creation and use of appropriate plug-ins may be considered or used to facilitate development of suitable ecosystems.

It is acceptable, even desirable for candidates to produce their own textures in image editing programs which are then imported into the 3D software being used.

Appropriate updates should be made in the suggested project diary to allow collection of additional evidence of the knowledge and skills the candidate is developing.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Animation: Environmental Modelling

Outcome 3

Create lighting demonstrating aesthetic, emotional and atmospheric effects

Knowledge and/or Skills

- Characteristics and quality of Light
- High and Low Contrast Lighting
- Volumetric Lighting

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- illuminate exterior and interior environments created in previous Outcomes or similar environments provided by the tutor. Each set-up should provide evidence that the candidate understands and can manipulate brightness or luminance, colour, hard and soft shadows, and directional lighting.

Assessment Guidelines

It is important that the candidate does not rely on a standard 3 point lighting set-up but demonstrates understanding of the power of light to create mood and atmosphere. It is not necessary that the lighting is photo-realistic but it is essential that the scene is lit with a range of different rigs which demonstrate the ability of light to evoke emotion and atmosphere, ie shadows, reflections, rays of light shining through openings in doors, trees etc. As with previous Outcomes it is suggested that the project diary is updated during the completion of this Outcome.

Outcome 4

Produce a short rendered animated overview of interior and exterior environments

Knowledge and/or Skills

- Storyboards
- Keyframes
- Animation of Cameras

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or Skills by showing that they can:

- create a storyboard of the proposed walk and/or fly-through of an environment with sufficient keyframes to allow the viewer to experience the geography and elements which populate the environment; to include any structure where an interior view is available. Animation of the camera/s along a path with pauses defined in the path to allow viewers to experience the environment.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Animation: Environmental Modelling

Assessment Guidelines

Candidates could use 3D Interior and Exterior models supplied but it is anticipated that they will use the model/s and environment created in previous Outcomes. It is suggested that the animated scene be a minimum of 10 and maximum of 20 seconds in length. The storyboard need not be too complex and detailed, merely indicating point on which the camera travels to supply views of the environment. The final rendering should be saved in a suitable digital format and submitted with the storyboard, together with any other documentation generated by the candidate during this and previous Outcomes.

Administrative Information

Unit code: F7BY 34

Unit title: 3D Animation: Environmental Modelling

Superclass category: JB

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History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: 3D Animation: Environmental Modelling

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 80 hours.

Guidance on the content and context for this Unit

This Unit is designed to provide candidates with the knowledge and skills required to generate convincing 3D worlds and the models and structures which populate it. These objectives are fundamental for candidates who wish to work for example in the creation of computer games, architectural renders and product development. Candidates will work to a given brief to accurately create an interior and exterior space which will subsequently be textured, rendered and explored by virtue of an animated fly-though or walk-through. For Outcome 1 candidates should work to a given or negotiated brief for the creation of a 3D Interior and Exterior model.

The level of detail in the model should be determined by the tutor and may vary according to the complexity of the brief. A simplistic box with and aperture placed on a flat plan would not suffice and there should be evidence that the candidate can manipulate geometry of the models, particularly the exterior environment to produce terrain which has depth, height, shadows etc. Evidence for this Outcome could be submitted in the form of a digital file or hard copy.

For Outcome 2 candidates should demonstrate their ability to apply mapping and textures to the interior and exterior 3D models. They should be able to demonstrate their ability to import and create textures for use with various mapping techniques including Alpha Maps, and the application of Displacements Maps in the construction of landscapes. The world created should make use of all that the software and where appropriate relevant plug-ins can provide in relation to creation of a function world with a developed ecosystem. Volumetric lighting and procedural terrain techniques should be used to add to the immersive reality the candidate is trying to create. These elements are of course complimentary to the activities of the Outcome 3.

For Outcome 3 the candidate should demonstrate their understanding of the complexities of light and its ability to add aesthetic sensibilities including the addition of emotion and atmosphere to models and environments created.

For Outcome 4 a short animated camera sequence should be created and rendered. The sequence should use a fly or walk-through, together with a storyboard with sufficient keyframes identified where pauses are inserted on the camera path allowing viewers sufficient time to appreciate the environment and models used to populate it.

Higher National Unit specification: support notes (cont)

Unit title: 3D Animation: Environmental Modelling

Guidance on the delivery and assessment of this Unit

The Unit may be linked/integrated with suitable Units in the HNC/HND 3D Computer Animation and a thematic approach adopted for both delivery and assessment.

This Unit should be delivered initially as a series of demonstrations and exercises.

For Outcome 1 candidates could be given a brief to work from, although it is acceptable for a brief to be negotiated and agreed by tutor and candidate.

The tutor delivering the Unit can determine the suitability of any proposed material. The material produced should include a 3D Interior model; this could be a room or the interior of a building and could have been produced as part of another design Unit. This Outcome also requires the creation of a 3D Exterior model which might take the form of a landscape or urban cityscape and should be sympathetic to the interior elements created.

For Outcome 2 the models created in Outcome 1 should be textured and mapped according to the environment and models chosen. Evidence can include details of texture created or imported for use with the models/environment and rendered single images saved out in suitable formats like JPEG etc

For Outcome 3 assessment evidence could include rough sketches of lighting rigs together with notes of the reasons for each set-up, ie to demonstrate atmosphere or passage of time. This evidence can be rendered single images of the impact of each lighting set-up and can be in the form of a digital file or hard copy, demonstrating the candidate's practical application of their skills and knowledge of lighting, its complexity and characteristics.

Consulting candidates' storyboards and or project diaries and their evaluations of source material could assist the authentication of evidence.

Outcome 4 should include candidate storyboard and the final rendered animated fly or walk-through sequence in hard and digital copy respectively.

Opportunities for developing Core Skills

The delivery and assessment of this Unit may contribute to the Core Skill of *Problem Solving* at SCQF level 6.

The general skill required by the Critical Thinking component is the ability to analyse a complex situation or issue and more specifically, to:

- identify the factors involved in the situation or issue
- assess the relevance of these factors to the situation or issue
- develop and justify an approach to deal with the situation or issue

Higher National Unit specification: support notes (cont)

Unit title: 3D Animation: Environmental Modelling

The general skill for the Planning and Organising component is the ability to plan, organise and complete a complex task. More specifically, candidates are asked to:

- develop a plan
- identify and obtain resources to carry out the plan
- carry out the task

The general skill for the Reviewing and Evaluation component is the ability to review and evaluate a complex problem solving activity. More specifically, candidates are asked to:

- evaluate the effectiveness of the strategy/strategies
- identify and gather appropriate evidence
- draw conclusions and make recommendations

This could be evidenced in the analysis of shapes and primitives underlying a series of either organic or non-organic scenes, breakdown of 3D model to basic shapes and the construction of new models from basic shapes to form a complete scene. This would also involve sourcing and evaluating the usefulness of source material, developing ideas for new scenes, creating new scenes, and evaluating the effectiveness of new models to illustrate either interior or exterior scenes.

Open learning

This Unit could be delivered by flexible, open learning using a blended delivery method. a VLE platform could provide some support to candidates. It would be helpful for the candidate to occasionally visit the course tutor to reflect on the technical, compositional and aesthetic elements of the 3D model which are better communicated face to face.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

General information for candidates

Unit title: 3D Animation: Environmental Modelling

This Unit is designed as an introduction to the creation of artwork for use in the planning stages of an animation production, computer animation production, video production, games production or film production, or any other similar situation where 3D model environment constructions must be produced to illustrate, scenes, or concepts.

In this Unit you should create both Interior Models and Exterior Models and populate an environment to create a convincing finished scene. The material you choose to texture the models with may be selected from digital photographs that you generate yourself, Internet or from digital files that you have created in a bitmap program.

The material textures must be accurately mapped onto the models and you should carefully consider how different surfaces will reflect or absorb light and if there will be any transparent areas like glass or reflective areas like metal. The lighting of the model should be carefully controlled and should be thought about at the initial research and initial rough sketch stage.

You should sketch your ideas out on paper to act as a template or guide for your finished model. Ideally collect as many different resources that you can find to act as references before you start to model.

You should save test renders of models and environment/s in appropriate digital formats.

Finally you will attach a camera to a path and thereafter render this animation to allow others to view the world and objects you have created. This part of the Unit requires the creation of a storyboard which along with the animation should be submitted in the correct digital format.

There are opportunities to develop the Core Skill components Critical thinking and Reviewing and Evaluating of the Core Skill *Problem Solving* at SCQF level 6 and the Core Skill component Using Graphical Information of the Core Skill *Numeracy* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.