Course guides
804246 - MVJ - Game Engines

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.
Degree: BACHELOR’S DEGREE IN VIDEO GAME DESIGN AND DEVELOPMENT (Syllabus 2014). (Compulsory subject).
Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish, English

LECTURER
Coordinating lecturer: Garrigó Invers, Marc
Others:

PRIOR SKILLS
Coding in C++. Previous knowledge and experience coding 2D games.

TEACHING METHODOLOGY
During each class, the lecturer will first show the students the theory behind the problem that needs solving. Together with the students, the lecturer will explore the different solutions that exist in the present that solve and simplify the complexities of real time applications like videogames.

LEARNING OBJECTIVES OF THE SUBJECT
- Understand how to organize the rendering pipeline and proper loading of a 3D scene.
- Knowledge in how to integrate 3D animation systems.
- Internal structure for entities and their components.
- Audio for 3D environments.
- Most common graphic techniques.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>18,0</td>
<td>12.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>12,0</td>
<td>8.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
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</tbody>
</table>

Total learning time: 150 h
## OpenGL basics

**Description:**
- Initialization
- Rendering in direct mode
- Vertex Buffers

**Full-or-part-time:** 15h
- Theory classes: 6h
- Self study: 9h

## Loading 3D models

**Description:**
- Loading of model information: geometry and materials
- Rendering of single models

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

## Camera and scene loading

**Description:**
- Free roaming camera, FPS style and single model
- Loading scene information
- Execution in threads

**Full-or-part-time:** 15h
- Theory classes: 6h
- Self study: 9h

## Basic rendering optimizations

**Description:**
- Frustum culling
- Level of details
- Octree

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

Description:
Implementing a Transformation Tree
Structure of an animation system
Loading of animations
Playing and blending of animations

Full-or-part-time: 25h
Theory classes: 10h
Self study : 15h

Component structure and player control

Description:
Component system for entities
Messaging and event system
Physics and player control

Full-or-part-time: 30h
Theory classes: 12h
Self study : 18h

3D Audio

Description:
Loading and playing music
Playing 3D effects

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

Graphics effects

Description:
Particle systems
Postprocess effects
Illumination models

Full-or-part-time: 20h
Theory classes: 8h
Self study : 12h

GRADING SYSTEM

Final exam with a weight of 30% with all subject knowledge will be put to test.
First assignment about scene loading (GameObjects and components) with a weight of 20%.
Second assignment about space optimizations, time management, mouse picking and optimized formats with a weight of 20%.
Third assignment about a single high level system to choose from: animation, particles, audio, scripting, physics, shaders or UI with a weight of 20%.
The final exam can be revaluated for its weight of 30%
Attitude and class participation will weight 10%
BIBLIOGRAPHY

Basic: