



## Course guide

### 804225 - M3D - 3D Modelling

**Last modified:** 15/09/2024

**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:** 2024    **ECTS Credits:** 6.0    **Languages:** Catalan, English

#### LECTURER

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**Coordinating lecturer:** Pau Sánchez

**Others:** Pau Sánchez  
Josep Serrano

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**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

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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

Type	Hours	Percentage
Hours large group	24,0	16.00
Hours medium group	16,0	10.67
Self study	90,0	60.00
Guided activities	20,0	13.33

**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 manifold 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



## 5. Materials

### Description:

The materials editor  
Shading trees  
Differences between maps and textures  
Procedural textures  
Multimaterials

### Specific objectives:

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.

### Related activities:

Textured from a polygonal exercise done above.

### Full-or-part-time: 11h

Theory classes: 2h  
Guided activities: 5h  
Self study : 4h

## 6. UV Unwrapping

### Description:

UV theory  
Advanced unwrap  
Deployed UVs  
UV packaging  
UV sets.  
Unfold and relax  
Exporting UVs to Photoshop  
Painted textures in Photoshop  
Occlusion maps

### Specific objectives:

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.

### Related activities:

Mapping of a previous organic modeling exercise

### Full-or-part-time: 17h

Theory classes: 2h  
Guided activities: 5h  
Self study : 10h



## 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

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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.

Irregular actions that may lead to a significant variation of the grade of one or more students constitute a fraudulent performance of an evaluation act. This action entails the descriptive grade of failure and a numerical grade of 0 for the ordinary global evaluation of the course, without the right to re-evaluation.

If the lecturers have indications of the use of AI tools not allowed in the evaluation tests, they may summon the students concerned to an oral test or a meeting to verify the authorship.

## EXAMINATION RULES.

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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

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**Basic:**

- Ascent, Co.. Autodesk 3ds Max 2021 Fundamentals. ISBN 978-1-63057-352-2.

- Murdock, Kelly L. . Autodesk 3ds Max 2021 Complete Reference Guide. ISBN 978-1-63057-334-8.

**Complementary:**

- 3DTotal Ltd. . Modeling Human Anatomy. 3dTotal.com,

- Birn, J. Iluminación y render. 2017. Anaya Multimedia, ISBN 9788441520912.

- Lurino, Luciano. 3D Environment Lighting . 3dTotal.com,

## RESOURCES

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**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 Korcsok, Richard Tilbury, 3DTotal Team (Editor)

Commercial video tutorials:  
[www.thegnomonworkshop.com](http://www.thegnomonworkshop.com)  
[www.digitaltutors.com](http://www.digitaltutors.com)  
[www.lynda.com](http://www.lynda.com)

<http://area.autodesk.com> />  
[www.cgchannel.com](http://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](http://www.cgpersia.com)

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

[www.3dpoder.com](http://www.3dpoder.com)

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

[www.foro3d.com](http://www.foro3d.com)

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