Course guides
804351 - VJ3D-A - 3D Video Games

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.
Degree: BACHELOR’S DEGREE IN DESIGN, ANIMATION AND DIGITAL ART (Syllabus 2017). (Optional subject).
Academic year: 2020 ECTS Credits: 6.0 Languages: Catalan

LECTURER
Coordinating lecturer: Löpfe, Lasse
Others: Ripoll Tarré, Marc

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEAAD 3. (ENG) Master the wide range of professional tools in the sector for developing all kinds of digital content.
CEAAD 7. (ENG) Aplicar técnicas de modelado y animación avanzada, postproducción y efectos especiales para la elaboración de contenidos digitales y/o su inclusión en ámbitos profesionales del arte digital como en la industria cinematográfica y la del videojuego.

Transversal:
04 COE. 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.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.
07 AAT. 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.
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

Exhibition and learning of new contents through theory, references and practical cases.
Participatory class where to develop activities for the resolution of problems and discussion of contents.
Practical work to apply and experiment with the contents seen in class. Exercises will be proposed to work during the week and improve the experience needed to master 3D design tools.

LEARNING OBJECTIVES OF THE SUBJECT

- Be able to model characters, objects and scenarios in low polygonization.
- Show knowledge, identify and know how to apply the different techniques of shaders as well as the advanced elaboration of textures.
- Know the theoretical aspects of the different techniques of advanced illumination as well as being able to carry them out through the different existing tools.
- Show knowledge about the concepts of animation tree and blending animation for inclusion in interactive projects.
- Know the need and the different 3D optimization techniques for the massive inclusion of resources (scenarios, characters and objects) in video games and virtual applications.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>16.0</td>
<td>10.67</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>26.0</td>
<td>17.33</td>
</tr>
<tr>
<td>Self study</td>
<td>90.0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>18.0</td>
<td>12.00</td>
</tr>
</tbody>
</table>

**Total learning time:** 150 h

CONTENTS

**Introduction to Unity 3d**

**Description:**
The Unity environment
Game Objects
Components
Transform
Renderer
Parenting
Pivots
Prefabs
Tags
Layers

**Full-or-part-time:** 10 h
Theory classes: 4h
Self study: 6h

**Fisics**

**Description:**
Rigidbodies
Colliders
Types of colliders
Collision detection
Forces
Physical materials
Effectors

**Full-or-part-time:** 18 h
Theory classes: 9h
Guided activities: 3h
Self study: 6h
Introduction to scripting

**Description:**
Custom Components
Monobehaviour: Start(), Update()
Single Responsibility Pattern
Events – Collision and Triggers
Game Loop, Execution Order

**Full-or-part-time:** 10 h
Theory classes: 4h
Self study : 6h

Illumination

**Description:**
Types of lights
Shadows
Global Illumination
Baking
Light Probes
Reflection Probes

**Full-or-part-time:** 10 h
Theory classes: 4h
Self study : 6h

Terrains

**Description:**
Height map
Splash map
Details & Vegetation
Paths

**Full-or-part-time:** 14 h
Practical classes: 4h
Guided activities: 4h
Self study : 6h

Animation

**Description:**
The Animation window
The animator
State Machines
Transitions
Control animator from script
State Machine Behaviours

**Full-or-part-time:** 21 h
Theory classes: 9h
Guided activities: 6h
Self study : 6h
**Game control**

**Description:**
Win / loose conditions
Time scale
Singleton
Scene Loading

**Full-or-part-time:** 21 h
Practical classes: 6h
Guided activities: 6h
Self study : 9h

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**GUI**

**Description:**
GUI elements
Canvas
Anchoring
GUI animation
Event system
World vs screen space
HUD

**Full-or-part-time:** 19 h
Practical classes: 9h
Guided activities: 4h
Self study : 6h

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**Particle systems**

**Description:**
Modules
Base
Emission
Shape
Lifetime
Noise
External forces
Trails
Renderer
Subemitters
Control from script

**Full-or-part-time:** 21 h
Practical classes: 9h
Guided activities: 6h
Self study : 6h
Audio

| Description: | Audio source | Audio Listener | Audio Manager | Audio Mixer |

Full-or-part-time: 6 h
- Theory classes: 2h
- Guided activities: 1h
- Self study: 3h

ACTIVITIES

Development of a video game

Description:
The students will work in groups developing the different tasks of a video game, from the part of design and art to simple programming tasks.
The activity will be structured in tasks and oriented to create a unique set game.

Specific objectives:
Design a functional game, following the guides explained in class.

Material:
Class documentation, Adobe photoshop, Unity 3d, Autodesk maya, visual studio.

Delivery:
In the corresponding folder on the virtual campus, according to the documentation given to the subject.

Full-or-part-time: 33 h
- Practical classes: 13h 20m
- Self study: 20h

GRADING SYSTEM

1 exercise with a weighting of 20% of the final grade of the subject.
1 exercise with a weighting of 20% of the final grade of the subject.
1 exercise with a weighting of 40% of the final grade of the subject.
Final evaluation of the final game - 10% of the final mark of the subject.
Participation and attitude of learning: the evaluation of the participation of the student in the formative activities of the subject, and the attitude of learning, will be evaluated by means of a follow-up of his interventions in class and the proportion of exercises and practices presented. This evaluation corresponds to 10% of the final grade.

EXAMINATION RULES.

A part of the exercises can be done during the classes with the teacher of the subject. Students will also have to dedicate independent work time (out of hours) to perform the exercises. To do this, you must follow the instructions specified in the working document.

The exercise once finalized will be deposited in the Virtual Campus in the delivery of the classroom of the section in the corresponding date, will only be taken into account to value those exercises delivered before the 24:00 hours of the deadline.