ACADEMIC PROGRAM

VISUAL EFFECTS FOR VIDEO GAMES AND IMMERSIVE SYSTEMS

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

MODALITY: ON CAMPUS

ACADEMIC YEAR: 2023-2024

Name of the course:	Visual Effects for Video Games and Immersive Systems
Degree :	Animation
Location:	Centro Universitario de Tecnología y Arte Digital
Area:	Art for Video Games and Immersive Systems
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:	http://www.u-tad.com/

SUBJECT DESCRIPTION

Area description

The subject includes all the courses that are part of the Mention in Art for Games and Immersive Systems. The subject allows for a deeper understanding in creation of digital content for games and immersive systems. Students in the mention will acquire theoretical, technical, and methodological knowledge with the aim of generating graphic elements such as 2D and 3D items, textures or icons for realtime rendering game engines and another interactive and immersive systems.

Subject description

In this course, the technical processes of basic visual effects applied to video games are studied. We study simulations, breakages, particle systems and fluid dynamics by means of procedural creation.

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

COMPETENCIES AND LEARNING OUTCOMES

Competencies

BASIC AND GENERAL

CG2 - Know the vocabulary and concepts inherent to the digital artistic field.

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 - Knowing 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.

SC4 - Represent three-dimensional forms and spaces using the essential techniques of traditional and digital modeling.

SC9 - Use the techniques of modeling for the three-dimensional representation of forms from a design.

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 (CEAV):

- CEAV1: Build Rigs for video games from a given model according to the constraints of real-time interaction with the character.

- CEAV2: Build and adapt the models and assets generated in 3D for their import and use in a video game engine.

- CEAV3: Know the methodologies and the main dynamic simulation tools for the creation of real-time visual effects.

Learning outcomes

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

- Apply the fundamentals of visual language to the digital environment.

- Apply the visual language to the different animation techniques to transmit ideas.

- Recognize the software and hardware requirements that meet the needs of a project and its cloud storage requirements.

- Know the syntax and basic use of programming languages for rigging and particle simulation.

- Represent objects and spaces in 3D through modeling, texturing, lighting and digital rendering.

- Apply basic digital modeling techniques to the creation of 3D objects, figures and environments in video game projects.

- Create clean and optimized modeling meshes in the creation of objects, figures and 3D environments.

- 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 the software and hardware requirements necessary for lighting, rendering and compositing.

- 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 a video game by means of the necessary debugging tools.

- 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.

- Identify the interaction needs between 3D models and users in the construction of rigs for video games.

- Generate the interactive controls of a 3D model for the creation of video games.

- Create the skinning or appearance of the interactive 3D character according to the needs of the system or hardware in a video game production.

- Calculate the optimal degree of polygonization of models and assets according to the technical limitations of the system or hardware in video game projects.

- Produce different versions of models and assets according to the game engine or final hardware.

- Determine the different components and fields involved in the collisions and interactions of particles rendered in real time in the creation of visual effects.

- Know the hardware limitations that can affect the generation of real-time rendered effects.

CONTENTS

· Particle systems

· Trails and physic particles

· Vector fields / Motion Vectors

SUBJECT SYLLABUS

Theme 1. Partículas - Unreal engine

Tema 2. Volumes - Unreal engine

Tema 3. rigid bodies - Unreal engine

Tema 4. Fluidos - Unreal engine

Tema 5. Cuerpos Blandos (Vellum) - Unreal engine

TRAINING ACTIVITIES AND TEACHING METHODOLOGIES

TRAINING ACTIVITIES

LEARNING ACTIVITIES	Total hours	Hours of presence
Theoretical / Expository classes	22,50	22,50
Practical classes	33,50	33,50
Tutorials	3,75	1,88
Independent study and autonomous work of the student	36,25	0,00
Elaboration of work (group or individual)	50,00	0,00
Evaluation Activities	4,00	4,00

TOTAL	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 FINAL ASSESSMENT (%)	MAXIMUM SCORE RESPECT TO THE FINAL ASSESSMENT (%)
Assessment of participation in class, exercises or projects of the course	10	20
Assessment of assignments, projects, reports, memos	30	60
Objective test	30	60

GRADING CRITERIA

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

General comments on the evaluations/assessments

Students must obtain at least a 5 in both the evaluation of the work and the objective test in order to pass the course.

Any detection of plagiarism in a paper or exam will result in the failure of that paper with a zero, a 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: https://www.sidefx.com/learn/getting_started/

https://www.tokeru.com/cgwiki/?title=Houdini

Programación práctica de mayas con python Rústica - 25 de julio de 2014 por Robert Galanakis

(Autor)

Referencias recomendadas:

Maya Python for Games and Film: A Complete Reference for Maya Python and the Maya

Python API Tapa dura - 28 de septiembre de 2011

REQUIRED MATERIALS, SOFTWARE AND TOOLS

Type of classroom
Theory

Materials:
Display - Digital whiteboard, Laptop

Software:
Autodesk Maya, Houdini, Niagara