UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: VIRTUAL AND AUGMENTED REALITY
Code: 311048
Type: CORE COURSE
ECTS credits: 6
Degree: 2361 - MÁSTER UNIVERSITARIO EN INGENIERÍA INFORMÁTICA (AB) (2020)
Academic year: 2022-23
Center: 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)
Group(s): 10 11
Year: 1
Duration: First semester
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **JOSE PASCUAL MOLINA MASSO** - Group(s): **10 11**

Building/Office	Department	Phone number	Email	Office hours
E.S. de Ingeniería Informática / Despacho 0.C.12	SISTEMAS INFORMÁTICOS	2544	josepascual.molina@uclm.es	https://www.esiiab.uclm.es/pers.php?codpers=120&curso=2022-23

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

This subject is included in the superset 'Computing', along with 'High Performance Computing' and 'Development of Intelligent Systems'. The main objective of this is to train the student in the fundamentals of visualization in information interaction, with special emphasis on different techniques to be used and deepening the aspect related to management responsibilities from the point of view of project management.
In recent years, there has been a rapid evolution in information interaction and visualization techniques. The needs of qualified personnel in the sector are notable, specifically in the direction and management of multidisciplinary work teams, in the field of video games, cinema, television, industrial design, scientific displays, simulations, etc ...
In this context, this subject addresses the main fields of knowledge in the field of modern computer interaction techniques and the methods of information synthesis.

4. Degree competences achieved in this course

Course competences

Code	Description
CE13	Ability to use and develop methodologies, techniques and programmes for specific uses, rules and computer standard graphics.
CE14	Ability to conceptualise, design, develop and assess the interaction between the user and the machine in the use of products, applications and IT services.
CE15	Ability to create and utilise virtual environments in the creation, management and distribution of multimedia content.
INS01	Analysis, synthesis and assessment skills.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER01	Team work abilities.
SIS01	Critical thinking.
SIS03	Autonomous learning.
UCLM02	Ability to use Information and Communication Technologies.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Use human-computer interaction techniques to facilitate navigation through the represented models and information, as well as the selection and manipulation of specific models or information

Visualise, design, develop, evaluate and exploit complex interactive systems, from multimedia systems to virtual worlds

Use computer graphics and multimedia methods to produce artificial, realistic and hybrid models and information by computer

6. Units / Contents

Unit 1: Introduction to interactive graphics.

Unit 2: Mathematics for computer graphics.

Unit 3: Geometric transformations and 3D viewing.

Unit 4: Light and Color. Local and Global Lighting Models.

Unit 5: Methods of Global Illumination. Ray Tracing and Radiosity.

Unit 6: 3D user interfaces. Application to Virtual and Augmented Reality.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CE13 CE14 CE15 INS01 INS04 INS05 SIS01	0.6	15	Y	N	Blended students can follow the classes by recorded or live video.
Study and Exam Preparation [OFF-SITE]	Self-study	CE13 CE14 CE15 INS01 INS04 INS05 SIS01 SIS03 UCLM02	0.9	22.5	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CE13 CE14 CE15 INS01 INS04 INS05 PER01 SIS01 UCLM02	0.04	1	Y	N	Blended students can follow the explanation of the problems by recorded or live video, and send the solutions through the virtual campus.
Other off-site activity [OFF-SITE]	Problem solving and exercises	CE13 CE14 CE15 INS01 INS04 INS05 SIS01 SIS03 UCLM02	0.06	1.5	N	-	
Computer room practice [ON-SITE]	Practical or hands-on activities	CE13 CE14 CE15 INS04 PER01 UCLM02	0.64	16	Y	N	Blended students can carry out the practices at home with their own computer, and send the deliveries through the virtual campus.
Practicum and practical activities report writing or preparation [OFF-SITE]	Practical or hands-on activities	CE13 CE14 CE15 INS01 INS04 INS05 SIS01 SIS03 UCLM02	1.04	26	Y	N	
Problem solving and/or case studies [ON-SITE]	Self-study	CE13 CE14 CE15 INS01 INS04 INS05 SIS01 SIS03 UCLM02	0.48	12	Y	N	Assigment 1, individual.
Problem solving and/or case studies [ON-SITE]	Group Work	CE13 CE14 CE15 INS01 INS04 INS05 PER01 SIS01 UCLM02	0.48	12	Y	N	Assigment 2, in groups.
Writing of reports or projects [OFF-SITE]	Self-study	CE13 CE14 CE15 INS01 INS04 INS05 SIS01 SIS03 UCLM02	0.72	18	Y	N	Assigment 1, individual.
Writing of reports or projects [OFF-SITE]	Group Work	CE13 CE14 CE15 INS01 INS04 INS05 PER01 SIS01 UCLM02	0.72	18	Y	N	Assigment 2, in groups.
Other on-site activities [ON-SITE]	Assessment tests	CE15 INS01 INS04 INS05 SIS01 UCLM02	0.16	4	Y	N	
Individual tutoring sessions [ON-SITE]	Other Methodologies	CE13 CE14 CE15 INS01 INS04 INS05	0.16	4	N	-	Blended students can solve their doubts through the virtual campus forum or by email.
		Total:	**6**	**150**			
		Total credits of in-class work: 2.56					**Total class time hours: 64**
		Total credits of out of class work: 3.44					**Total hours of out of class work: 86**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Projects	10.00%	10.00%	Delivery of assigment 1, individual. [INF] Delivery of reports, exercises, etc. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Projects	10.00%	10.00%	Delivery of assigment 2, in groups. [INF] Delivery of reports, exercises, etc. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Oral presentations assessment	10.00%	10.00%	Presentation of assigment 1, individual. [PRES] Presentations and participation in seminars. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Oral presentations assessment	10.00%	10.00%	Presentation of assigment 2, in groups. [PRES] Presentations and participation in seminars. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Test	15.00%	15.00%	Oral test of assigment 1, individual. [PRU] Partial tests and final exam at the end of the subject. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions

Test	15.00%	15.00%	Oral test of assigment 2, in groups. [PRU] Partial tests and final exam at the end of the subject. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Laboratory sessions	30.00%	30.00%	Individual practices. [LAB] Work at laboratory and/or cases. Both students attending the presence-based and blended modality will be assessed in the same type of examination sessions
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

A minimum score is not required in any of the evaluation systems, the student will pass the course if the sum of all of them reaches 50%.

Non-continuous evaluation:

A minimum score is not required in any of the evaluation systems, the student will pass the course if the sum of all of them reaches 50%.
The student can transfer to this evaluation points obtained in previous evaluation tests. In the tests that the student wants to improve in order to pass or obtain a higher grade, the work already done will not be reevaluated but, instead, the complete test has to be repeated, presenting -where appropriate- different works to those already delivered.
In team tests, in case the student cannot be part of a team, they will take them individually.

Specifications for the resit/retake exam:

Same as in the non-continuous evaluation of the ordinary call.

Specifications for the second resit / retake exam:

Same as in the non-continuous evaluation of the ordinary call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
Other on-site activities [PRESENCIAL][Assessment tests]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	4
Unit 1 (de 6): Introduction to interactive graphics.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Unit 2 (de 6): Mathematics for computer graphics.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1.5
Unit 3 (de 6): Geometric transformations and 3D viewing.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Unit 4 (de 6): Light and Color. Local and Global Lighting Models.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	1.5
Unit 5 (de 6): Methods of Global Illumination. Ray Tracing and Radiosity.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Computer room practice [PRESENCIAL][Practical or hands-on activities]	8
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	13
Problem solving and/or case studies [PRESENCIAL][Self-study]	12
Writing of reports or projects [AUTÓNOMA][Self-study]	18
Unit 6 (de 6): 3D user interfaces. Application to Virtual and Augmented Reality.	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Computer room practice [PRESENCIAL][Practical or hands-on activities]	8
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	13
Problem solving and/or case studies [PRESENCIAL][Group Work]	12
Writing of reports or projects [AUTÓNOMA][Group Work]	18
Global activity	
Activities	**hours**
Computer room practice [PRESENCIAL][Practical or hands-on activities]	16
Problem solving and/or case studies [PRESENCIAL][Group Work]	12

Class Attendance (theory) [PRESENCIAL][Lectures]	15
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Problem solving and/or case studies [PRESENCIAL][Self-study]	12
Writing of reports or projects [AUTÓNOMA][Group Work]	18
Writing of reports or projects [AUTÓNOMA][Self-study]	18
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	1.5
Other on-site activities [PRESENCIAL][Assessment tests]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	22.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	26
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Vince, JohnJohn A.	Mathematics for computer graphics	Springer		978-1-84628-034-4	2006	
Angel, Edward	Interactive computer graphics : a top down approach with Web	Pearson Education Limited,		978-1-292-01934-5	2015	
	3d user interfaces : theory and practice /	Addison-Wesley,		978-0-13-403432-4	2017	
McCaffrey, Mitch.	Unreal engine VR cookbook : developing virtual reality with	Addison-Wesley,		0-13-464917-6	2017	