



# Course guide

## 804472 - PEV - Programming Visual Environments

Last modified: 05/09/2024

**Unit in charge:** Image Processing and Multimedia Technology Centre  
**Teaching unit:** 804 - CITM - Image Processing and Multimedia Technology Centre.

**Degree:** BACHELOR'S DEGREE IN DIGITAL DESIGN AND MULTIMEDIA TECHNOLOGIES (Syllabus 2023).  
(Compulsory subject).

**Academic year:** 2024    **ECTS Credits:** 6.0    **Languages:** Catalan

### LECTURER

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**Coordinating lecturer:** Löpfe, Lasse

**Others:**

### TEACHING METHODOLOGY

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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

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#### Knowledge

Recognise basic concepts related to electronics and microcontrollers and identify their potential application in the development of multimedia installations and products.

Identify the importance and design of multisensory feedback (visual, auditory, haptic) in multimedia applications.

#### Skills

Edit, transform and encode sound and digital image files through programming languages and authoring programs.

Use advanced programming techniques, integrating graphic, audiovisual, animation and sound resources to generate interactive applications.

- 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

Type	Hours	Percentage
Guided activities	12,0	8.00
Self study	90,0	60.00
Hours large group	30,0	20.00
Hours medium group	18,0	12.00

**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:** 6h

Theory classes: 2h

Self study : 4h

### 2. Scene creation

**Description:**

1. Basic predefined objects.

a. Camera

b. Lights

2. Materials.

3. Animation.

4. Physics

5. Terrain

**Full-or-part-time:** 60h

Theory classes: 18h

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. Game Control

**Full-or-part-time:** 68h

Theory classes: 27h

Self study : 41h

### 4. VFX

**Description:**

- 1 Ilumination  
Baking  
Light Probes  
Reflection Probes
- 2 Particles Systems
- 3 Postprocessing
- 4 Shaders

**Full-or-part-time:** 12h

Theory classes: 3h

Practical classes: 3h

Self study : 6h

### 5. Audio

**Description:**

1. Audiomanager
2. Audio Mixer
3. FMOD

**Full-or-part-time:** 4h

Theory classes: 1h

Practical classes: 1h

Self study : 2h

## GRADING SYSTEM

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### Practices

- 3 qualifying practices with a weighting of 65% of the total grade of the subject.
- Practice 1 (individual): Basic exercises 10% of the grade
- Practice 2 (group): Real environment 25% of the grade
- Practice 3 (group): Utopia and dystopia 30% of the mark

### Exams:

- 1 partial exam with a weighting of 25% of the final grade of the subject.

### Participation and learning attitude:

The evaluation of the student's participation in the training activities of the subject, and the learning attitude, will be evaluated by monitoring their interventions in class and the proportion of exercises and practices presented. This evaluation corresponds to 10% of the final grade.

Students who do not pass the subject through the continuous assessment will have the option to present themselves for the reassessment (only the 35% corresponding to the partial exam and practice 1 will be reassessed. The final mark of the subject after the re-evaluation will be a maximum of 5).

Irregular actions that may lead to a significant variation in the grade of one or more students constitute a fraudulent performance of an evaluation act. This action will lead to a descriptive grade of fail and a numerical grade of 0 for the ordinary global assessment of the subject, without the right to re-evaluation.

If the teachers have evidence of the use of AI tools that are not permitted in the assessment tests, they may summon the students involved to an oral test or a meeting to verify the authorship.

## EXAMINATION RULES.

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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

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### Basic:

- Harrison Ferrone. Learning C# by Developing Games with Unity 2020: An enjoyable and intuitive approach to getting started with C# programming and Unity. 5th. Birmingham: Packt Publishing, 2020. ISBN 978-1-80020-780-6.
- Doran, John P. / Zucconi, Alan. Unity 2018 Shaders and Effects Cookbook: Transform your game into a visually stunning masterpiece with over 70 recipes. 3rd. Birmingham: Packt, 2018. ISBN 978-11-78839-623-3.
- Ciarán Robinson. Game Audio with FMOD and Unity. 1st. New York: Taylor & Francis, 2019. ISBN 978-1-138-31597-6.

## RESOURCES

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### 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> (Godot) <https://www.youtube.com/@CodeMonkeyUnity> /> <https://www.youtube.com/@Brackeys>



[/>https://www.youtube.com/@Unity3dCollege](https://www.youtube.com/@Unity3dCollege)