



ACADEMIC PROGRAM

3D CONTENT DEVELOPMENT

B.F.A. IN INTERACTIVE PRODUCT DESIGN

MODALITY: ON CAMPUS

ACADEMIC YEAR: 2023-2024

Name of the course:	3D content development
Degree :	Interactive Product Design
Location:	Centro Universitario de Tecnología y Arte Digital
Modulo:	Ideation and Concept Design
Area:	Audiovisual Production and Development
Year:	3º
Teaching period:	1º
Type:	OB
ECTS credits:	6
Teaching modality:	On campus
Language:	English
Lecturer / Email	Juan González Leiva/juan.leiva@u-tad.com
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SUBJECT DESCRIPTION

Area description

This subject belongs to the module of Conceptual Design and Ideation and, within this, to the area of Audiovisual Production and Development.

This area refers to the study and practice of the set of fundamental artistic techniques of creation and their application to the digital environment, such as video games. In it, the student obtains diverse skills related to art, and acquires the necessary knowledge of digital tools that will allow them to use them.

Subject description

The subject of 3D Content Creation provides the skills to understand in a global way the process of interactive design, especially video games, placing value on plastic expression. It develops in students the necessary skills for their autonomy as creators of interactive products, also favouring the integration of the future professional in multidisciplinary teams and greatly enriching their professional profile.

COMPETENCIES AND LEARNING OUTCOMES

Competencies

BASIC AND GENERAL

GC12 - Express a critical and self-critical sense and the ability to analyse in order to evaluate different alternatives.

GC1 - Lifelong learning through self-study and continuous training.

GC2 - Knowing how to adapt to change and new situations with flexibility and versatility.

GC3 - Develop creativity and innovation and have the ability to present new resources, ideas and methods in order to subsequently turn them into actions.

GC5 - Demonstrate initiative and entrepreneurial spirit.

GC6 - Demonstrate motivation for quality.

CB1 - That students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2 - Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3 - Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements that include reflection on relevant social, scientific or ethical issues.

CB4 - Students are able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5 - That students have developed those learning skills necessary to undertake further study with a high degree of autonomy.

SPECIFIC

SC5 - Understand the influence of sociology, philosophy and psychology in their correlation with the history of art, literature and games as a reference in the creative process.

SC8 - Evaluate the ethical, technical and creative implications of technology in the design of interactive products.

SC9 - Understand the principles of audiovisual narrative to develop discourses and stories applicable to interactive products.

SC10 - Knowing the techniques of artistic representation and design of 2D and 3D content.

SC11 - Apply creativity in the digital content environment.

SC14 - Apply the fundamentals of narrative to the development of interactive products.

SC15 - Analysing the characteristics and needs of users in the humanistic environment as a fundamental element in the design of interactive products.

SC17 - Apply the fundamentals of animation on computer-generated models.

SC18 - Apply theoretical and practical knowledge of product design for content development.

Learning outcomes

Transforming a concept or message into a graphic representation

Experiment with different drawing techniques

Use visual language knowledge to build basic designs

Transferring knowledge of the psychological and perceptual effects of light, colour, music and sound to game design

Use symbolism and iconography to convey information

Create coherent visual worlds

Identify the most appropriate geometry representation method for each type of shape or space

Differentiate and categorize the different processes that take place in the generation of graphs within the graphical pipeline model.

Develop insight into bi-dimensional and three-dimensional geometry.

CONTENTS

- Introduction to 3D modeling
- Geometry mapping
- Shading
- Creation of 3D textures
- Lighting and rendering
- Creation of 3D environments
- Export to game engines

SUBJECT SYLLABUS

Topic 1. Introduction to 3D modelling

1.1. Fundamentals of 3D modelling.

1.1.1. Modeling tools interface.

1.1.2. Transformations and transformation centres.

1.1.3. Geometry components: vertices, edges, polygons

1.1.4. Copies and instances.

1.2. Polygonal modelling.

1.2.1. Polygonal modelling vs. nurbs

1.2.2. Concepts: Tris /Quads, Edge loops.

1.2.3. Fundamental operations

1.3. Modelling strategies.

1.3.1. Extrusions.

1.3.2. Symmetric objects: axial and radial symmetry

1.4. modelling by subdivision

Topic 2. Geometry Mapping

2.1. Notion of mapping.

2.1.1. Projections

2.2. Editing UV's

2.2.1. UV Space

2.2.2. Basic operations with the UV editor

Topic 3. Texture creation and texturing

3.1. Texture banks

3.2. Formats and sizes

3.3. Photocomposition and creation

3.3.1. 2D techniques on UV layout

3.3.2. 3D techniques on the model

3.4. Generation of normal maps

Topic 4. Lighting and rendering

4.1. Initial concepts: Lighting, shading and rendering

4.2. Types of rendering and their properties

4.2.1. Real-time rendering

4.2.2. PBR

4.3. Light types and properties

4.3.1. Dynamic and static lights

4.4. Lighting schemes

Topic 5. Materials

5.1. Notion of shader

5.1.1. Relationship between shading, lighting and rendering

5.1.2. Materials in UNREAL

5.2. Constants

5.2.1. Base colour

5.2.2. Metallic and roughness control

5.2.3. Use of normal maps

5.2.4. Detail maps

5.3. Basic nodes

5.3.1. Multiplication and addition

5.3.2. Linear interpolation

5.3.3. Inversion

Topic 6. Creating environments

6.1. Graphical pipeline. 3D content production

6.2. Introduction to Modular Environment Creation

6.2.1. Prototyping

6.2.2. Instantiation and replacement of assets

6.3. Lighting and rendering in real time

6.3.1. Secondary sets of UV's

Topic 7. Export to game engines

7.1. Optimisation

7.1.1. Geometry optimisation

7.1.2. LOD Notion

7.1.3. Optimisation of mapping: tiling and overlapping

7.2. Export/import formats

7.2.1. Exporting geometry

7.2.2. Workflow Modelling programme-UNREAL and vice versa 7.2.3.

7.2.3. Content migration

TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
<i>Theoretical classes</i>	30,00	30,00
<i>Seminars and workshops</i>	3,33	3,33
<i>Practical classes</i>	20,67	20,67
<i>Tutorials</i>	4,00	4,00
<i>Evaluation Activities</i>	6,00	6,00
<i>Group work and study</i>	17,67	0,88
<i>Autonomous and individual study and work</i>	68,33	0,00
TOTAL	150	65

Teaching methodologies

Expository method/Master lecture

Case studies

Exercise and problem solving

Problem-based learning

Cooperative learning

TEMPORAL DEVELOPMENT

- Topic 1 Introduction to 3D modelling: 5 weeks
- Topic 2 Mappinggeometry: 4 weeks
- Topic 3 Texture creation and texturing: 1 week
- Topic 4 Lighting and rendering: 1 week
- Topic 5 Materials: 1 week
- Topic 6 Creation of environments: 2 weeks
- Topic 7 Exporting to game engines: 1 week

EVALUATION SYSTEM

ASSESSMENT SYSTEM	MINIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)	MAXIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)
<i>Assessment of participation in class, exercises or projects of the course</i>	10	30
<i>Assessment of assignments, projects, reports, memos</i>	35	70
<i>Objective test</i>	30	60

GRADING CRITERIA

ASSESSMENT SYSTEM	ORDINARY EVALUATION	EXTRAORDINARY EVALUATION
<i>Assessment of participation in class, exercises or projects of the course</i>	10	10
<i>Assessment of assignments, projects, reports, memos</i>	40	40
<i>Objective test</i>	50	50

General comments on the evaluations/assessments

- It will be necessary to pass each of the parts (exam and activities) in order to pass the course. It will be necessary to obtain at least a 4 in the Environment in order to obtain the average of the activities.
- Having handed in all the practicals is a prerequisite to obtain a positive grade in the ordinary call. Including the activities carried out in class.
- The marks of the parts passed will be maintained in the extraordinary call.
- In the event of failing the exam or any of the practical parts, the maximum grade obtained will be 4.
- The final numerical grade is from 0 to 10, a minimum grade of 5 points will be required in order to obtain a pass.
- Any detection of plagiarism, copying or use of bad practices (such as the use of AIs) in a paper or exam will imply the failure of this work with a zero, the report to the faculty and academic coordinator and the application of the current regulations, which can lead to very serious penalties for the student.

- The use of Smartwatches or cell phones is not allowed during exams. Such devices will have to be put away and out of the student's sight during the exam. The use of cell phones is not allowed during classes.

LIST OF REFERENCES (BOOKS, PUBLICATIONS, WEBSITES):

Key references

MEDIAACTIVE, 2017. El gran libro de 3ds Max 2017. Marcombo, S.A. Autodesk, 2005. 3Ds Max. Tutorial guide. Microsoft Corporation, S.A.

TICKOO, Sham, 2013. Autodesk Maya 2013, A Comprehensive Guide, CADCIMTechnologies

MCKINLEY, Michael, 2010. Maya studio projects, Game Environments and props. WileyPub.

Recommended references

MARCOMBO, 2017. Aprender 3ds Max 2017 con 100 ejercicios prácticos.

LLENA HURTADO, Sonia. 3ds Max: bases, modelado, texturizado y render. Marcombo

AMIN, Jahirul, 2015. Beginner's guide to character creation in Maya. 3DTotal Publishing

AMIN, Jahirul, 2015. Beginner's guide to character creation in Maya. 3DTotal Publishing

VAUGHAN, William (2012). Digital Modeling. New Riders

DUNLOP, 2014. Production pipeline fundamentals for film and game. Focal Press

POLYCOUNT.: <http://wiki.polycount.com/wiki/Polycount>) POLYCOUNT forums. (<http://www.polycount.com/forum/>)

GUERRILLACGPROJECT: <http://www.youtube.com/user/GuerrillaCG>) CGSOCIETY.- (<http://www.cgsociety.org/>)

3DPODER.- (<http://www.foro3d.com/foro3d.php>)

CONCEPTART.ORG.- (<http://conceptart.org/forums/forum.php>)

REQUIRED MATERIALS, SOFTWARE AND TOOLS

Type of classroom

Projection equipment

Materials:

Laptop computer

Mouse (other than the one built into the laptop)

Software:

Modelling software (Maya)

Substance Painter

Unreal

Photoshop