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: 2021  ECTS Credits: 6.0  Languages: Catalan, Spanish

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>Hours large group</td>
<td>18,0</td>
<td>12.00</td>
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<tr>
<td>Hours medium group</td>
<td>26,0</td>
<td>17.33</td>
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<tr>
<td>Self study</td>
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<td>60.00</td>
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<tr>
<td>Guided activities</td>
<td>16,0</td>
<td>10.67</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: 10h
Theory classes: 4h
Self study : 6h

Physics

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

Full-or-part-time: 18h
Theory classes: 9h
Self study : 9h
## Introduction to scripting

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

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

## Illumination

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

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

## Terrains

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

**Full-or-part-time:** 14h  
Practical classes: 4h  
Self study: 10h

## Animation

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

**Full-or-part-time:** 21h  
Theory classes: 9h  
Self study: 12h
Game control

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

**Full-or-part-time:** 21h
- Practical classes: 6h
- Self study: 15h

GUI

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

**Full-or-part-time:** 19h
- Practical classes: 9h
- Self study: 10h

Particle systems

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

**Full-or-part-time:** 21h
- Practical classes: 9h
- Self study: 12h
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: 33h 20m
Practical classes: 13h 20m
Self study: 20h

GRADING SYSTEM

3 deliveries with a weighting of 25% of the final grade of the subject each.

Final presentation of the project with a weighting of 25% of the final grade

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.
BIBLIOGRAPHY

Basic:
- Scott Rogers. Level Up! The Guide to Great Video Game Design.
- Norman Kerr. Techniques of photographic lighting.