Universidad Zaragoza

Year : 2019/20

25897 - 30 Interactive Environments

Syllabus Information

Academic Year: 2019/20
Subject: 25897 - 30 Interactive Environments
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 558 - Bachelor's Degree in Industrial Design and Product Development Engineering
ECTS: 6.0
Year: 4
Semester: Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

The student will be able to complement his work as a product design engineer with the preparation of broad-spectrum audiovisual projects, in an integral way and using conventional scenarios or through computer-generated reality, thereby documenting and optimally visualizing the stages of whole product cycle.

1.2.Context and importance of this course in the degree

This subject is directly related to the visual improvement of design engineering projects, using conventional scenarios or through computer-generated reality, with which any of the stages related to the product cycle is documented and visualized in an optimal way, from launch to the promotion or the after-sales service.

1.3.Recommendations to take this course

This subject is one of the essential subjects in the training in technologies of the synthesis image. There is independence with the contents of core subjects and curricular incompatibilities are not considered in addition to those established by the Curriculum.
Certain contents are related to the knowledge acquired in Graphic Expression, Graphic Design and Communication (Contributing interactivity and the three-dimensional approach to graphic design), Creativity (Providing new expressive resources that favor the diffusion of ideas) and Computer Aided Design (Optimizing the detail display and the complex animation of functional events of the product).

2.Learning goals

2.1.Competences

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.

2.2.Learning goals

The student, to overcome this subject, must demonstrate the following results:

1. He is capable of choosing applications and technologies that allow the photorealistic recreation of the products that

are the object of the design and of the visual simulation of its operation, maintenance or utility-function.

2. He is capable of optimizing various stages of the product cycle, especially those related to conceptual analysis or virtual simulation of prototypes.
3. He is able to design product-user interfaces based on videogame technologies, virtual reality or augmented reality.
4. He is capable to coordinate the necessary resources in audiovisual projects in which these techniques are used.
5. He is able to show in the most effective way, the work the design products that the student does, both in group and solo.

2.3.Importance of learning goals

The subject is related to the group of subjects of Design and Creativity Workshop, all these subjects are methodological and experimental so that learning is by carrying out projects, where experimentality is a very important factor in their learning.

3.Assessment (1st and 2nd call)

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

The global subject assessment has two parts with different percentage:

- 60% knowledge of basic concepts of the subject and its application to solving problems and cases.
- 40% individual practical exercise.

They described below.

Knowledge evaluation: There will be a test of knowledge in exam that will deal with the general concepts of the subject exposed in the theoretical classes. It will be done on the date, time and place determined by the EINA global evaluation test calendar. Its weight will be 40% of the grade of the subject. It is necessary to approve it to be able to pass the subject.

Throughout the course in problem class, exercises will be proposed to be carried out individually or in groups according to their nature. Your evaluation will have a weight of 20% of the grade of the subject.

Individual practical exercise: The student must perform a series of integrated tasks in a specific case / project. These tasks are introduced sequentially in the practical sessions of the subject. The tasks involve putting into practice, with specific software, the concepts presented in the classroom. It is an individual job and accounts for 40% of the total rating. It will be evaluated by the teacher assessing the degree of understanding of the subject reached by the student in the different applications, techniques or technologies reviewed as well as the ability to put them into practice on the specific case, its development coherent and compensated. It is an individual work.

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

It is a subject with a high practical component, but without neglecting the knowledge, on the part of the students, of the basic theoretical foundations. The objective is that the student, future engineer, is not a mere user of computer applications, but is able to understand its operation, its capabilities and limitations. It is intended to foster the ability to make decisions based on technical reasoning, to carry out a critical analysis of applications and software with the aim of being able to lead projects with a strong technological component. The application of the knowledge to cases of use is encouraged real cases of the engineer of industrial design and product development and the use of tools accessible to a current university student. Individual work is the core of the activities, but the objective is the active dissemination of the results with the participation of the rest of the classmates.

The bulk of the subject will consist of the presentation of the theoretical contents and cases of use by the teachers, complemented by the realization of practical exercises by students in the classroom. The exercises to be carried out will encourage the work of both written and oral expression at the time of presenting the results.

Additionally, the students will carry out a series of practical laboratory sessions around an individual project/work that allows the monitoring of the achievements and partial and general objectives that are reached. In this way, students will learn the management of specific software and free access, which will serve for the different tasks to be carried out in the project / practical work.

For the realization of practical work, the following methodology will be applied:

- The initial phase of definition of the animation/interaction project: Background, scope, and determination of objectives.
- The phase of 3D modeling of the stage.
- Animation phase.
- 3D interaction phase.

Final evaluation: Evaluation criteria are established that will help us assess the results obtained.

4.2.Learning tasks

The course will address the following learning tasks:

- LECTURES and SEMINARS (30 hours): The fundamental contents of the subject are exposed. This activity will be carried out in the classroom in person using electronic presentations, applications, demos, videos, etc. The work of the professors of the subject will be complemented by talks/demonstrations by company specialists making use of the programs of external collaborators of the center.
- PROBLEMS (15 hours): Practical exercises to apply the knowledge with the help of the student's personal computer under the supervision of the teacher. Study of practical cases. Search for complementary information. They will be carried out individually or in groups according to their nature.
- PRACTICAL SESSIONS (15 hours): Practical exercises sessions in which similar tasks are presented to those that the student must do in his project of practices to be evaluated. Specific multi-platform visual software is installed on the student's personal computer (laptop), in conditioned classrooms with WiFi connection and under the guidance of the teacher.
- TUTORING: The tutorials will be carried out throughout the course in person at the established time or through email or direct coordination through MOODLE.
- NON-PRESENTIAL WORK of the student: It is estimated at 89h. It will include the study of the contents, the realization of problems and the practical work of the subject.
- EXAM: It will consist of a written test (1 hour) to be held within the exam calendar established by the Center.

4.3.Syllabus

The syllabus of the subject is the following:

- Introduction. 3D interactive spaces. Creation and interaction. Techniques, applications, and methodologies. Applications.
- Geometric modeling. Polygons. NURBS. Subdivision. Procedural models.
- Visual modeling. Textures. Materials and shaders. Light interaction.
- Rendering. Cameras. Local global vs. illumination models. Ray tracing. Radiosity.
- General animation techniques. Fundamentals of animation. Keyframing. Kinematics and dynamics. Animation of particles.
- Virtual character animation techniques. Character design. Rigging. Animation techniques. Motion capture. Facial animation. Behaviours modeling. Applications.
- Interactivity in interactive 3D environments: Interaction paradigms. Interaction in mixed reality environments: virtual reality and augmented reality. Natural interaction: gestural, tangible and brain-computer interfaces.
- Applications of interactive 3D environments: Facilities Design. Design of complex products.

The practical part will be structured around the creation of a 3D minigame comprising the following tasks:

- Construction of a 3D environment.
- Materials and photorealistic rendering.
- Creation of a 3D character.
- Integration of objects and character in the scene.
- Interaction.

4.4.Course planning and calendar

In the presentation of the subject, the calendar and detailed planning of the activities will be established, adjusting them to the calendar established by the center for that course. A special effort will be made to pace the presentation of the topics with the corresponding practical work to be done.

4.5.Bibliography and recommended resources