Course guide
240405 - 240405 - Computer Games. Structure and Development

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 723 - CS - Department of Computer Science.
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
Academic year: 2022 ECTS Credits: 3.0 Languages: Catalan

LECTURER

Coordinating lecturer: Marc Vigo
Others: Antoni Soto

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

General:
2. PROJECT MANAGEMENT: Being able to present, execute and direct Industrial Engineering projects, by means of applying scientific and technologic knowledge, attitudes and procedures, once conditions have been identified or valued.

TEACHING METHODOLOGY

The course consists of 2 hours of classes a week in the classroom. These classes are expository, participatory and emphasizes on cooperative learning. They solve problems and cases under study as the theoretical concepts are introduced. It is for this reason that classes are always conducted in laboratory classes.

Given the technical complexity of the subject all activities are made in groups of two or three.

LEARNING OBJECTIVES OF THE SUBJECT

After completing the course the student will be able to:
- Classify the different types of games that exist and identify the technological challenges that they introduce.
- Recognize and apply the concepts of Physics, Computer Graphics and Artificial Intelligence to develop a video game.
- Implement a game of moderate complexity.
- Develop the technical report of a video game.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>45,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>40.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h
## 1. Structure and Functionalities

### Description:
- 1.1 History
- 1.2 Characterization
- 1.3 Features
- 1.4 Game Engine
- 1.5 Physics
- 1.6 Artificial Intelligence

### Related activities:
1. Design Document

### Full-or-part-time: 30h
- Theory classes: 10h
- Practical classes: 5h
- Self study: 15h

## 2. Development

### Description:
- 2.1 Development Environment
- 2.2 Vector design and bitmaps
- 2.3 Symbols
- 2.4 Animation
- 2.5 ActionScript
- 2.6 Publishing

### Related activities:
2. Structure
3. Project
4. Memory

### Full-or-part-time: 45h
- Theory classes: 3h
- Laboratory classes: 12h
- Self study: 30h
## ACTIVITIES

### 1. DESIGN DOCUMENT

**Description:**
Work done in teams developed the original idea of creating a video game.

**Specific objectives:**
After the activity, students will be able to:
- Classify the different types of games that exist and identify the technological challenges that introduce each other
- Develop a video game design document
- Describe the elements prior to the implementation of a moderate complex game

**Material:**
Documents available on campus ATENEA

**Delivery:**
Evidences:
Evaluation is made with the document delivered that includes the key elements of the project to be developed in the next module.
This note has a weight of 10%.

**Full-or-part-time**: 7h  
Laboratory classes: 2h  
Self study: 5h

### 2. ESTRUCTURE

**Description:**
Work done in teams of two where the main structure of a game engine is developed, according to some specific requirements concerning the design document done in the previous activity.

**Specific objectives:**
After the activity, students will be able to:
- Develop and implement the main structure of a game

**Material:**
Documents available on campus ATENEA

**Delivery:**
The implemented work, the quality and the result are evaluated.
This note has a weight of 10%.

**Full-or-part-time**: 15h  
Laboratory classes: 5h  
Self study: 10h
3. PROJECT

Description:
Work done in teams of two where a game of moderate complexity is developed. This work initiates from the two previous activities. The design document provides the content to be included in the project and from the structure different technological elements are inserted.

Specific objectives:
After the activity, students will be able to:
- Identify the technological challenges involved in implementing a game.
- Recognize and apply the concepts of physics, computer graphics and artificial intelligence to develop a video game.
- Implement a game of moderate complexity.

Material:
Documents available on campus ATENEA

Delivery:
The implemented work, the quality and the result are evaluated.
This note has a weight of 60%.

Full-or-part-time: 35h
Laboratory classes: 10h
Self study: 25h

4. MEMORIA

Description:
Work done in teams of two documenting the project activity implemented and justifying taken decisions.

Specific objectives:
After the activity, students will be able to:
- Develop a technical report that describes and justifies the technological challenges that have been used in the project and reviews the design document.

Material:
Documents available on campus ATENEA

Delivery:
Evidences:
Technical paper delivered is evaluated.
This note has a weight of 20%.

Full-or-part-time: 6h
Laboratory classes: 1h
Self study: 5h

GRADING SYSTEM

Two written tests are performed (activities 1 and 4) and two practices (activities 2 and 3). These are the weights of the percentage of the final mark they represent:

A1 - Activity 1. Design Document: 10%
A2 - Activity 2. Structure: 10%
A3 - Activity 3. Project: 60%
A4 - Activity 4. Memory: 20%

Final mark = 0.1 + 0.1 * A1 * A2 * A3 + 0.6 + 0.2 * A4
BIBLIOGRAPHY

Complementary:

RESOURCES

Other resources:
http://en.wikipedia.org/wiki/Video_game_development
https://wiki.python.org/moin/GameProgramming
http://www.pygame.org/
http://fias.upc.edu/uwin/catala/home/home