Course guide
804225 - M3D - 3D Modelling

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.
Degree: BACHELOR'S DEGREE IN VIDEO GAME DESIGN AND DEVELOPMENT (Syllabus 2014). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, English

LECTURER

Coordinating lecturer: Pau Sánchez
Others: Pau Sánchez
Paula Martín

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Design, model, texturise and animate 2D and 3D objects, characters and scenes for inclusion in digital projects, audiovisual sequences and video games.
2. Master the wide range of professional tools in the sector for developing all kinds of digital content.
3. Schematically and visually represent complex concepts, ideas and/or data based on personal skills and external references, in order to convey attractiveness, originality and creativity.

Transversal:
4. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
6. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

TEACHING METHODOLOGY

The subject is eminently practical. As a consequence, the proposed methodology, with the exception of the first class, which will be purely introductory, will have the following structure:
The initial twenty minutes will be used for the clarification and resolution of doubts regarding the exercise proposed in the previous class.
The following eighty minutes will proceed to a masterful explanation of the new topic and / or procedure to work on.
The last twenty minutes will be used for the presentation and proposal of the next exercise to be carried out, which will be directly linked to the previous master class.
LEARNING OBJECTIVES OF THE SUBJECT

· Understand the concepts of three-dimensional modeling and its relationship with the different areas of design and artistic disciplines.
· Know the most used professional 3d design tools at a professional level.
· Understand the work methodology used by video game studies, analyze the importance of teamwork and learn to identify good practices when working.
· To know the most important specific video game techniques and their application to the content created by the graphic designers.
· Learn the basics of 3d modeling, texturing and lighting.
· Recognize the particularities of 3d design applied to the world of video games and interactive applications.
· Introduce work with digital sculpture.
· Use the content of the subject to create professional quality models.
· Adapt the application of 2d design concepts and illustration in the creation of textures for 3d models.
· Use the content of the subject for the elaboration and application of textures on a three-dimensional model following the most common techniques.
· Carry out the exercises proposed in the subject applying a correct structure, presentation and time planning, accompanied by a good spelling and grammar level.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>24,0</td>
<td>16.00</td>
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<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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<tr>
<td>Hours medium group</td>
<td>16,0</td>
<td>10.67</td>
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<tr>
<td>Guided activities</td>
<td>20,0</td>
<td>13.33</td>
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Total learning time: 150 h

CONTENTS

1. Introduction

Description:
Basic concepts of three-dimensional space
Coordinate systems
Program interface
Customization and menus
Navigation.
Modeling process: creation and manipulation of objects.
Finishing and output processes: materials, lights, cameras and renderings

Specific objectives:
Know the basic concepts of any three-dimensional space.
Know the interface of the 3Ds MAX program

Related activities:
Non-evaluable activity: independently investigate the operation of the program

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h
### 2. Poly modelling

**Description:**
- Polygonal modeling tools
- Subobjects
- Selection tools
- Loops and rings
- Copy / Instance / Reference
- Creating simple objects from primitives
- Polycount
- History
- Work organization techniques
- Template generation
- Complex shapes from 2D shapes
- Parametric modifiers
- Advanced polygonal modeling tools
- Free modifiers
- Work at Lowpoly
- Compound objects
- Modeled from composite objects

**Specific objectives:**
Demonstrate knowledge and know how to apply concepts related to flat and three-dimensional representation and the control of the visualization of objects and scenes, using computer programs for graphic representation.

**Related activities:**
- Design and creation of usual objects from 2D shapes
- Design and creation of industrial and furniture elements created from primitives

**Full-or-part-time:** 33h
- Theory classes: 6h
- Guided activities: 9h
- Self study: 18h
4. Character modelling

Description:
Character modeling
References
Most common errors: T-shapes, non mainfold geometry, nGons.
Modeling with simple primitives
Modeling of a bust
Hair modeling, Hi poly and Low poly techniques
Modeling based on subdivision surfaces
Poly to poly modeling
Anatomy of a figurative human body
body, limbs and hands
Modeling of a mimetic human body
3dsMAX digital sculpture tools
Modeling paradigm shift
Other digital sculpture programs and / or tools: Maya, Mudbox and zBrush
Preparation of geometry
Molding brushes
HiPoly vs LowPoly
Polygonal reduction
Processes and tools of retopology
Reduction levels.
Retopology has since 3dsMAX.
Other retopology programs.
Normal maps: extraction and application
Displacement maps

Specific objectives:
Know the basic concepts of geometry to generate bodies and surfaces, and know how to apply them in the modeling of 3D objects and scenes

Related activities:
Modeling of simple shapes: fruits, simple insects, claws
Modeling a doll or any trinket
Modeling a head
Modeling a mimetic human body.

Full-or-part-time: 55h
Theory classes: 6h
Guided activities: 9h
Self study : 40h
<table>
<thead>
<tr>
<th>5. Materials</th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
</tr>
<tr>
<td>The materials editor</td>
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<tr>
<td>Shading trees</td>
</tr>
<tr>
<td>Differences between maps and textures</td>
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<tr>
<td>Procedural textures</td>
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<tr>
<td>Multimaterials</td>
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<tr>
<td><strong>Specific objectives:</strong></td>
</tr>
<tr>
<td>Know how to use different three-dimensional modeling and texturing techniques, taking into account the characteristics or type of application for which the 3D model is being generated.</td>
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<tr>
<td><strong>Related activities:</strong></td>
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<tr>
<td>Textured from a polygonal exercise done above.</td>
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<tr>
<td><strong>Full-or-part-time:</strong></td>
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<tr>
<td>Theory classes: 2h</td>
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<td>Guided activities: 5h</td>
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<td>Self study : 4h</td>
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<tr>
<th>6. UV Unwrapping</th>
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<tr>
<td><strong>Description:</strong></td>
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<tr>
<td>UV theory</td>
</tr>
<tr>
<td>Advanced unwrap</td>
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<tr>
<td>Deployed UVs</td>
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<td>UV packaging</td>
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<td>UV sets.</td>
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<tr>
<td>Unfold and relax</td>
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<td>Exporting UVs to Photoshop</td>
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<td>Painted textures in Photoshop</td>
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<tr>
<td>Occlusion maps</td>
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<tr>
<td><strong>Specific objectives:</strong></td>
</tr>
<tr>
<td>Know how to use different three-dimensional modeling and texturing techniques, taking into account the characteristics or type of application for which the 3D model is being generated.</td>
</tr>
<tr>
<td><strong>Related activities:</strong></td>
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<tr>
<td>Mapping of a previous organic modeling exercise</td>
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<td><strong>Full-or-part-time:</strong></td>
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<tr>
<td>Theory classes: 2h</td>
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<td>Guided activities: 5h</td>
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<td>Self study : 10h</td>
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7. Lighting

**Description:**
Types of lights  
Basic lighting models  
Outdoor lighting  
Generation and typology of shadows

**Specific objectives:**
Know how to use different lighting techniques, taking into account the characteristics or type of application for which the 3D model is being generated.

**Related activities:**
Creation and subsequent lighting of a composition from the elements previously mapped.

**Full-or-part-time:** 13h  
Theory classes: 2h  
Guided activities: 5h  
Self study: 6h

8. Scene visualization

**Description:**
Camera types and settings  
Differences from real cameras  
Render engines: common and uncommon parameters  
Adding effects  
Render reflections and refractions  
Render by channels  
Output formats: sequence of still images and / or video

**Specific objectives:**
Know how to plan the most appropriate workflow in the different rendering phases, as well as know the most appropriate rendering parameters for a given 3D design.

**Related activities:**
Addition of at least two cameras with different views and also different settings from the previous scene. Obtaining three renderings of different qualities with an explanation of how they were obtained.

**Full-or-part-time:** 17h  
Theory classes: 2h  
Guided activities: 5h  
Self study: 10h

ACTIVITIES

**Partial exam**

**Description:**
Score exam 20%  
Part A: Modeling an industrial element according to different techniques. From primitive forms and from two-dimensional forms.  
Part B: Test

**Full-or-part-time:** 4h  
Self study: 4h
## Final exam

**Description:**
Exam score 30%
Part A: Modeling in an organic body from a model.
Part B: Test

**Full-or-part-time:** 4h
Self study: 4h

## GRADING SYSTEM

Practices:
- Polygonal modeling practices: 10% of the final grade.
- Organic modeling practices: 15% of the final grade.
- Practices of the materials and maps: 7.5% of the final grade.
- Lighting and visualization practices: 7.5% of the final grade.
- Student attitude and participation: 10% of the final grade

Partial exam: 20% of the final grade.
Final exam: 30% weight on the final grade.

Students who fail will have the chance to take the reevaluation exam. The mark of this exam will replace the mark of the partial and final exams and, in case of passing the course, the maximum final mark will be a 5.

## EXAMINATION RULES.

The practices will be carried out individually outside the classroom.
In a generic way, they will always use the first thirty minutes of each class to solve any doubts that may exist in the exercises.
All the practices will be delivered in the corresponding folder of the campus in the established term. Failure to deliver a practice or part of it will mean the loss of its value in the final grade.

## BIBLIOGRAPHY

**Basic:**

**Complementary:**
- Lurino, Luciano. 3D Environment Lighting . 3dTotal.com,
- 3DTotal Ltd. . Modeling Human Anatomy, 3dTotal.com,

## RESOURCES

**Other resources:**
Digital Texturing and Painting
Owen Demers

Digital Lighting and Rendering
Jeremy Birn
Available in Spanish by Anaya

Creating the Art of the Game
Matthew Omernick
3D Game Textures: Create Professional Game Art Using Photoshop
Luke Ahearn

Photoshop for 3D Artists: Volume 1: Enhance Your 3D Renders!
Andrzej Sykut, Fabio M. Ragonha, Zoltan Kocesok, Richard Tilbury, 3DTotal Team (Editor)

Commercial video tutorials:
www.thegnomonworkshop.com
www.digitaltutors.com
www.lynda.com

http://area.autodesk.com /
www.cgchannel.com
Comunitat d'artistes digitals. It complies with debates on programs and with the possibility of accessing various resources, tutorials and online workshops.

www.cgpersia.com
Web and resource forum and tutorials d'aprenentatge of the latest versions of programs. Molts dels seus resources are structured and ordered by marques and commercial programs.

www.3dpoder.com
Resources and tutorials destined to l'aprenentatge of the virtual representation in three dimensions.

www.foro3d.com
Forum of resolution of dubtes and debate of 3dpoder.com