Course guides
804244 - RAVJ - Augmented Reality

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.
Degree: BACHELOR'S DEGREE IN VIDEO GAME DESIGN AND DEVELOPMENT (Syllabus 2014). (Compulsory subject).
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Academic year: 2020 ECTS Credits: 6.0 Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Fernández Ruiz, Marta
Others: Seinfeld Tarafa, Sofia
Omedas, Pedro

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

TEACHING METHODOLOGY

Explanation by the teacher of the theoretical and practical concepts, which must allow the student to understand the current state and the possibilities offered by the different fields introduced in the subject, as well as carrying out the practices proposed throughout the course.

Some practices will be done individually, while the final work of the subject will be done in groups (3 to 4 people). The development of contents and some part of the practices will be carried out in class with the assistance of the teacher, while other activities will have to be carried out independently outside of class time.

The results of the final work, in addition to being delivered in writing, must also be presented in class. Both in the explanation of contents and in the realization of practices, it is about doing a participatory class where the student actively intervenes, asking questions and proposing solutions / alternatives in relation to the concepts and technologies used.
LEARNING OBJECTIVES OF THE SUBJECT

- Be able to design video games for interfaces based on augmented reality (AR) and immersive virtual reality (VR).
- Understand the principles of user-centered design for AR and VR, as well as the challenges and applications generated by these technologies.
- Be able to identify and evaluate the technical characteristics of game engines as a technology for the creation of virtual and augmented reality applications.
- Show knowledge and be able to use libraries for the creation of video games and applications on mobile devices and/or other devices.
- To be able to design and build models that represent the necessary information for the creation and visualization of interactive images using virtual and augmented reality.
- Understand the current status and the different possibilities offered by computer graphics, computer vision systems and virtual and augmented reality.
- Understand the cognitive principles and perceptual illusions generated by AR and VR technologies.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>18,0</td>
<td>12.00</td>
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<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>12,0</td>
<td>8.00</td>
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<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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Total learning time: 150 h

CONTENTS

Theme 1. Introduction to AR and VR

Description:
Definition, evolution, current status and applications of augmented reality and virtual reality.

Full-or-part-time: 13h
Theory classes: 6h
Guided activities: 2h
Self study : 5h
<table>
<thead>
<tr>
<th>Theme 2. Concepts, properties and effects of AR and VR</th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
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<tr>
<td>- Immersion.</td>
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<tr>
<td>- Presence.</td>
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<td>- Embodiment.</td>
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<tr>
<td>- Agency.</td>
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<td>- Plausibility.</td>
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<td>- Spatiality.</td>
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<td>- VR / AR hardware and software.</td>
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<tr>
<td><strong>Full-or-part-time:</strong> 18h</td>
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<tr>
<td>Theory classes: 6h</td>
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<td>Guided activities: 2h</td>
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<td>Self study : 10h</td>
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<thead>
<tr>
<th>Theme 3. Interaction and Interface Design in VR and AR Environments</th>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
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<tr>
<td>- 3D User Interface (interaction techniques, selection, manipulation, navigation, visual perspective).</td>
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<tr>
<td>- User Centered Design Principles applied to VR and AR.</td>
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<td>- Challenges (level of graphic realism, simulator sickness, social interaction, multisensory feedback, ethics).</td>
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<tr>
<td><strong>Full-or-part-time:</strong> 29h</td>
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<tr>
<td>Theory classes: 8h</td>
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<tr>
<td>Practical classes: 2h</td>
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<tr>
<td>Guided activities: 4h</td>
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<tr>
<td>Self study : 15h</td>
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<table>
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<tr>
<th>Theme 4. Video games and applications in AR y VR</th>
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<tr>
<td><strong>Description:</strong></td>
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<tr>
<td>- Storytelling.</td>
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<tr>
<td>- Mechanics.</td>
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<tr>
<td>- Genres / Typologies.</td>
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<tr>
<td>- Techniques (Unity, Unreal, Vuforia, AR Foundation, etc).</td>
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<td><strong>Related activities:</strong></td>
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<tr>
<td>Critical analysis of two video games, one based on VR and the other on AR. The analysis should collect all the concepts seen throughout the course, including the perceptual illusions and properties of VR / AR, up to the principles of interaction and design that are used in the video game.</td>
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<tr>
<td><strong>Full-or-part-time:</strong> 26h</td>
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<tr>
<td>Theory classes: 4h</td>
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<tr>
<td>Guided activities: 2h</td>
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<tr>
<td>Self study : 20h</td>
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Theme 5. Prototyping and testing

Description:
- Conceptualization and creation of a video game prototype based on VR or AR, applying all the contents explained in class.
- Testing of VR and AR applications.

Related activities:
Conceptualization and prototyping of a video game based on AR or VR. The prototype must collect aspects of game design and all the concepts seen throughout the course.

Full-or-part-time: 64h
Theory classes: 4h
Practical classes: 16h
Guided activities: 4h
Self study : 40h

ACTIVITIES

Practice 1 - Analysis

Description:
Critical analysis of two video games, one based on VR and the other on AR. The analysis will collect all the concepts seen throughout the course, including the perceptual illusions and properties of VR / AR, up to the principles of interaction and design that are used in the video game.

Full-or-part-time: 25h
Self study: 25h

Practice 2 - Project

Description:
Conceptualization and prototyping of a video game based on AR or VR, collecting aspects of game design and all the concepts seen throughout the course.

Full-or-part-time: 44h
Guided activities: 4h
Self study: 40h

GRADING SYSTEM

- Practical Exercise 1: 20%
- Practice Exercise 2 (AR / VR Video Game Prototype): 30%
- Partial Exam: 20%
- Final Exam: 20%
- Participation and Learning Attitude: 10%

* 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 learning interest shown during the course. This evaluation corresponds to 10% of the final grade.

Students who do not pass the subject during the continuous assessment may take the re-assessment (only the 40% corresponding to the midterm and final exams will be assessed, with 5 being the maximum mark that can be obtained in the subject).
EXAMINATION RULES.

- The activities, once completed, must be delivered to the Virtual Campus in the corresponding delivery and on the corresponding date.

- The evaluation of the activities does not only imply the resolution of the same, but also the presentation of the results (when the student or the group is required to do so during the classes).

- The documents must be completed following the instructions given therein, especially with regard to the file names and the content structure. The correct management of the documentation provided is an aspect related to the skills to be acquired and is, therefore, subject to evaluation.

BIBLIOGRAPHY

Basic:

RESOURCES

Hyperlink:
- Unity3D. https://unity3d.com/es

Other resources:
Scientific Papers:


