Universidad Zaragoza

25838 - 3D Interactive Environments

<u>**Información del Plan Docente**</u>

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	271 - Bachelor's Degree in Industrial Design and Product Development Engineering
ECTS	5.0
Year	
Semester	Second Four-month period
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

Brief presentation of the subject

This course is a complement to the Bachelor's Degree in Industrial Design and Product Development Engineering which aims to promote knowledge on technologies recreation of reality through computer, not covered by other subjects.
The matter is structured into **two** blocks:

- The advanced visualization refers, among others, special modeling techniques used to obtain real-time animation, using virtual actors or simulation systems of environmental conditions.
- The other block is the one that is related to the various existing procedures for establishing the interaction between people and computers also focusing on the fundamentals, applications, trends and special hardware used in designing virtual environments or augmented reality.

The course is eminently practical and evaluated by two jobs or task, one single and one team.

1.2.Recommendations to take this course

This matter is one of the essential subjects of basic training in computer graphics and render technology. It has affinity with Composition and Multimedia Communication and Image Editing on the Degree.
Also it related to the theoretical contents or foundations established in other optional intensification and Photography (composition scene, camera optics) and to a lesser extent with Light and Color in Industrial Design.
There independence with the contents of the core subjects and are not considered additional to those established by the Curriculum in the Bachelor's Degree in Industrial Design and Product Development Engineering.

1.3.Context and importance of this course in the degree

The student will be able to complement their work as a design engineer with the making of audiovisual projects broad spectrum holistically and using conventional or by actually computer-generated scenarios with what is documented and displayed optimally any stage of product launch, including the promotion and after-sales service.
Certain materials may be enriched by the additional knowledge gained in this optional, as in the case of Graphic Expression, Graphic Design and Communication (Providing interactivity and three-dimensional approach to graphics),

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Creativity (provided new expressive resources that favor the spread of ideas), Computer Aided Design (Optimizing display detail and animation of complex functional product events) and Ergonomics (Using technologies and use of synthetic characters)

1.4.Activities and key dates

They will be presented in MOODLE 2.

2.Learning goals

2.1.Learning goals

The student, for passing this subject, should demonstrate the following results ...

- It is able to select software, applications and technologies that enable photorealistic recreation of the products design and visual simulation of their operation, maintenance or utility-function.
- It is able to optimize various stages of the product cycle, especially those related to the conceptual analysis or virtual simulation prototypes.
- It is capable of designing user interfaces product-based video game technologies, virtual reality or augmented reality.
- You can coordinate the necessary resources for audiovisual projects in which these techniques are used.
- It is able to use all the technologies involved in this subject, in order to show the most effective way possible work design products made by the student.

2.2.Importance of learning goals

The discipline provides specific training, updated and practical in a field of ICT in clear expansion which can improve the technical profile of the student and enable it to more complex and multidisciplinary innovative projects.

3.Aims of the course and competences

3.1.Aims of the course

The subject and its expected results meet the following approaches and objectives:

This course is an elective 5 credits within the Bachelor's Degree in Industrial Design and Product Development Engineering. And aims to enhance the knowledge of the degree in the field of image synthesis generation along with the subjects Communication and Multimedia Composition and Editing of pictures. These three subjects are interrelated and complementary in many of the works of audiovisual production regardless of the medium involved: Generation storybords, modeling and preparation of scenarios or funds, generation of 3d shaders, defining keyframes, events and sequences, filters picture, special effects and postproduction works.

3.2.Competences

To pass the course, students will be more competent to ...

BASIC COMPETENCES

- (CB04): Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

GENERAL COMPETENCES

- (GC03): Ability to design and develop design projects in aspects related to the nature of products and services, their relevance to the market, usage environments and user, and based on their manufacture, the selection of materials and processes most appropriate in each case considering relevant aspects such as quality and product improvement.
- (GC05): Capacity to collect, manage, analyze and synthesize information from various sources for the development of design projects and product development. Capacity to use this documentation to obtain conclusions aimed at solving problems and making decisions with initiative, creativity and critical thinking, in order to generate new product concepts, new ideas and solutions.
- (GC06):Ability to generate the necessary documentation for the proper transmission of ideas through graphics, reports and technical documents, models and prototypes, oral presentations in Spanish and other languages.
- (GC08): Ability to learn continuously, to develop autonomous learning strategies and to work in multidisciplinary groups with motivation and determination to achieve goals.

SPECIFIC COMPETENCES

- SC04. Capacity of spatial vision and knowledge of graphic representation techniques, both traditional methods of metric geometry and descriptive geometry, such as through applications of computer-aided design.
- SC05. Ability to conduct effective and professional presentations through drawing and digital technologies using visual skills to communicate ideas and concepts quickly and efficiently, by selecting the most appropriate media and content.
- SC17. Ability to make models and prototypes using workshop techniques and tools. Know and master three-dimensional representation techniques traditional and digital as well as its tools and materials.
- SC18. Ability to generate 3D geometric models for application to presentations, photorealistic rendering, simulations and tests of various kinds.
- SC26. Ability to obtain quality images and manipulate in an advanced manner both static and dynamic digital images.

SUBJECT ADTIONALS:

- (01): Capacity to coordinate tasks in a project Product Engineering that requires the intervention of virtual or augmented reality as part of its direct development, or indirectly as a support tool.
- (02): Ability to evaluate and select all alternatives advanced recreation of environments that can present projects computer-aided design.
- (03): Ability to develop projects that would be unviable Ergonomics other methods through the application of human knowledge with digital synthesis simulating severe working conditions or displayed not prove detrimental to members or anatomical areas.
- (04): Capacity to present compelling and innovative projects using, for example, interactive virtual agents or actors.
- (05): Ability to coordinate 3D audiovisual projects in a broad sense.
- (06): Ability to select the most appropriate time to establish any process of interaction person computer forms of interaction.

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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The student must demonstrate that it has achieved the intended learning outcomes through the following evaluation activities

OPTION A, continuous assessment of TWO task (one per each block)

- REVIEW CASE STUDY RESOLVED BY PARTIAL TASK (BLOCK A): Students must complete six tasks integrated a particular case. These tasks determine the understanding of the subject by students and the ability to apply learning and a subject chosen by him and supervised by teachers. Account for 60% of the total score. It is an individual work
- Exposure of project or CASE RESOLVED (BLOCK B): It is proposed that a team of students explore the possibility of using technologies developed during the course on a particular topic. The assessment of this activity is the other 40% will be made according to the criteria of the teacher who is who proposed the theme of the report. In this test not only the ability to work in teams and knowledge gained by the students but the development of critical thinking skills that will enable them to understand and analyze a technical as well as its ability to select, organize and present information will be taken into account collectively.

OPTION B. Test.

- For those students who want this option or not exceeding the minimum qualification in the form of continuous assessment, a written test that consign 100% of qualifying to celebrate in the exam schedule established by the EINA will take place.

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process that is designed for this subject is based on the following:

It is a practical subject and uses rational resources. It encourages the use of tools accessible to a college student oriented real case studies for the professional engineer of the Bachelor's Degree in Industrial Design and Product Development Engineering. Increases its ability to integrate into a productive system and / or company. Individual work is the core of the activities but the goal is the active dissemination of the results with the participation of other partners.

5.2.Learning tasks
- LECTURE (20 hours): the fundamental contents of the subject are presented. This activity will take place in the classroom by classroom using electronic filing, offline and online creative applications via Internet or through lectures by company specialists.
- PRACTICAL SESIONS (CASE STUDY EXAMPLE) (30 hours): Practical sessions in which similar to those required of the student to be evaluated tasks are presented. specific visual software platform installed on the student's personal computer (laptop) in classrooms conditioned for it with WiFi and under the guidance of Professor used.
- TUTORIALS: The tutorials will be carried out throughout the course in person at the scheduled time or via e-mail or direct coordination through MOODLE.
- GROUP WORK EXPOSITION (04 hours). It is done on digital media in a means of public access.
- NO CLASSROOM WORK Student: estimated at 71h.
- EXAMINATION: If applicable. It will consist of a letter written to celebrate in the exam schedule established by the

Center.

5.3.Syllabus

The program that the student is offered to help you achieve the expected results includes the following activities ...

BLOCK A: 3D enviroments

- Methodology for the development of a 3D interactive environment.
- Geometric modeling for real-time applications.
- Techniques real-time display, editing and manipulation of textures.Lighting methods. 3D scenary optimization.
- General animation through direct or analytical methods (heuristic and physical).
- Virtual actors/agents. Conceptual design of characters for animation in real time. Adaptive modeling organic. Preparation movement.Specific techniques of 3D animation characters.
- Commercial applications of virtual actors in real time.

BLOCK B: Interaction

- What is an interactive 3D environment ?: synthetic worlds.
- Increased worlds (real image + synthetic image)
- The real-time GPU (Graphics Processing Unit) GPGPU (General-Purpose Computing on Graphics Processing Units).
- Interactivity with interactive 3D environments: conventional interaction.
- Interaction with specific peripherals. tangible interaction. natural interaction.
- Applications of interactive 3D environments: Design of facilities. Design of complex products.

5.4.Course planning and calendar

Schedule sessions and presentation of works (semester 14-15 weeks)

Block A: 8-7 weeks.
Block B: 7-6 weeks.
Last week semester makes the public presentation of the work of block B

The Friday of the first week of exams band established by the EINA, is the deadline for submission of reports of the tasks of Block A.

5.5.Bibliography and recommended resources

The references of the subject are delivered to students during the semester, the necessary links appearing on the MOODLE 2 platform.