



Universidad  
de Alcalá

# TEACHING GUIDE

## Videogames Technology

**Transversal Subject**

**Universidad de Alcalá**

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**2021-2022**

2nd semester

## GUÍA DOCENTE

Course name:	Videogames Technology
Code:	100084
Degrees:	Consult in <a href="https://www.uah.es/es/admision-y-ayudas/grados/matricula/otras-ofertas/index.html">https://www.uah.es/es/admision-y-ayudas/grados/matricula/otras-ofertas/index.html</a>
Department:	Computer Engineering. Computers Architecture and Technology
Type:	Transversal
ECTS:	6
Year:	Second semester
Teachers:	Dr. David Fernández Barrero
Tutorships:	See website
Language:	Spanish – English friendly

### 1.A PRESENTATION

Video games are interesting from an industrial, academic and educational perspective. There exists a growing demand for highly qualified professionals with a series of specific skills. Additionally, video games pose a scenario where apply a wide range of knowledge and skills that exceed the limits of engineering: Creativity, artistic skills and teamwork are vital components in the development of video games.

The course is an introduction to game design. The aim is to provide an overview of the various problems that arise in the development of video games and enable students to apply the solution to those problems to areas of engineering. For this end the course overviews technical, artistic and organizational issues related to game development, giving greater emphasis on those problems whose solution is easily generalizable to other Engineering areas.

To enroll this course, it is recommended to have basic programming skills, and being able to code in at least one object-oriented language, preferably Python.

### 2. SKILLS

Generic competences

This course contributes to acquire the following generic competences proposed by the University of Alcalá for their programs:

- TRU1: Analysis and synthesis capacity.
- TRU2: Oral and written communication.
- TRU3: Information management capacity.
- TRU4: Autonomous learning.
- TRU5: Teamwork.

Learning outcomes:

- Identify the development process of the videogames, professional profiles and areas of knowledge involved [RA1].
- Describe the types of problems and main solutions present in the creation of video games [RA2].
- Plan, design and implement a videogame in team attending to multidisciplinary [RA3].
- Manage the development tools involved in the development of video games [RA4].
- Document the development process [RA5].

### 3. CONTENES

Part	Subject	Hours
PART 1: Introduction to OOP in the context of videogame development	Fundamental programming concepts Object-oriented programming in the context of videogame development Data structures Videogame engine	20h
PART 2: Videogames design	Videogame fundamental concepts Development team Design of a video game Architecture of videogames Software engineering applied to videogame development	20h
PART 3: Artificial Intelligence in Videogames	Introduction to Artificial Intelligence Artificial Intelligence in videogames Search algorithms	18h

## 4. TEACHING-LEARNING METHODOLOGIES. FORMATION ACTIVITIES

Number of hours: 150

Number of hours	30 hours in big group 30 hours in small group Total: 60 hours
Student work hours	25 hours personal work 65 hours in group Total: 90 hours
Total	Total: 150 horas

### Methodological strategies

The main methodology followed in the subject is **Project-Based Learning**, in which the realization of a project of certain ambition centers the learning process, facilitating the acquisition of advanced skills. The main theoretical contents are developed through a master class in a large group, complemented with more specific contents developed in small groups, oriented to aspects more related to the implementation of the project. The evaluation instruments will be associated with the project.

The backbone of the subject will be the implementation of a complete video game, which will be carried out within working groups, in which each of the members will assume a role depending on their personal preferences and academic profile. The management of the groups will be developed looking for the greatest possible similarity to the professional practice, including form of work and tools.

The teacher, within the small groups, will monitor each working group, helping in the establishment of objectives, planning and development of the project. Emphasis will be placed on the development of good work habits, conflict resolution, communication and coordination of team members, all of which are essential to be able to develop a complete videogame, with its logical and artistic components.

### Resources

The materials for the preparation of the face-to-face sessions, as well as the activities to be carried out by the student individually, can be found in the teaching publication environment. The functioning of this teaching tool will be detailed in the presentation class of the subject. The presentation will also explain the way in which students will

register in the general message forum, which will be the official communication and notification mechanism. To facilitate communication, evade the limitation of the face-to-face class and be able to carry out innovative training activities, a Twitter account (@videojuegos\_uah) will be associated with the subject.

For each activity, the teacher will provide a series of bibliographical references that can be consulted in the library of the Polytechnic Building or freely on the Internet. For those activities that require it, the teacher will indicate the way to plan this activity as well as the deliverables that should result from the realization of it.

In order to facilitate the coordination of the work teams, online development tools similar to those found in professional development environments will be provided. In particular, an online project management tool as well as a code repository will be provided.

All software resources will be freely distributed, so that the barriers to their adaptation are minimal. For this reason, the practices in small group will be carried out in the Linux operating system, but the student is free to use the operating system that he considers appropriate in his own team.

## 5. EVALUATION

### ***5.1. Procedures and types of evaluation***

The evaluation will be oriented to the continuous and formative evaluation, so that a continuous feedback is provided to the student about his learning process. It will be sought that the feedback helps the student to be placed in the learning process and to be able to adapt the process to improve the performance.

Throughout this process, the teacher will look for evidence of the learning process to follow up on it. These evidences will be elements that intervene in the realization of the project. The evaluation, which will have a formative orientation, may be carried out with different instruments, including hetero-evaluation, coevaluation and self-evaluation.

Students who for extraordinary and justified reasons can not accept the continuous evaluation, should follow the established procedure to request exemption from the continuous evaluation. In this modality, the projects and assignments assigned by the professor must be carried out, as well as a final exam on the official date established for that purpose.

## 5.2. Evaluation and qualification criteria

EVALUATION CRITERIA	QUALIFICATION CRITERIA			
	A	B+	B-	F
Understand the fundamental concepts of videogame development (CE1)	Excellent knowledge of the concepts, which is also related to other subjects and disciplines	Comprehensive and reflective knowledge of the concepts. Vision of the subject as a whole	Basic knowledge of the fundamental concepts, without reflexive capacity or integrating them	There is no understanding of the concepts, or it is incorrect
Develop code with the support of a videogame engine (CE2)	Excellent command of programming and the video game engine. Create programs in an elegant way and following good practices	Program with ease and correction. Coping with problems from an algorithmic perspective and the use of a video game engine	Limited programming capabilities and use of a video game engine Inability to program, algorithmic thinking or not have a minimum management of a video game engine	Inability to program, algorithmic thinking or not have a minimum management of a video game engine
Design a videogame (CE3)	Excellent understanding of design techniques and pose original ideas	Correct understanding and application of the techniques, but ideas lack originality	Limited understanding of the design techniques	Insufficient understanding of the design techniques
Work with an interdisciplinary and cooperative perspective (CE4)	Excellent collaborative perspective, integration of personal profiles, responsibility towards the group and consensus	Shows good knowledge about professional profiles as well as responsibility and attitude of consensus with the group	It shows knowledge about professional profiles as well as limited responsibility and attitude of	Insufficient understanding of the different professional profiles involved in the development of a video game or

	attitude		consensus with the group	shows lack of commitment to the group
Formal quality of the activities delivered (CE5)	Excellent presentation and execution. Solid argumentation, fluid writing and coherent structure	The deliverable is correct, the writing / presentation is solid and the argument coherent	The deliverables are correct, but there are notable formal deficiencies, argumentation presents contradictions or is weak	Deliverables do not meet minimum quality criteria in terms of organization, writing and spelling

### 5.3. Ordinary evaluation

The default evaluation modality is continuous, whose evaluation instruments are the following:

- Complete video game [E1].
- Fingerprint (activity record in collaborative tools) [E2].
- Co-evaluation [E3].
- Videogame design document [E4].
- Final report of the project [E5].
- Examination [E6].

The relationship between competences, learning outcomes, evaluation criteria and evaluation instruments is as follows:

Skill	Learning results	Evaluation criteria	Evaluation instrument	Calification weight
TRU1, TRU4	RA1, RA2, RA3	CE1, CE2, CE3	E1, E5, E6	30+20=50%
TRU2	RA5	CE3	E4	20%
TRU5	RA5, RA3	CE4	E2, E3	20%
TRU2, TRU3	RA3, RA4	CE5	E4, E5	10%

In exceptional circumstances, the student can opt for the final evaluation modality, which will be requested in the terms contemplated in the regulations of the University. In this modality the student must submit an individual project, as well as perform a final exam. Both evaluation instruments will have the same weight in the rating.

Those students that do not integrate in the working groups or give up their responsibilities once the group activity has started, will be considered "not presented".

### 5.4. Extraordinary evaluation

The extraordinary evaluation will be common to the continuous evaluation modality as well as to the final evaluation. The default assessment instrument in extraordinary

call is a single written examination. Depending on personal and group circumstances, such as specific competences not acquired, the examination may be substituted by one of the evaluation instruments listed in point 5.3. Work teams can decide to submit the final project for extraordinary evaluation. In that case the marks of the ordinary exam will be kept.

The students that do take the extraordinary evaluation will be considered as “not presented”.

## 6. BIBLIOGRAPHY

Generalist:

### **Desarrollo de Videojuegos - Arquitectura del Motor de Videojuegos**

David Vallejo Fernández y Cleto Martín Angelina.

Cuarta edición. Universidad de Castilla-La Mancha. 2015

### **Desarrollo de Videojuegos – Desarrollo de Componentes**

Francisco Jurado, Javier Albusac, José Jesús Castro y otros

Cuarta edición. Universidad de Castilla-La Mancha. 2015

Programming:

### **Beginning Game Development with Python and Pygame for Game Developers. From Novice to Professional**

Will McGugan

Apress. 2007

### **A Making Games with Python and Pygame. A guide to programming with graphics, animation and sound**

Al Sweigart

Albert/Sweigart. 2010

<http://inventwithpython.com/pygame/chapters/>

Videogame design:

### **A theory of Fun**

Raph Koster

Segunda edición. Editorial Morgan Kaufmann. 2009

Artificial Intelligence:

### **Artificial Intelligence: A Modern Approach**

Stuart Russell and Peter Norvig

Tercera edición. Prentice Hall. 2010

### **Artificial Intelligence for Games**

Ian Milington y John Funge

Segunda edición. Editorial O'Reilly. 2014



## **Disclosure Note**

The University of Alcalá guarantees to its students that, if due to health requirements the competent authorities do not allow the total or partial attendance of the teaching activities, the teaching plans will achieve their objectives through a teaching-learning and evaluation methodology in online format, which will return to the face-to-face mode as soon as these impediments cease.