UNIVERSIDAD DE CASTILLA - LA MANCHA
GUÍA DOCENTE

1. General information

Course: MULTI-AGENT SYSTEMS
Type: CORE COURSE
Degree: 347 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING (CR)
Center: 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL
Year: 4
Main language: Spanish
Use of additional languages:
Web site:

Code: 42346
ECTS credits: 6
Academic year: 2022-23
Group(s): 20
Duration: First semester
Second language: English
English Friendly: Y
Bilingual: N

Lecturer: **RUBEN RODRÍGUEZ CARDOS** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
Fermin Caballero / 106	TECNOLOGÍAS Y SISTEMAS DE INFORMACIÓN		Profesor.RRCardos@uclm.es	Available at https://esi.uclm.es/index.php/grado-en-ingenieria-informatica/profesorado/

2. Pre-Requisites

In order to take this course it is advisable to have taken the Basic Training modules (Module I) and the Common to the Computer Branch module (Module II).

Intelligent Systems is a subject that should have been taken before entering this subject.

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

In recent years Multiagent Systems have emerged as an interesting milestone in software development technology.

Multiagent Systems are a group of agents working together to solve problems. These systems are composed of normally heterogeneous agents, with a certain degree of independence. These agents are autonomous computational processes, with initiative, capacity to modify their environment and communicate with other agents.

For this reason, the course aims to provide the student with current and quality training on Multiagent Systems, covering both methodological and technological aspects, as well as their application through intelligent services in the Information Society.

This approach translates into the following specific objectives:

- To broaden the student's training (fundamentals, methodologies, technology, applications, etc.) for the development or research in distributed and open software systems based on agents.
- Complement the knowledge of Multiagent Systems with ICT technological foundations.
- To broaden the student's training on social and professional issues relevant to the creation of intelligent services in the Information Society.

The subject Multiagent Systems belongs to the subject of SPECIFIC TECHNOLOGY OF COMPUTATION. It is strongly related to other subjects of the same subject, such as:

Knowledge Based Systems
Data Mining

It also complements the third year course called Intelligent Systems.

4. Degree competences achieved in this course

Course competences

Code	Description
CM05	Ability to acquire, formalise, and represent human knowledge in a computable form for the solution of problems throughout a digital system in any application context, especially the one linked to computational aspects, perception, and behaviour in intelligent frames.
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.
PER02	Ability to work in multidisciplinary teams.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.
SIS01	Critical thinking.
SIS03	Autonomous learning.
SIS09	Care for quality.
UCLM03	Accurate speaking and writing skills.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Design and implementation of multiagent systems using specific languages ¿¿and tools.

Establishment, definition and development of mechanisms of interaction and communication between the agents that make up a multi-agent system.

Additional outcomes

6. Units / Contents

Unit 1: Introduction to MultiAgent Systems
Unit 2: Intelligent Agents
Unit 3: Architectures of Agents
Unit 4: Communication
Unit 5: Ontologies
Unit 6: Movility
Unit 7: Interaction
Unit 8: Negotiation Models
Unit 9: Learning

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	CM05	0.6	15	N	-	Teaching of the subject matter by lecturer (MAG)
Individual tutoring sessions [ON-SITE]		CM05 INS05 SIS01 SIS09 UCLM03	0.18	4.5	N	-	Individual or small group tutoring in lecturer's office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	CM05 INS01 SIS01 SIS03 SIS09	1.8	45	N	-	Self-study (EST)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	CM05 INS01 INS04 PER02 PER04 PER05 SIS03 SIS09 UCLM03	0.9	22.5	N	-	Lab practical preparation (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CM05 INS01 INS04 PER02 PER04 PER05 SIS01 SIS09	0.6	15	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO)
Writing of reports or projects [OFF-SITE]	Self-study	CM05 INS01 INS04 INS05 PER02 PER04 PER05 SIS01 SIS03 SIS09 UCLM03	0.9	22.5	Y	N	Preparation of essays on topics proposed by lecturer (RES)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CM05 INS04 PER02 PER04 PER05 SIS03 SIS09	0.72	18	Y	Y	Realization of practicals in laboratory /computing room (LAB)
Final test [ON-SITE]	Assessment tests	CM05 INS01 INS04 INS05 PER02 SIS01 SIS09 UCLM03	0.3	7.5	Y	Y	Final test of the complete syllabus of the subject (EVA)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

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
Final test	50.00%	50.00%	Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call (convocatoria ordinaria).
Theoretical papers assessment	15.00%	15.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period
Laboratory sessions	25.00%	25.00%	Compulsory activity that can be retaken. To be carried out during lab sessions
Assessment of active participation	10.00%	10.00%	Non-compulsory activity that can be retaken. To be carried out during the theory/lab sessions for the continous assesment students. Non-continuous evaluation students will be evaluated with an alternative system in the first examination period.
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:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The

evaluation of the activities will be global and therefore must be quantified by means of a single mark. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The final exam will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students.

A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake examcall (convocatoria extraordinaria). If an activity is not recoverable, its assessment will be preserved for the resit/retake exam call (convocatoria extraordinaria) even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.

The mark of the passed activities in any call, except for the final exam, will be conserved for the subsequent academic year at the request of the student, provided that mark is equal or greater than 50% and that the activities and evaluation criteria of the subject remain unchanged prior to the beginning of that academic year.
In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The failure of a student to attend the final exam will automatically result in her/him receiving a "Failure to attend" (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Students may apply at the beginning of the semester for the non-continuous assessment mode. In the same way, the student may change to the non-continuous evaluation mode as long as she/he has not participated during the teaching period in evaluable activities that together account for at least 50% of the total mark of the subject. If a student has reached this 50% of the total obtainable mark or the teaching period is over, she/he will be considered in continuous assessment without the possibility of changing to non-continuous evaluation mode.

Students who take the non-continuous evaluation mode will be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous evaluation".

In the "non-continuous evaluation" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous assessment mode.

Specifications for the resit/retake exam:
Evaluation tests will be conducted for all recoverable activities.
Specifications for the second resit / retake exam:
Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates
Not related to the syllabus/contents

Hours	hours

General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week.

10. Bibliography and Sources						
Author(s)	**Title/Link**	**Publishing house**	**Citv**	**ISBN**	**Year**	**Description**
Mas, Ana María	Agentes software y sistemas multiagente : conceptos, arquite	Prentice Hall		84-205-4367-5	2005	
G. Weiss	Multiagent systems : a modern approach to distributed artif	The MIT Press		0-262-73131-2	2000	
Padgham, Lin	Developing intelligent agent systems : a practical guide	John Wiley		0-470-86120-7	2004	
Russell, Stuart J.	Inteligencia artificial : un enfoque moderno	Pearson		978-84-205-4003-0	2011	