240405 - Computer Games. Structure and Development

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering  
Teaching unit: 723 - CS - Department of Computer Science  
Academic year: 2019  
Degree: BACHELOR’S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Teaching unit Optional)  
BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)  
BACHELOR’S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Optional)  
ECTS credits: 3  
Teaching languages: Catalan

Teaching staff

Coordinator: 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 emphasize 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>Total learning time: 75h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>40.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours small group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>45h</td>
<td>60.00%</td>
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# 240405 - Computer Games. Structure and Development

## Content

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<th>- 1. STRUCTURE AND FUNCTIONALITIES</th>
<th>Learning time: 30h</th>
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<td><strong>Description:</strong></td>
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<tr>
<td>1.1 History</td>
<td>Theory classes: 10h</td>
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<tr>
<td>1.2 Characterization</td>
<td>Practical classes: 5h</td>
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<td>1.3 Features</td>
<td>Self study: 15h</td>
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<tr>
<td>1.4 Game Engine</td>
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<td>1.5 Physics</td>
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<td>1.6 Artificial Intelligence</td>
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<td><strong>Related activities:</strong></td>
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<td>1. Design Document</td>
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<th>- 2. DEVELOPMENT</th>
<th>Learning time: 45h</th>
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<td><strong>Description:</strong></td>
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<tr>
<td>2.1 Development Environment</td>
<td>Theory classes: 3h</td>
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<td>2.2 Vector design and bitmaps</td>
<td>Laboratory classes: 12h</td>
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<td>2.3 Symbols</td>
<td>Self study: 30h</td>
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<td>2.4 Animation</td>
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<td>2.5 ActionScript</td>
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<td>2.6 Publishing</td>
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<td><strong>Related activities:</strong></td>
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<td>2. Structure</td>
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<td>3. Project</td>
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<tr>
<td>4. Memory</td>
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## Planning of activities

### 1. DESIGN DOCUMENT

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

**Support materials:**
Documents available on campus ATENEA

**Descriptions of the assignments due and their relation to the assessment:**
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%.

**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

**Hours:** 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.

**Support materials:**
Documents available on campus ATENEA

**Descriptions of the assignments due and their relation to the assessment:**
The implemented work, the quality and the result are evaluated.
This note has a weight of 10%.

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

**Hours:** 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.

**Hours:** 35h
- Laboratory classes: 10h
- Self study: 25h
Support materials:
Documents available on campus ATENEA

Descriptions of the assignments due and their relation to the assessment:
The implemented work, the quality and the result are evaluated.
This note has a weight of 60%.

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.

4. MEMORIA

Hours: 6h
Laboratory classes: 1h
Self study: 5h

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

Support materials:
Documents available on campus ATENEA

Descriptions of the assignments due and their relation to the assessment:
Evidences:
Technical paper delivered is evaluated.
This note has a weight of 20%.

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.

Qualification 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:


Others resources:

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