Academic Year/course: 2024/25

25897 - 30 Interactive Environments

Syllabus Information

Academic year: 2024/25
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

This subject reviews advanced product/user visualization, using conventional scenarios or computer generated reality to optimally recreate any of the stages related to the product cycle or its use by virtual humans. Topics such as complex event animation using physical conditions, advanced 3D character manipulation , synthesis image generation by simulation of light behavior,integration with tools used in the entertainment industry and their application in research or production are covered.

2. Learning results

- The ability to choose applications and technologies that allow the photo-realistic recreation of the products to be designed and the visual simulation of their operation, maintenance or utility-function is acquired.
- May lead virtual simulation/recreation work on motion prototypes.
- Be able to design product-user interfaces based on video game, virtual reality or augmented reality technologies.
- Ability to use virtual humans in engineering or occupational risk prevention projects.
- Be able to present in the most effective way, the work, the design products made by the student both as a group and alone.

3. Syllabus

- BLOCK 01: Concept of interactive 3D spaces. Creation and interaction. Techniques, uses and methodologies.

    Applications.
- BLOCK 02: Geometric modeling of spaces. Polygonal models. Procedural models. Visual modeling.

    Textures. Materials and shaders. Light-matter interaction. Cameras. Local vs. global illumination.ray tracer.
    Radiosity. Render passes.
- BLOCK 03: General animation techniques. Fundamentals of animation. Animation by key shots. Kinematics and dynamics techniques. Animation by physical variables. Particle animation.

- BLOCK 04: Design and modeling of a 3D character. Integration of objects and character. Animation techniques for Virtual characters. Rigging. Animation techniques. Motion capture. Facial animation. Modeling of behavior. Applications.

- BLOCK 05: Interactivity techniques in interactive 3D environments: Interaction paradigms. Interaction in Mixed Reality environments: virtual reality and augmented reality. Natural interaction: gestural, tangible interfaces and brain-computer.

4. Academic activities

- LECTURE LESSONS and SEMINARS (30 hours): The fundamental contents of the subject are presented. The work of the subject teachers will be complemented by lectures/demonstrations by company specialists using the programs of external collaborators of the center.
- LABORATORY PRACTICES (30 hours): Practical exercise sessions using specific multi-platform visual softwareinstalled on the student's personal computer (laptop) under the guidance of the teacher.
- STUDY and DEVELOPMENT of TASKS: Estimated at 89h. It will include the study of the theory contents, the

realization of the work associated to the tasks established in the practices of the subject and the elaboration of the report that accredits the authorship and methodology followed in the same.

- EXAMINATION: It will consist of a written test (1 hour) to be held within the examination schedule established by the Centre.

5. Assessment system

The subject is evaluated in two parts with different percentages:

- - GLOBAL ASSESSMENT TEST: It will deal with the general concepts of the subject exposed in the theoretical classes. It will be held on the date, time and place determined by the EINA Global Assessment Testing Schedule . Its weight will be 40% of the grade of the subject and it is necessary to pass it in order to pass the subject.
- INDIVIDUAL SUPERVISED ASSIGNMENTS: A series of integrated exercises must be carried out with a specific case/project of free choice associated with a theme. They are defined during the practical sessions of the subject. It is an individual work that involves the elaboration of a written report to be delivered on the established date.

It accounts for 60% of the total grade, if the previous global test is passed.

6. Sustainable Development Goals

8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure