COURSE DATA

Data Subject	
Code	36473
Name	Multimodal Interaction
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	4	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	19 - Optatividad	Optional

SUMMARY

The Multimodal Interaction course is part of the field of Interaction I. Systems This is an elective course that aims to equip students with the latest knowledge in systems of human-computer interaction. In the curriculum is planned pair your fourth year teaching in second quarter with a total charge of 6 ECTS.

In recent years there has been a major change in how the forms of interaction between people and computers. These changes are particularly important in multimedia applications environment. Therefore, this course aims to introduce students to review the various multimodal interaction mechanisms currently employed in the field of multimedia. These range from the Virtual Reality and Augmented Reality, ubiquitous computing systems, multitouch environments, mobile devices, ubiquitous computing and tangible interfaces.

The main objective of the course is that students learn these interaction mechanisms and the technologies involved in each of them and be able to decide which is the most appropriate depending on the type of application that has to be developed so as to ensure proper accessibility thereof.

The course is twofold theoretical and practical. You need to expose students to the theoretical basis on which these techniques are based to be able to cope with problems or unforeseen contingencies in the tools or libraries available. Moreover, it is imperative that students become familiar through practice, with standard forms of work in these fields using any of the most used tools and libraries exist to generate graphs.

The student must also be able to handle the technical vocabulary of these fields and to assess and argue advantages and disadvantages of using the various techniques presented, and use the contents presented in the problem solving approach and proposed. In this respect the proposed themes oral presentations and group problem sessions have this aim to help students in the task of synthesis, abstraction and understanding required for the proper assimilation of the content.

The dynamics of the class is participatory. Exposure classes in content, is a dialogue teacher-student and student-student through formulation of questions both the teacher and the student. In the classes of problems, will develop activities that encourage group discussion and oral presentation by the students. In laboratories will consider the development of small group work and presentation to the teacher preferably through a dialogue that promotes explanatory and reasoned argument. The tutoring sessions are voluntary but are an important part of student accommodation to the dynamics of the subject and is the place not only answer specific questions about the concepts presented, but also to raise any problem or difficulty focusing staff arises regarding any aspect of the subject.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Being a fourth-year course, there are important relationships with previous courses. The most important relationships are with Computer Graphics and Advanced Graphics and Sound in the second year and also the subjects of Simulation and Animation of third. These subjects are important because most of the systems involve the integration reviewing high level of content described in these subjects. Finally remark that the subjects of Mathematics I and II also give the student the ability to understand the geome

OUTCOMES

1407 - Degree in Multimedia Engineering

- G1 - Be able to relate and structure information from different sources and to integrate ideas and knowledge. (RD1393/2007)
- G2 - Have the learning skills needed to undertake further studies or to gain further training with a certain degree of autonomy. (RD1393/2007)
- G4 - Be able to integrate into working groups and collaborate in multidisciplinary environments and be able to communicate properly with professionals from all fields.
- MM1 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia systems including all the disciplines covered by these systems.
- MM2 - Be able to understand and manage the different technologies involved in multimedia systems, both from the point of view of hardware and electronics and of software.
- MM9 - Program correctly in the different specific languages of multimedia systems taking into account time and cost restrictions.
- MM21 - Communicate effectively, both in writing and verbally, knowledge, procedures, results and ideas related to ICT and specifically to multimedia, and know their socioeconomic impact.
- MM24 - Be able to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of multimedia systems, services and applications and of the information that these manage.
- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

This course aims to achieve the following learning outcomes:

-Know the fundamental basic processes that are involved in human-computer interaction systems current and to go beyond desktop models.

-Diagnose and troubleshoot-specific design and development of interactive systems in different environments.

-Become familiar with advanced interaction devices and common APIs for programming.

- Know the application development environments Virtual and Augmented Reality to use them properly in creating interactive applications.

- Know the motion capture systems and gesture recognition mechanisms to use as human-computer interaction.

- Know interconnection systems and sensor networks that allow application development with environmental interaction.

- Know haptic interaction elements and their use in the environment for multimedia applications.

-Understand and manage bibliographic sources representative of this matter.

To complement these outcomes, this course also aims that students acquire the following skills:

- Be able to integrate into multidisciplinary development teams taking different roles in a team.

- Personal work.

DESCRIPTION OF CONTENTS

1. Introduction Multimodal Interaction Systems. Evolution of the interaction mechanisms

- Introduction to Advanced Interaction systems
- Multimodal Interaction Concept

2. 3D Interaction. Environments Virtual Reality (VR)

Introduction to VR
VR Devices
Immersive Projection Systems

3. Augmented Reality (AR) Environments

Introduction to AR Systems
Environments based on AR Marks
Features based RA Environments
Registration and Occlusion

4. Natural Interaction Mechanisms

Motion Capture Systems
- Systems Multitouch gestures and environments
- Infrared Motion Capture

5. Ubiquitous interaction

- Basics of Ubiquitous computing
- Sensor systems and middleware for ubiquitous systems.
- Interaction Ubiquitous, Tangible interfaces

6. Haptic Systems

-- Introduction to haptic interaction
- Physical simulation and haptic environments
- Developing Applications with haptic devices

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	4,00	0
Development of individual work	4,00	0
Study and independent work	10,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	12,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	20,00	0
Resolution of case studies	10,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Theoretical activities.

Description: The lectures will present the course contents providing a global vision, a detailed analysis of the key concepts and encouraging the student participation. The workload of this section for the students is 20% of the total of the course.

Practical activities.

Description: The practical activities complement the theoretical classes and allow the students to put into practice the contents and improve the understanding of the course concepts. They include the following types of classroom activities:

• Solving problems in class.
• Regular discussion of exercises and problems that the students have previously tried to work out.

• Laboratory sessions.

• Support tutorial sessions (individualized or in group).

• Individual evaluation of questionnaires to be done in class with the help of professors.

The workload of this section for the students is 30% of the total of the course.

Personal work.

Description: It is the work that the student must carry out individually out of the classroom timetable. It tries to promote the autonomous work habit. Activities in this group are: monographs, guided literature search, exercises and problems as well as preparation of classes and exams. The workload of this section for the students is 50% of the total of the course.

During the course the e-learning (pizarra virtual) platform of the University of Valencia will be used to support the teaching activities. This platform allows the access to the course materials used in the classes as well as additional documents, solved problems and exercises.

EVALUATION

For the evaluation of the course the following aspects will be considered.
-Continuous assessment, based on participation and the degree of involvement on the teaching-learning process. The attendance on regular basis to on-campus lectures/activities will be taken into account. A set of activities consisting of individual and group work to do at home or in class, oral presentations, resolution of issues and problems in class, and some partial individual tests may be conducted during the course. These exercises may be proposed without previous notice.-There will be a final individual test consisting of one or more written exams or test of knowledge. These tests will consist of both theoretical questions and practical problems. It will be necessary to approve each test to compensate.-Assessment of practical activities based on the achievement of objectives in the laboratory sessions and problems and a final work. This section need to be approved to compensate.

The final mark is calculated as follows:

Final Mark = 0.2 * C + 0.5 + 0.3 * E * P

In the second summons will be kept note of the continuous assessment (C) and parts (E and P) approved. For unapproved parts (E and P) will be an exam, calculating the final mark as you would at first call.

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the Governing Council on 30th May 2017 (ACGUV 108/2017)

REFERENCES

Basic

- Interactive Computer Graphics. Edwar Angel. Addison Wesley.2001
- Computer Graphics and Virtual Environments. Slater M., Steed, A., Chrysantou Y. Addison-Wesley.2002
- Handbook of Augmented Reality. Borko Furht Editor. Editorial Springer. 2011
- Ubiquitous Computing. Stefan Poslad. Edit. Wiley. 2009

Additional

- ARToolkint Reference Manual.
- OpenSceneGraph Reference Manual v2.2. 2007

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching methodology for this subject will follow the model approved by the Academic Committee of the GII / GIM degrees (https://links.uv.es/catinfmult/modeloDocent). If the facilities are closed because of COVID-19 pandemics, the scheduled lectures will be replaced by synchronous online sessions within the assigned time slots of the course, using the tools provided by the university.

If the facilities need to be closed due to the pandemics causing any of the evaluation exercises to be held at ETSE-UV, these exercises will be substituted by equivalent exercieses held online using the tools provided by the university. The weights for each activity will remain the same as specified in the teaching guide.