

## Course guide

### 270537 - JC - Computer Games

**Last modified:** 03/02/2025

**Unit in charge:** Barcelona School of Informatics  
**Teaching unit:** 723 - CS - Department of Computer Science.

**Degree:** MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Optional subject).

**Academic year:** 2024    **ECTS Credits:** 3.0    **Languages:** Catalan, Spanish

#### LECTURER

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**Coordinating lecturer:** ANTONIO CHICA CALAF

**Others:** Segon quadrimestre:  
ANTONIO CHICA CALAF - 10

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.

CTE10. Capability to use and develop methodologies, methods, techniques, special-purpose programs, rules and standards for computer graphics.

CTE11. Capability to conceptualize, design, develop and evaluate human-computer interaction of products, systems, applications and informatic services.

CTE12. Capability to create and exploit virtual environments, and to the create, manageme and distribute of multimedia content.

**Basic:**

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

#### TEACHING METHODOLOGY

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The course spans six weeks with four hours a week of classroom lectures and labs.

In weekly sessions of two hours, the teacher will present the concepts and techniques studied.

From a practical point of view, students will develop a project in groups appropriate to the load required for the course.

Each week there will be a two-hour lab class in which students will receive guidance.

#### LEARNING OBJECTIVES OF THE SUBJECT

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- 1.To be exposed to general architectures for multimedia applications as well as to develop the hability of developing these kind of applications.
- 2.To learn the basis on which advanced 3D graphic applications are built by developing specific prototypes.
- 3.To learn how to implement applications that simulates physical phenomena studied in the course and their applications to computer games and virtual reality environments.
- 4.To be able to effectively communicate in writting which is the solved problem as well as which is the technical solution developed



## STUDY LOAD

Type	Hours	Percentage
Hours small group	13,5	18.00
Self study	48,0	64.00
Hours large group	13,5	18.00

Total learning time: 75 h

## CONTENTS

### Introduction

**Description:**

Introduction to game development. Basics. Development tools.

### Game programming

**Description:**

Basics concepts. Game Loop. Scripting.

### Graphics

**Description:**

Asset management. Model import. Tilemaps and sprites. Animation.

### AI

**Description:**

Inteligència artificial: patrons, màquines d'estats.

### Physics

**Description:**

Rigid Bodies. Collision detection and triggers. Physics materials.

### Videogame design

**Description:**

Understand the concepts behind video game design, in particular the importance of gameplay and its relation to application usability.

### Effects

**Description:**

Appearance improving effects. Shaders. Particle systems.

## ACTIVITIES

### Videogame architecture

**Description:**

Description of the basic architecture of a game. Game Loop - Presentation and update. Definition of game engine and its components.

**Specific objectives:**

1

**Related competencies :**

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**Full-or-part-time:** 7h

Self study: 5h

Laboratory classes: 2h

### Levels

**Description:**

Tilemap based engines, use of multiple layers, dense and scattered layers, scroll, parallax effect and types of cameras.

**Specific objectives:**

3

**Related competencies :**

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

Self study: 8h

Laboratory classes: 4h

## Entities

### Description:

Graphic representation of entities in a video game: sprites, animation and effects.

### Specific objectives:

2, 3

### Related competencies :

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CTE12. Capability to create and exploit virtual environments, and to the create, manageme and distribute of multimedia content.

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

Self study: 8h

Laboratory classes: 4h

## AI for video games

### Description:

Pathfinding, finite state machines and rule systems. Action-oriented intelligence and tactical intelligence.

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

Self study: 8h

Laboratory classes: 4h

## Physics

### Description:

Kinematics and dynamics of the rigid solid. Collisions.

### Specific objectives:

3

### Related competencies :

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

Self study: 8h

Laboratory classes: 4h

## Effects

**Description:**

Using shaders. Particle systems.

**Specific objectives:**

1, 2

**Related competencies :**

CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

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**Full-or-part-time:** 6h

Self study: 4h

Laboratory classes: 2h

## Videogame design

**Description:**

Video game design concepts. Gameplay. Storyboard of the game. Design document.

**Specific objectives:**

1, 4

**Related competencies :**

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**Full-or-part-time:** 6h

Self study: 4h

Laboratory classes: 2h

### Additional systems

**Description:**

Scripting systems. Audio management.

**Specific objectives:**

1

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CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.

CTE12. Capability to create and exploit virtual environments, and to the create, manageme and distribute of multimedia content.

**Full-or-part-time:** 6h

Self study: 4h

Laboratory classes: 2h

## GRADING SYSTEM

Students will create a video game that applies the contents of this course.

This project will be evaluated in two parts. One will evaluate the merits of the practical project developed by the students. This part will have a partial delivery (NP) and a final one (NF). The second part will evaluate a technical report on the project (NM) that each student will write, following the guidelines that the teacher will publish.

The three grades (NP, NF, NM) will be combined to determine the course's grade:

$$N = 0.3 \text{ NP} + 0.5 \text{ NF} + 0.2 \text{ NM}$$

## BIBLIOGRAPHY

**Basic:**

- Watt, A.H.; Policarpo, F. 3D games. Addison-Wesley, 2001-2003. ISBN 0201619210.