Course guides
804037 - PEV-M - Virtual Environment Programming

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.
Degree: BACHELOR'S DEGREE IN MULTIMEDIA STUDIES (Syllabus 2009). (Compulsory subject).
Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Loepfe, Lasse

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Identify the different virtual reality systems and the physiological and psychological principles on which they are based.
2. Apply model and scene optimisation techniques to virtual reality applications.

Transversal:
3. 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.
4. 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.
5. 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.

TEACHING METHODOLOGY

The subject is divided in sessions of 2h, where three different activities take place:
1. Explanation of the main topics of the subject: the lecturer explains the new topics and presents the material to do the proposed activities (notes, exercises to solve, working plan, etc.).
2. Correction of exercises/activities: the student shares with the rest of the class the difficulties found during the resolution of the proposed activities and proposes solutions/alternatives related to the topics and technologies used. Some tests related to the work carried out during the course may be made.
3. Team work: the students develop the projects/activities proposed at class with the assistance of the lecturer.

LEARNING OBJECTIVES OF THE SUBJECT

- Understand the main topics to design and develop virtual environments.
- Acquire the basic knowledge of the software used to develop virtual environments: Unity3D in our case.
- Apply the acquired knowledge in decision making, work planning and bibliography research to be able to develop virtual environments in a satisfactory way.
- Be able to communicate in a proper way the results of your work.
- Be able to plan and use the information required to present an academic project (the TFG, for instance) by means of a critical reflection on the resources used.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>60,0</td>
<td>40.00</td>
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</tbody>
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Total learning time: 150 h

CONTENTS

1. Introduction

Description:
0. Definition and applications of virtual environments.
1. Introduction to Unity3D.
   1.1. Interface
   1.2. Game Objects
   1.3. Components
      1.3.1. Transform
      1.3.2. Renderer
   1.4. Parenting
   1.5. Pivots
   1.6. Prefabs

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

2. Scene creation

Description:
1. Basic predefined objects.
   a. Camera
   b. Lights
3. Components.
4. Physics
5. Terrain
6. Animation
7. Particle systems
8. User interface.

Full-or-part-time: 70h
Theory classes: 28h
Self study: 42h
3. Scene interaction: scripting

Description:
1. Scripting introduction.
   a. Component oriented structure.
   b. Variables.
   c. Functions.
   d. Debugging.
2. Create and delete objects.
3. Translation, rotation and scaling.
4. Time control.
5. Modify components’ behaviour.
6. Game Control
7. Puzzles

Full-or-part-time: 70h
Theory classes: 28h
Self study: 42h

ACTIVITIES

Coding Exercise

Description:
Little project with clear indications to get in touch with Unity and coding

Full-or-part-time: 10h
Self study: 10h

Project

Description:
You'll have to develop a small game in Unity

Full-or-part-time: 30h
Self study: 30h
GRADING SYSTEM

Projects:
- 3 projects: 50% of the mark of the subject.
  -- Delivery 1: Coding exercises (10%)
  -- Delivery 2: First delivery of the project (15%)
  -- Delivery 3: Second delivery of the project (30%)

Presentation of the project (15%)
- Presentation of the project, including a trailer and marketing campaign

Exams:
- 1 midterm exam: 20% of the mark of the subject.

Participation and learning attitude: 10% of the mark of the subject.
This part will be evaluated according to the participation of the student at class (solving exercises, proposing solutions/alternatives),
the interest shown in learning the different topics and developing the projects, etc.

The students who do not pass the course will have the possibility to do a reevaluation exam (just the 30% corresponding to the mid
term exam and delivery 1 is evaluated, and 5 will be the maximum mark of the subject).

EXAMINATION RULES.

Part of the activities will be developed at class with the assistance of the lecturer. Students should also work autonomously to finish
the activities proposed during the course.

Projects will be submitted via Campus Virtual following the guidelines provided by the instructions document of each one (name of the
files, etc.). Projects submitted after midnight of the specified date will be considered as NP. Any issues that do not allow the student
to submit a project in time should have a reasonable cause and must be communicated with enough anticipation to the lecturer. The
evaluation of the projects does not consist just on submitting the code, but also on oral presentations when required.

Projects have to be executed at CITM, so be sure that you work with the same Unity3D version as the one provided at the center and
that your projects can be executed there without errors.

BIBLIOGRAPHY

Basic:
- Harrison Ferrone. Learning C# by Developing Games with Unity 2020: An enjoyable and intuitive approach to getting started with

Complementary:
- Doran, John P. / Zucconi, Alan. Unity 2018 Shaders and Effects Cookbook: Transform your game into a visually stunning

RESOURCES

Other resources:
Unity3D: https://unity3d.com
API Scripting Unity3D: https://docs.unity3d.com/ScriptReference/
Unity3D tutorials: https://unity3d.com/es/learn/tutorials
https://www.raywenderlich.com/unity
https://catlikecoding.com/unity/tutorials/
https://unitycodemonkey.com/