Higher National Unit specification

General information for centres

Unit title: 3D Computer Modelling and Animation: An Introduction

Unit code: F5GC 34

Unit purpose: This Unit is designed to enable candidates to create and manipulate simple 3D models using a variety of tools from within a 3D modelling package. The models will utilise simple geometry to optimise the polygon count making models quickly renderable. A variety of simple animation techniques will be demonstrated by producing a short animated sequence.

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

1   Design a simple model and a simple environment for a 3D animation for a given client brief.
2   Create a simple model and a simple environment for a 3D animation for a given client brief.
3   Use lighting effects effectively within a given scene.
4   Manipulate cameras and camera lenses to effectively view a scene.
5   Create a simple 3D computer animation sequence.

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. However, it would be beneficial if candidates had proficiency in the use of computers and an understanding of file management techniques. This may be demonstrated by possession of:

♦   NQ Unit *Computer Aided 3D Modelling Visualisation and Presentation* (D175 13)

or

♦   Higher Art and Design Studies (C223 12)

and/or

♦   *Product Design* (C211 12) at SCQF level 6 or equivalent Units of study at SCQF level 6

Core Skills: There are opportunities to develop Core Skill components within *IT* and Reviewing and Evaluating Core Skill of *Problem Solving* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

General information for centres (cont)

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: Outcome 1 is an open-book assessment. A project sketchbook should be used to record developmental work. Outcomes 2, 3, 4 and 5 are open-book, practical assessment requiring the creation of a 3D model and the completion of a project sketchbook to record developmental work, however a portion of Outcome 4 is in the form of a closed-book assessment. Electronic files should be saved and located on a storage device easily accessible by the lecturer.

As an alternative, all Outcomes could be assessed using a project which requires the candidate to collect all the necessary evidence to include design and development work, sketches, and necessary still images, all to be supported by electronic evidence saved in an appropriate file format located on a dedicated storage device easily accessible by the lecturer.

Higher National Unit specification: statement of standards

Unit title: 3D Computer Modelling and Animation: An Introduction

Unit code: F5GC 34

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

Design a simple model and a simple environment for a 3D animation for a given client brief

Knowledge and/or Skills

♦ Working with a client brief
♦ Creation of developmental sketches
♦ 3D character and environment modelling

Evidence Requirements

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

♦ produce sketches which interpret a client brief
♦ design a simple model and a simple environment for a 3D animation
♦ produce a project sketchbook recording developmental work

Assessment Guidelines

Candidates should understand the need to produce sketches and designs to meet the client brief. If possible candidates should be provided with exemplars of sketches and sketchbooks. The brief should be such that the candidates are encouraged to develop a model beyond simple off-the-shelf primitives. The model could take the form of a simple robotic character. Similar information within the brief should refer to the creation of the desired environment in which the model functions.

This Outcome could be assessed separately or all five Outcomes can be jointly assessed as a project. The project could require the candidate to collect all the necessary evidence to include design and development work and sketches, still images as required and supported by electronic evidence saved in an appropriate file format and located on a dedicated storage device easily accessible by the lecturer.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Outcome 2

Create a simple model and a simple environment for a 3D animation for a given client brief

Knowledge and/or Skills

♦ Basic primitive modelling
♦ Basic environment modelling
♦ Texture mapping
♦ File formats
♦ Storage devices
♦ Rendering algorithms

Evidence Requirements

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

♦ create a simple 3D model and a simple 3D environment appropriate to the client brief
♦ apply a minimum of three simulated surface texture maps to the virtual model or within the virtual environment using textures supplied within the software
♦ create a minimum of four full colour renders as suitable still images
♦ save rendered images in an appropriate file format located in a dedicated storage device easily accessible by the lecturer
♦ maintain project sketchbook recording developmental work

Assessment Guidelines

The 3D model and environment designed for Outcome 1 should be the one developed in this Outcome or a new brief may be issued to candidates.

This Outcome could be assessed separately or all five Outcomes can be jointly assessed as a project. The project could require the candidate to collect all the necessary evidence to include design and development work and sketches, still images as required and supported by electronic evidence saved in an appropriate file format and located on a dedicated storage device easily accessible by the lecturer.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Outcome 3

Use lighting effects effectively within a given scene

Knowledge and/or Skills

♦ Lighting
♦ Lighting effects

Evidence Requirements

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

♦ create a minimum of one omni-directional light, one spotlight and one distance light
♦ create a minimum of one shadow effect within the scene
♦ create global illumination to effectively light the simple 3D model and simple 3D environment
♦ control lighting effectively by excluding one object from light sources and show the effects on one object of colour being absorbed and reflected from light sources within a scene
♦ maintain a project sketchbook to record developmental work
♦ electronic files should be saved and located on a storage device easily accessible by the lecturer

Assessment Guidelines

It is recommended that candidates be made aware of the time that a scene can take to render using shadows and that they may have to adjust their original ideas after discussion with their tutor on projected rendering times.

This Outcome could be assessed separately or all five Outcomes can be jointly assessed as a project. The project could require the candidate to collect all the necessary evidence to include design and development work and sketches, still images as required and supported by electronic evidence saved in an appropriate file format and located on a dedicated storage device easily accessible by the lecturer.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Outcome 4

Manipulate cameras and camera lenses to effectively view a scene

Knowledge and/or Skills

♦ Cinematic actions
♦ Cameras in a 3D environment

Evidence Requirements

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

♦ manipulate cameras and camera lenses to effectively view a scene which demonstrates:
— control of cameras
— use of camera angles including: close-up, extreme close-up, wide angle and medium shot
— camera movement
— demonstrate motion blur
♦ identify the following cinematic actions from film clips: tracking, dolly, crab and pull focus.
♦ evidence demonstrating the use of camera angles should be provided in the form of rendered stills in, at least the Open GL format.
♦ evidence for the identification of cinematic actions/techniques should be generated under **closed-book supervised conditions**. Candidates should identify examples from live action cinema or other material which demonstrates the necessary range of camera movement. A project sketchbook should also be maintained to record developmental work, copies of rendered images etc.
♦ electronic files should be saved and located on a storage device easily accessible by the lecturer.

Assessment Guidelines

The film clips provided could range from spaghetti westerns to action movies, whatever is accessible to the centre, however it is not necessary that copyright material is used and any generic filmed material can be used which demonstrates the necessary range of camera movement.

Candidates are required to correctly identify six cinematic actions from ten examples to constitute a pass in this section by means of a tick box.

This Outcome could be assessed separately or all five Outcomes can be jointly assessed as a project. The project could require the candidate to collect all the necessary evidence to include design and development work and sketches, still images as required and supported by electronic evidence saved in an appropriate file format and located on a dedicated storage device easily accessible by the lecturer.

Higher National Unit specification: statement of standards (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Outcome 5

Create a simple 3D computer animation sequence

Knowledge and/or Skills

♦ Treatment
♦ Storyboard
♦ Keyframing
♦ Rendering

Evidence Requirements

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

♦ produce a treatment detailing title, duration, target audience, aims, synopsis and animation techniques to be used
♦ produce a storyboard detailing keyframes in a sequence of at least six images that show the keyframes in the ten second animation
♦ create a simple 3D animation of ten seconds duration that reflects the intentions of the storyboard details
♦ render the animation sequence

The final animation sequence reflecting good industry practice must be submitted in a suitable animation format. The sequence must be saved to an appropriate digital storage device.

Assessment Guidelines

Assessment of this Outcome can be independent from the assessment of Outcomes 1, 2, 3 and 4. However, knowledge gained through completion of this Outcome will contribute directly to the understanding of Outcomes 1, 2, 3 and 4 and therefore all 5 Outcomes can be assessed jointly as a project. As an alternative the project could require the candidate to collect all the necessary evidence, including design and development work, sketches, and still images supported by electronic evidence saved in an appropriate file format and located on a dedicated storage device easily accessible by the lecturer.

It is recommended that candidates be made aware of the time that an animation can take to render and that they may have to adjust their original ideas and storyboards after discussion with their tutor as to projected rendering times.

The animation must be based on the treatment and storyboard that the candidate develops and must be submitted before the animation commences. The storyboard images must be incorporated in the animation and must clearly identify movement of geometry, cameras, lights and background appropriate to treatment. At least five objects should be in motion within the animation along with at least one moving light and one moving camera.

Administrative Information

Unit code: F5GC 34

Unit title: 3D Computer Modelling and Animation: An Introduction

Superclass category: CE

Original date of publication: August 2008

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

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Higher National Unit specification: support notes

Unit title: 3D Computer Modelling and Animation: An Introduction

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 an opportunity to acquire knowledge of the fundamental principles of modelling, lighting, texturing, camera techniques, animation and the use of fundamental rendering algorithms essential in the production of a 3D design solution.

Candidates should be encouraged to create non-complex models at the beginning of the course, and, as knowledge and skills develop, produce more complex geometries.

It should be recognised that modelling, lighting, texturing, camera techniques and animation is a vast subject area and that this Unit is not intended to provide specialist expertise but to develop basic knowledge and to raise the candidates' awareness of fundamental issues in modelling, lighting design, camera use and the animation both functionally and aesthetically. Candidates should fully recognise the importance of these elements which can significantly impact on a 3D design scheme.

Outcome 1

Outcome 1 looks at the use of the 3D software interface and the interpretation of a client brief. Candidates could be encouraged to familiarise themselves with the functions and commands including the use of:

♦   transformation tools (such as Move, Scale, Rotate)
♦   view command tools (such as Zoom, Pan, viewport sizing, viewport number and View Rotate)
♦   commonly used modelling and editing tools

The interpretation of a client brief may be broken down into the different features/requirements of the brief, since the brief requires a simple model and a simple environment in which the model can function and interact with the lights, and cameras. For this Outcome the candidate should create a sketchbook which outlines research for the model and environment, production sketches, designs for a simple model and environment. All development work should be detailed and where necessary referenced within the sketchbook.

Outcome 2

Outcome 2 looks at the use of the 3D software interface to create, render and save as a suitable file format, simple 3D primitives and textures to create a simple 3D model and simple 3D environment to interpret a client brief.

Candidates should be given demonstration in modelling simple geometry and in the use of the texturing, rendering and saving models, and be allocated time to familiarise themselves with the software's features. Candidates will not use all of the functions and commands available to them at this stage.

Higher National Unit specification: support notes (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Candidates should be encouraged to familiarise themselves with the functions and commands including the use and creation of:

♦ simple primitives (such as boxes, spheres, cylinders)
♦ texturing tools (such as Bump map, Opacity, Transparency, Reflections and Refractions)
  Textures used should be those supplied in the modelling software
♦ rendering algorithms
♦ file formats (such as jpeg, tga, tiff)

Outcome 3

This Outcome focuses the Candidates' attention on the essential role that shadows play in lighting. Candidates should be given demonstration in the use lighting a 3D environment. Candidates will not use all of the animation functions and commands available to them at this stage however candidates should be encouraged to experiment with the lighting command tools, (such as Intensity, Colour, Light type and Shadows).

Outcome 4

Candidates should be made familiar with standard cinematic terminology within the context of moving cameras eg: tracking; dolly; crab and pull focus. Candidates should be given demonstration in the use of virtual cameras within a 3D environment. Candidates will not use all of the camera functions and commands available to them at this stage however candidates should be encouraged to experiment with the most commonly used Camera tools, (such as Field of View, Targeted, Free and Lens Size).

There is a closed-book element in this Outcome which requires candidates to identify the following cinematic actions from film clips: tracking, dolly, crab and pull focus. The assessment requires answers to be articulated by means of a tick box. Candidates are required to correctly identify six cinematic actions from ten examples to constitute a pass in this section.

Outcome 5

Candidates should be given demonstration in the use of the animation tools and how they can be applied to geometry, cameras and lighting. Candidates will not use all of the animation functions and commands available to them at this stage however candidates should be encouraged to experiment with adjusting the timeline or length of an animation and how to animate the properties of the entities within the scene and demonstrate suitable keyframing techniques. Candidates will also be required to produce suitable storyboards and a treatment that meets the given brief.

Higher National Unit specification: support notes (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Guidance on the delivery and assessment of this Unit

This Unit is likely to form part of a Group Award designed to provide candidates with the technical knowledge and skills for employment within a computer-aided design environment. It is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Unit has been developed as part of the HND 3D Computer Animation Group Award. If this Unit is delivered as part of this Group Award it is recommended that opportunities be taken to link or integrate with other aspects of the course and a thematic approach adopted for both delivery and assessment. The candidate's learning experience would be greatly enhanced if this Unit were delivered prior to, or along with, project-based animation Units.

As candidates will have limited or no knowledge of any of the processes involved in designing, modelling, texturing, rendering, lighting and rendering for a 3D model or animation the delivery should be informative — lecture/seminar based. Content should focus on the fundamental principles of animation.

Guest lecturers with specialist knowledge and external site visits could be beneficial as could group tasks to encourage active discussion.

Candidates should be encouraged to use a wide variety of research sources and to show initiative in finding original sources of research. The use of commercial 3D materials as sources of inspiration and as teaching resources should be actively encouraged.

A typical delivery pattern may be:

- Introduction to the Unit (1)
- Overview of the capabilities of 3D software — Simple Modelling (1)
- Interpreting a brief and sketches (1)
- Working towards Outcome One — Brief, Sketches (2)
- Simple Modelling — demonstration and practice of basic tools (4)
- Creation of models (2)
- Lighting overview (1)
- Lighting — demonstration and application of techniques (2)
- Textures — demonstration and practice of operations (2)
- Texturing — demonstration and application of techniques (1)
- Animation — demonstration and practice of basic skills (1)
- Animation of final piece (4)
- Render and Saving of final material (1)
- Remediation (1)

Higher National Unit specification: support notes (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

According to this proposed delivery schedule the assessments for each of the Outcomes should have the following pattern:

Outcome 1: Week 5
Outcome 2: Week 11
Outcome 3: Week 14
Outcome 4: Week 17
Outcome 5: Week 23

Outcome 1

Content should focus on how to interpret a client brief and produce sketches that convey how the candidate intends to produce a solution using the 3D software tools available.

Candidates should also be shown how to use the basic features of the software package.

Outcome 2

Content should focus on the fundamental principles of modelling, texturing and rendering rather than an expert level of technical knowledge.

Texturing should be related to real life scenarios explaining how materials reflect their environment in various conditions. This relates directly to environment creation and the teaching of both should overlap.

Rendering should examine various types of rendering algorithms available to the candidate and how the choice of algorithm can greatly enhance a scene and affect rendering times.

Outcome 3

Content should focus on the fundamental principles of lighting rather than an expert level of technical knowledge.

Lighting should be related to real life scenarios explaining how light can be absorbed and reflected and how various lighting types and shadows can greatly affect a 3D scene in various conditions.

Outcome 4

Content should focus on the fundamental principles of camera techniques rather than an expert level of technical knowledge.

Camera use should be related to real life scenarios explaining how good and bad camera techniques greatly enhance or detract from a scene. This relates directly to environment creation and the teaching of both should overlap.

Higher National Unit specification: support notes (cont)

Unit title: 3D Computer Modelling and Animation: An Introduction

Outcome 5

Attention should be paid to the use of paths within animation and how it simplifies the movement of geometry and cameras within an animation. Content should focus on the fundamental use of animation within a scene, rather than an expert level of technical knowledge. Candidates should be encouraged to create non-complex models at the beginning of the course, and, as knowledge and skills develop, produce more complex geometries.

The completed animation file should show a developing knowledge of the use of animation on a 3D design scheme. This animation file should be suitably storyboarded and a suitable treatment developed.

Candidates need only demonstrate a very basic understanding of the role of a storyboard and treatment at this stage but they must provide evidence that reflects good industry practice.

Opportunities for developing Core Skills

All elements of the Core Skill of *Problem Solving* and *Information Technology* should be naturally developed and enhanced as the Unit is completed.

Problem solving is used in interpreting the briefs and manipulating and modifying the animated solutions. IT skills are used when using different file types and transferring and saving files

Open learning

This Unit could be delivered by distance learning, which may incorporate some degree of on-line support. Candidate would require access to appropriate learning materials and 3D software. With regard to assessment, arrangements would need to be made by the centre to ensure the sufficiency and authenticity of candidate evidence.

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 Computer Modelling and Animation: An Introduction

The Unit is designed to provide you with opportunities to acquire knowledge of the fundamental principles of modelling, lighting, texturing, camera techniques, animation and the use of fundamental rendering algorithms essential in the production of a 3D design solution. You may be encouraged to create non-complex models at the beginning of the course, and, as your knowledge and skills develop, produce more complex geometries.

It should be recognised that modelling, lighting, texturing, camera techniques and animation is a vast subject area and this Unit is intended to develop your basic knowledge and to raise your awareness of fundamental issues in modelling, lighting design, camera use and the animation both functionally and aesthetically, not to provide you with specialist expertise. If you complete the Unit, you should fully recognise the importance of modelling, lighting, texturing, correct use and placement of cameras and animation within 3D design and recognise that lighting and its effects can significantly impact on a 3D design scheme as can the correct use of cameras.

Throughout the Unit you may create and manipulate simplistic 3D models using a variety of tools from within a 3D modelling package. The models will be simplistic geometry to optimise the polygon count making models easier to render. You will have to demonstrate simple animation techniques by producing an animated sequence incorporating a variety of animation techniques.

All elements of the Core Skill of *Problem Solving* and *Information Technology* should be naturally developed and enhanced as the Unit is completed.

Problem Solving is used in interpreting the briefs and manipulating and modifying the animated solutions. IT skills are used when using different file types and transferring and saving files.