



# **ACADEMIC PROGRAM**

## **3D VISUAL EFFECTS**

### **B.F.A. IN ANIMATION**

***MODALITY: ON CAMPUS***

***ACADEMIC YEAR: 2023-2024***

<b>Name of the course:</b>	<b>3D Visual Effects</b>
Degree :	Animation
Location:	Centro Universitario de Tecnología y Arte Digital
Area:	Advanced 3D Techniques for Animation
Year:	4º
Teaching period:	1
Type:	OBM
ECTS credits:	6
Teaching modality:	On campus
Language:	English
Lecturer / Email	Miguel Angel Arribas Sanchez/miguel.arribas@u-tad.com
Web page:	<a href="http://www.u-tad.com/">http://www.u-tad.com/</a>

## SUBJECT DESCRIPTION

### Area description

This subject is mandatory for the students that choose the Mention in Backend Animation Pipeline techniques.

This subject will allow the students who choose it to deepen the knowledge acquired in 3D techniques in the common part of the bachelor's degree applied to the final processes of 3D animation content production, known as Backend Pipeline. These processes, which without losing their technical component incorporate a high technical content, include lighting, compositing, 3D effects simulation, character effects (cloth, hair, fur) and the preparation of the character for animation through the Rigging process.

### Subject description

In this course, the technical processes of basic visual effects and the integration of photographic elements with digital elements are studied. Simulations, breaks, particle systems and fluid dynamics are studied by means of procedural creation.

Visual effects, especially of a procedural nature, are one of the most technical and complex processes in animation production. In this course, students learn how to use procedural creation to generate new and personalized effects, more sophisticated than the standard ones offered by common software.

## COMPETENCIES AND LEARNING OUTCOMES

### Competencies

#### BASIC AND GENERAL

CG4 - Apply the aesthetic and perception fundamentals of the image in terms of structure, form, color and space in the representation of digital content.

CG8 - Optimize the work according to the technological resources related to the processes and tools of the project to be developed.

CB1 - That students have demonstrated to possess and understand knowledge in an area of study that starts from the basis of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study.

CB2 - That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their field of study.

CB3 - That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.

CB4 - Students should be able to convey information, ideas, problems and solutions to both specialized and non-specialized audiences.

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

#### TRANSVERSALS

CT3 - Know the hardware and software fundamentals of computers and communication networks, as well as the principles of storage and cloud computing along with their usefulness and application to the development projects of the digital economy.

CT4 - Update the knowledge acquired in the management of digital tools and technologies according to the current state of the sector and the technologies used.

CT5 - Demonstrate versatility, flexibility and creativity in the development of projects, activities and works.

CT6 - Develop collaborative projects in a climate of teamwork based on respect, cooperation and responsibility.

#### SPECIFIC

CE16 - Know the concepts and apply the tools and techniques that allow the introduction of visual effects in an audiovisual project.

SC17 - Use texturing techniques to apply materials to 3D models.

SC2 - Know and apply the fundamentals of photography, its elements of visual composition and the expressive value of lighting.

CE7 - Create audiovisual pieces applying the principles of composition, audiovisual narrative and graphics animation to the realization, planning, editing and post-production of sequences and shots.

CE10 - Create images with a high level of finish using the most appropriate tools for the project of which it is part.

CE11 - Use the theory, techniques and tools associated with lighting, rendering and composition.

#### SPECIFIC TO THE MENTION

Students who choose this subject will acquire the following specific competences of the mention (CE3D):

- CE3D1: Build 3D Rigs from a given model.
- CE3D2: Know the internal structure of 3D scenes and be able to generate interfaces and automation of effects in 3D software through code.
- CE3D3: Know the methodologies and the main dynamic simulation tools for the creation of 3D visual effects.

#### **Learning outcomes**

At the end of the degree, the graduate will be able to:

- Apply visual language to the different animation techniques to convey ideas.
- Know the syntax and basic use of programming languages applied to rigging and particle simulation.
- Manage the interaction between different materials and lighting systems in 3D and 2D creation environments.
- Create environments with a high degree of verisimilitude through the use of layers, alphas and other basic digital compositing techniques.
- Identify software and hardware requirements for lighting, rendering and compositing.
- Integrate with visual consistency the various elements involved in a 2D or 3D layered composition in the post-production phase of the project.
- To integrate convincingly synthetic images, created with digital tools, and real images, recorded photographically.
- Determine the emitting elements, collisions and fields of particle systems in the creation of visual effects.
- Simulate the dynamic elements and situations involved in atmospheric phenomena, such as clouds, fog, rain, smoke, fire, or in the breakage and destruction of rigid solid bodies by collisions or explosions.
- Optimize the programming code used in an animation scene using the necessary debugging tools.
- Program elements in a 2D or 3D scene for the simulation of visual effects or the technical optimization of scenes.
- Manage texture libraries for reuse in an animation scene.
- Combine the qualities of various materials such as reflection, refraction and specularities for the creation of shading.
- Apply the required textures and shaders convincingly and according to the needs of the production in the various parts of a 3D animation scene such as sets, objects or characters.

- Determine the chain of relationships in the construction of body, facial and node controls that are part of a 3D skeleton or rig.
- Establish the skinning of the different parts of a 3D model.
- Use different techniques of bone construction in 3D models according to the needs of character and object animation.
- Generate the character pickers or synoptics necessary for other members of a 3D production to manipulate 3D elements.
- Modify and debug the programming codes of a 3D animation scene.
- Automate the generation of digital effects in a 3D animation scene.
- Determine the different fields involved in collisions and particle interactions in the post-production phase of an audiovisual project.
- Control the dynamics and parameters involved in the simulation of fluids in a 3D animation scene.
- Establish the necessary elements in the creation of breaks and fractures in rigid models in a 3D simulation.
- Create clean and optimized modeling meshes in the creation of 3D objects, figures and environments.

## CONTENTS

- Particle systems. Issuers. Collisions. Fields.
- Rigid Body. Simulators. Breaks.
- Fluids: Smoke, Fire, Explosions.
- Atmospheric Effects: clouds, mists.
- Effects integration.

## SUBJECT SYLLABUS

Tema 1. Partículas

Tema 2. Volumenés

Tema 3. Rigid Bodies

Tema 4. Fluidos

Tema 5. Cuerpos Blandos (Vellum)

## TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

### TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
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<i>Theoretical / Expository classes</i>	22,00	22,00
<i>Practical classes</i>	33,75	33,75
<i>Tutorials</i>	4,25	2,13
<i>Independent study and autonomous work of the student</i>	35,00	0,00
<i>Elaboration of work (group or individual)</i>	50,75	0,00
<i>Evaluation Activities</i>	4,25	4,00
<b>TOTAL</b>	150	61,88

### Teaching methodologies

Expository method or master class

Case method

Problem-based learning

Cooperative or collaborative learning

Inquiry-based learning

Flipped classroom or inverted classroom methodology

Gamification

### TEMPORAL DEVELOPMENT

Theme 1-1 week

Theme 2- 2 weeks

Theme 3- 4 weeks

Theme 4- 3 weeks

Theme5-4 weeks

### EVALUATION SYSTEM

ASSESSMENT SYSTEM	MINIMUM SCORE RESPECT TO THE	MAXIMUM SCORE RESPECT
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	<b>FINAL ASSESSMENT (%)</b>	<b>TO THE FINAL ASSESSMENT (%)</b>
<i>Assessment of participation in class, exercises or projects of the course</i>	10	20
<i>Assessment of assignments, projects, reports, memos</i>	30	60
<i>Objective test</i>	30	60

## GRADING CRITERIA

<b>ASSESSMENT SYSTEM</b>	<b>ORDINARY EVALUATION</b>	<b>EXTRAORDINARY EVALUATION</b>
<i>Assessment of participation in class, exercises or projects of the course</i>	10	10
<i>Assessment of assignments, projects, reports, memos</i>	60	60
<i>Objective test</i>	30	30

### General comments on the evaluations/assessments

It is crucial to deliver on time. A 10-minute courtesy period will be given during which the submission is considered to be on time. After that time, work may be handed in up to 24 hours after the due date, but with a penalty on the grade to be determined by the teacher. No work will be accepted after 24 hours.

Any detection of plagiarism, copying or use of bad practices (such as the use of IAs) in a paper or exam will imply the failure of that paper 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.

### LIST OF REFERENCES (BOOKS, PUBLICATIONS, WEBSITES):

Basic:

Practical Maya Programming with Python Paperback – July 25, 2014 by Robert Galanakis (Author)

Maya Python for Games and Film: A Complete Reference for Maya Python and the MayaPython API Hardcover – September 28, 2011

Recommended:

sidefx.com

## REQUIRED MATERIALS, SOFTWARE AND TOOLS

### Type of classroom

Theory

### Materials:

Display - Digital whiteboard, Laptop

### Software:

Autodesk Maya