Universidad Zaragoza

Academic Year/course: 2023/24

62228 - Computer Graphics and immersive multimedia environments

Syllabus Information

Academic year: 2023/24
Subject: 62228 - Computer Graphics and immersive multimedia environments
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 534 - Master's Degree in Informatics Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

This course focuses on the general topic of visual computing, and in particular on its scientific foundations and its applications in industry and science. Visual computing is a largely relevang field in modern computer science, and it has a widespread presence in mostly all aspects of modern life.

It is expected that after passing the course, the student will be able to:

- Have a general perspective on the field of visual computing, including its evolution, state of the art, and open problems.

- Communicate to a general audience the acquired knowledge on visual computing.

- Understand the mathematical models and computational algorithms used in visual computing.

- Elaborate R+D projects.

- Design hardware and software products for solving problems in visual computing.

- Create and leverage virtual enviroments, including virtual, mixed, and augmented reality, as well as multimedia content and populated virtual environments.

These goals are aligned with the following Sustainable Development Goals in the UN Agenda 2030 (https://www.un.org/sustainabledevelopment/es/). Specifically, the activities in this course will contribute to the achievement of goals 8, 9 y 10.

2. Learning results

After passing the course, the student will demonstrate the following results:

1. Understand the theoretical and practical bases of synthetic image generation, including the fundamental algorithms in computer graphics, the theoretical basis of light transport, and the use of graphics hardware. He/she will know the historical evolution of the field, and its applications in entertainment, CAD, architecture, etc.
2. Know the concepts of Virtual Reality, Augmented Reality and Mixed Reality; understand their application, how virtual environments are implemented, and how can be coupled and populated using intelligent agents.
3. Know the theoretical basis of 3D reconstruction and localization in real environments, and its integration in Augmented and Mixed Reality.

3. Syllabus

Section 1:

- Fundamentals of Computer Graphics and synthetic image generation
- Real time Computer Graphics

Section 2:
- Light transport
- Global illumination
- Participating media

Section 3:
- Multiview geometry modeling for computer vision
- Structure from Motion (SfM)
- Visual SLAM (Simultaneous Localization and Mapping)

Section 4:
- Interactive environments. Interaction paradigms and styles
- Inmersive environments
- Populated environments

4. Academic activities

The course (150 hours, 6 ECTS credits) includes the following learning tasks:
- Lectures and practical sessions: 60 hours
- Practical application or research assignments: 60 hours
- Study: 25 h
- Evaluation tests: 5h

5. Assessment system

The evaluation of the learning results of the student will be done using the following activities:
- Final written exam (40%)
- Practical assignments (50%)
- Presentations and participation (10%)

To pass the course, the students will need to have a minimum weighted average of 5/10, and at least a grade of 4/10 on each evaluation activities. If the grade of any of the activities is below 4, the maximum grade will be 4/10.

Students not opting or passing the evaluation described previously, or wanting to increase their grade, will have the right to pass through a global evaluation.