



## Higher National Unit specification

### General information for centres

**Unit title:** 3D Computer Animation: Surface Texturing and Shading

**Unit code:** F562 34

**Unit purpose:** This Unit is designed to enable candidates to acquire a better understanding of the techniques of texture creation, applying texture to a model in a 3D environment and thereafter rendering the scene with suitable shaders applied.

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

- 1 Create and edit a texture in a bitmap program.
- 2 Apply 2D Textures within a 3D Environment.
- 3 Render 3D model with applied textures to a given brief.

**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 would benefit by having an understanding of basic 2D and 3D Computer Animation terminology and a 2D bitmap editing graphics package. Candidates should have a basic understanding of the manipulation of bitmap graphics and the planning process for producing design solutions within the constraints of a design brief. This may be evidenced by the possession of relevant National Units, HN units or experience. Higher Art and Design and/or Craft Design and Technology would provide useful background knowledge but are not essential to success in this Unit. It is recommended that Candidates should be aware of the meaning of the following terminology, resolution, bump map, alpha channel, tiling, displacement map, and UV map.

**Core Skills:** There are opportunities to develop the Core Skills of *Information Technology* and *Problem Solving* at SCQF level 6 in this Unit, 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.

## **General information for centres (cont)**

**Assessment:** Outcome 1 requires the candidate to create and edit a 2D texture in a bitmap graphics programme. Outcome 2 requires the candidate to map the 2D texture onto a 3D model. Outcome 3 requires the model to be rendered with the texture mapped to fit the model accurately.

## Higher National Unit specification: statement of standards

**Unit title:** 3D Computer Animation: Surface Texturing and Shading

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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 and edit a texture in a bitmap program

#### Knowledge and/or Skills

- ◆ Resolution
- ◆ RGB Colour space
- ◆ Bitmap file formats
- ◆ Layers
- ◆ Alpha Channels
- ◆ Displacement Map
- ◆ Bump Map
- ◆ Tiling

#### Evidence Requirements

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

- ◆ work at the correct dimension, size, resolution and colour space
- ◆ create a texture in a 2D bitmap image editing paint programme and save to correct bitmap file format
- ◆ create a Bump Map works in a bitmap file format
- ◆ create a Displacement Map
- ◆ create an Alpha Channel to use as a transparency mask
- ◆ create and apply tiling with and without seams

Candidates should produce and edit a texture in a Bitmap image-editing programme. The Candidate could use a digital camera or scanner to capture real world textures before editing in a bitmap graphics programme. This Outcome could be assessed individually however there is an opportunity for integration of this Outcome as part of a holistic integration of Outcomes 1–3 and if used in this way, an assessment matrix should be devised.

## **Higher National Unit specification: statement of standards (cont)**

### **Unit title:** 3D Computer Animation: Surface Texturing and Shading

#### **Assessment Guidelines**

Candidates will be encouraged to investigate and research the possibilities working to a brief and an agreed deadline using a 2D bitmap graphics paint programme to create textures before they are applied within a 3D environment. Alpha Channels may be used as a transparency mask. These have to be saved in a format that supports transparency. A Bump Map is a grayscale image. The lighter areas are rendered as raised portions of the surface and darker areas are rendered as depressions. A Displacement Map works in a similar way to a Bump Map but doesn't fake the deformation a rough surface can be produced from a texture by changing the position of vertices. This process is utilized a lot in 3D Landscape generation. Candidates should make a formal presentation of their ideas and solutions to the tutor. This should be followed by questioning and feedback. This may be part of a group or peer review. A written evaluation report could be produced relating to the effectiveness of the finished texture.

#### **Assessment**

The assessment for Outcome 1 will require candidates to create and edit a 2D texture in a bitmap graphics program. For Outcome 1 candidates should work to a given brief/instruction that would provide source material from which candidates will extract the information necessary to create a 2D digital image. The level and number of images should be determined by the tutor and would vary according to the complexity of the images selected. 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 by accurately applying the image created for Outcome 1 across the provided 3D models planes. This maybe done by unwrapping the model mesh creating a UV Map to give you a flat template, the candidate could then colour code it to aid in reminding them what surface they are working on before they import the texture and apply it to their model.

For Outcome 3 Candidates should combine their knowledge of Outcome 1 and Outcome 2 to accurately render out the finished model applying suitable lighting parameters which will involve establishing the materials surface properties and the environment that the model inhabits; this will have a significant effect on which ambient, diffuse or specular shaders to employ.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** 3D Computer Animation: Surface Texturing and Shading

### Outcome 2

Apply 2D Textures within a 3D Environment

#### Knowledge and/or Skills

- ◆ Import texture
- ◆ Scale
- ◆ Mapping
- ◆ Align
- ◆ Alpha Channels

#### Evidence Requirements

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

- ◆ apply texture to 3D simple box model provided
- ◆ import textures into a 3D application
- ◆ scale texture along set parameters
- ◆ create an unwrap map
- ◆ align texture along the u.v.w and map all faces of model
- ◆ apply Alpha channels to create transparency
- ◆ apply Bump Maps to create differences in heights to create illusion of depth
- ◆ apply Displacement Maps to change the position of geometry
- ◆ models used should be basic, examples found in support notes

#### Assessment Guidelines

Using a model supplied, candidates could apply texture and could explore the different methods of wrapping the texture to the model, using the unwrap uvw mapping using vertex edge and face.

To allow the texture to apply itself accurately a UV map could be constructed. The texture should fit perfectly as long as you do not add any more objects to the model.

The candidate could apply a different colour to each UV map so that they may easily see it on the model. With a displacement map a genuinely rough surface could be produced; generated from a greyscale texture by changing the position of vertices in a similar way that a Bump Map works only the Displacement Map affects the geometry and position of the vertices and doesn't fake it like Bump maps do.

A series of exercises could be produced to demonstrate the variety of different effects that Alpha Channels, Bump Maps and Displacement Maps can have on a primitive 3D model. These could be applied from Outcome 1.

## **Higher National Unit specification: statement of standards (cont)**

**Unit title:** 3D Computer Animation: Surface Texturing and Shading

### **Outcome 3**

Render 3D model with applied textures to a given brief

#### **Knowledge and/or Skills**

- ◆ Import 3D model
- ◆ Apply lighting
- ◆ Apply texture
- ◆ Set resolution
- ◆ Set dimensions
- ◆ Set properties
- ◆ Choose appropriate shaders
- ◆ Render Scene

#### **Evidence Requirements**

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

- ◆ select and evaluate suitability of imported 3D model
- ◆ select suitable lighting to reflect purpose of the brief
- ◆ apply texture at set resolution and dimensions in accordance with the brief
- ◆ create appropriate shaders
- ◆ Adjust Ambient, Diffuse and Specular shader properties to reflect the nature of the surface texture and environment
- ◆ preview final render
- ◆ output final rendered scene in a format suitable for presentation to a client
- ◆ save to an appropriate format

#### **Assessment Guidelines**

Outcome 3 requires Candidates to produce a fully rendered scene or sequence that requires all elements learned and practiced in Outcomes 1 and Outcomes 2. The candidate should accurately render out the finished model applying suitable lighting parameters which will involve establishing the material's surface properties and the environment that the model inhabits; this activity will have a significant effect on which ambient, diffuse or specular shaders to employ.

Evidence for this Outcome could be submitted in the form of a digital file or hard copy consisting of the rendered image.

## Administrative Information

**Unit code:** F562 34

**Unit title:** 3D Computer Animation: Surface Texturing and Shading

**Superclass category:** JB

**Original date of publication:** August 2008

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### History of changes:

Version	Description of change	Date

**Source:** SQA

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## **Higher National Unit specification: support notes**

### **Unit title: 3D Computer Animation: Surface Texturing and Shading**

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 images, with application of suitable textures generated or edited in a 2D environment. Candidates will evaluate source material and correctly dimension it in order to be able to accurately apply it to a 3D model, which as a result creates an accurate and realistic rendered, textured 3D digital image from the original source material.

For Outcome 1 candidates should work to a given brief/instruction providing the candidate with source material from which the candidate will extract the information necessary to create a 2D digital image which will function as a texture, applied to a 3D model. The level and number of images should be determined by the tutor and would vary according to the complexity of the images selected. 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 by accurately applying the image created for Outcome 1 across 3D models planes provided for this purpose. This maybe done by unwrapping the model mesh creating a UV Map to give a flat template, the candidate could then colour code it to aid in reminding them what surface they are working on before they import the texture and apply it to their model.

For Outcome 3 Candidates should combine the knowledge and skills gained in completing Outcomes 1 and 2 to accurately render out the finished model, applying suitable lighting parameters which will involve establishing the materials surface properties and the environment that the model inhabits; this activity will have a significant effect on which ambient, diffuse or specular shaders to employ.

It is expected that the candidate will have gained some computer competencies before taking this Unit. It is therefore suggested that this Unit is introduced at a later stage of the delivery of the awards. This Unit may be taught as a stand alone Unit. However, it is possible that this Unit can be integrated with other practical based Units.

Assessment could be continuous, and could be assessed holistically on completion of all three Outcomes. The Unit may be linked/integrated with suitable Units in the HNC/D 3D Computer Animation Group Award 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 source material to work from, or they could provide it themselves. The tutor delivering the Unit can determine the suitability of any proposed material. The source material could be 2D and have been produced as part of another design Unit.

Assessment evidence could show visual evaluation of the source material, in the form of sketches and mood boards. This could be in the form of a digital file or hard copy and could be accompanied by a series of 2D images that demonstrate the candidate's practical application of their skills and knowledge.



## Higher National Unit specification: support notes (cont)

### Unit title: 3D Computer Animation: Surface Texturing and Shading

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

#### *Opportunities for developing Core Skills*

Candidates could be required as they undertake the Unit to analyse and seek solutions to a range of theoretical and practical issues involved in 3D Surface and Texturing. Formative work in which they are encouraged to identify and consider the variables in a range of situations, including all available resources, and to analyse the significance of each before identifying and justifying an appropriate approach will be valuable. The application of knowledge in the design and production of a screen based presentation will provide opportunities to develop problem solving and technology skills to an advanced level. Evaluation which examines all stages of proposed design solutions and their potential and actual impact should be on-going. Skills in developing an effective search strategy for accessing and evaluating paper based and electronic sources of current complex information on professional considerations, issues and ideas could be developed. The production of drafts for research and presentations will support the development of skills in effective evaluation and collating of relevant research materials, and up to date software packages could support all aspects of the research and design process.

Although communication skills are not formally assessed candidates could be expected to analyse, produce and present written or oral materials to standards acceptable in industry, and to express essential ideas, information accurately and coherently. They could be encouraged to consider the most appropriate approach and to ensure that what they decide to communicate has been considered, is accurate and is designed for impact and effectiveness. Presentations could have the facility to demonstrate that they can:

- ◆ collate, organise and structure information effectively
- ◆ signpost key points
- ◆ select and produce support materials for impact
- ◆ be supported where appropriate by non-verbal communication techniques
- ◆ include a facility to respond to questions in a way that progresses communication

### Open learning

This Unit could be delivered by open learning provided the candidate has access to the appropriate hardware and software required of the Outcomes.

### Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* ([www.sqa.org.uk](http://www.sqa.org.uk)).

## General information for candidates

### Unit title: 3D Computer Animation: Surface Texturing and Shading

The Unit will provide you with the knowledge to develop an understanding of 3D Surfacing and Texturing. You will be given a brief to analyse and then required to research and develop ideas.

You should learn how to use various techniques used in the production and editing of bitmap graphics, such as, shading, blending, stretching, skewing, rotating, guides, and grids.

You will then communicate your ideas to others and finally produce a realistically textured model. You will develop technical competences and integrate them within the creative process.

**Outcome 1** will require you to create and edit a 2D texture in a bitmap graphics programme. For this Outcome you will work to a given brief/instruction that provides you with source material from which you will extract the information necessary to create a 2D digital image. The level and number of images should be determined by the tutor and would vary according to the complexity of the images selected. Evidence for this Outcome could be submitted in the form of a digital file or hard copy.

**Outcome 2** you should demonstrate your ability by accurately applying the image created for Outcome 1 across the 3D models planes provided. This may be done by unwrapping the model mesh creating a UV Map to give you a flat template, you should then colour code the model mesh to remind you what surface you are working on before importing the texture and applying it to your model.

**Outcome 3** requires you to produce a fully rendered scene or sequence that demonstrated all the elements learned and practiced in Outcomes 1 and 2. To accurately render out the finished model and apply suitable lighting parameters will involve establishing the materials surface properties and the environment that the model inhabits and this will have a significant effect on which ambient, diffuse or specular shaders to employ.

### Delivery and Assessment

As this is seen as a summation of skills and knowledge gathered throughout the overall course of this Unit. You should also export stills of a suitable output quality and resolution from your projects as you go, for inclusion into a portfolio of work which may be examined in detail.

Final submission should include a finished Render, with texture that you created properly mapped onto the 3D model provided. You will be assessed on the quality and suitability of your texture and the way it is applied within a 3D environment to a given brief. It must be fully rendered saved to disk or other suitable digital format and presented to the client.