UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2022/23**
Subject (*)	Multiagent Systems		**Code**	614544005
Study programme	Máster Universitario en Intelixencia Artificial			
Descriptors				

Cycle	**Period**	**Year**	**Type**	**Credits**
Official Master's Degree	2nd four-month period	First	Optional	6

Language	English
Teaching method	Face-to-face
Prerequisites	
Department	Ciencias da Computación e Tecnoloxías da Información

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General description	The main objective of this subject is to learn to distinguish the appropriate problems for designing multi-agent systems, as well as their main characteristics. The concept of an intelligent agent is introduced. The main theories and models will be detailed, as well as the various architectures of multi-agent systems and their most relevant applications.

Study programme competences	
Code	**Study programme competences**
A6	CE05 - Ability to design and develop intelligent systems through the application of inference algorithms, knowledge representation and automated planning
A7	CE06 - Ability to recognise those problems that require a distributed architecture, not predetermined during the system design, suitable for the implementation of multiagent systems
A8	CE07 - Ability to understand the consequences of the development of an explainable and interpretable intelligent system
A9	CE08 - Ability to design and develop secure intelligent systems, in terms of integrity, confidentiality and robustness
B1	CG01 - Maintaining and extending theoretical foundations to allow the introduction and exploitation of new and advanced technologies in the field of AI
B2	CG02 - Successfully addressing each and every stage of an AI project
B3	CG03 - Searching and selecting that useful information required to solve complex problems, with a confident handling of bibliographical sources in the field
B6	CB01 - Acquiring and understanding knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, frequently in a research context
B7	CB02 - The students will be able to apply the acquired knowledge and to use their capacity of solving problems in new or poorly explored environments inside wider (or multidisciplinary) contexts related to their field of study
B8	CB03 - The students will be able to integrate different pieces of knowledge, to face the complexity of formulating opinions (from information that may be incomplete or limited) and to include considerations about social and ethical responsibilities linked to the application of their knowledge and opinions
B9	CB04 - The students will be able to communicate their conclusions, their premises and their ultimate justifications, both to specialised and non-specialised audiences, using a clear style language, free from ambiguities
C2	CT02 - Command in understanding and expression, both in oral and written forms, of a foreign language
C3	CT03 - Use of the basic tools of Information and Communications Technology (ICT) required for the student's professional practice and learning along her life
C4	CT04 - Acquiring a personal development for practicing a citizenship under observation of the democratic culture, the human rights and the gender perspective
C5	CT05 - Understanding the importance of the entrepreneurial culture and knowledge of the resources within the entrepreneur person's means
C6	CT06 - Acquiring abilities for life and healthy customs, routines and life styles

C7	CT07 - Developing the ability to work in interdisciplinary or cross-disciplinary teams to provide proposal that contribute to a sustainable environmental, economic, political and social development
C8	CT08 - Appreciating the importance of research, innovation and technological development in the socioeconomic and cultural progress of society

Learning outcomes			
Learning outcomes	Study programme competences		
Introduce the concept of multi-agent systems based on the need for distributed architectures in intelligent systems	AC6 AC7 AC8	BC1 BC9	CC3 CC6 CC8
Understand the different approaches to intelligent agent architectures	AC5 AC6	BC1 BC6 BC7	
Understand the notion of negotiation as a simple aspect inherent to multi-agent systems.	AC6 AC7	BC6 BC7	
Understand the notions and basic aspects of communication, coordination and cooperation.	AC6 AC7	BC8	
Analyze the various existing methodologies for the development of multi-agent systems.	AC5 AC6	BC2 BC8	CC2
Know applications of this type of systems in industrial, medical, computer environments, etc.	AC6	BC3 BC6 BC7	CC4 CC5 CC7

Contents	
Topic	Sub-topic
Introduction	Intelligent agent concept
	Multiagent system
Agent architectures	Deliberative architectures
	Reactive architectures
	Hybrid architectures
Interaction between agents	Communication
	Negotiation
	Cooperation
	Coordination
Agent-oriented methodologies	Adaptation of existing methodologies
	Agent-oriented methodologies
Applications	Industry
	Medicine
	Computer science

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Laboratory practice	A6 A9 B2 C3 C6 C7	14	48	62
Problem solving	A7 B1 B3 B7 C4 C5	7	39	46
Oral presentation	B9 C2	1	1	2
Guest lecture / keynote speech	A8 B8 C8	21	17	38
Objective test	B6 B8 C2	2	0	2
Personalized attention		0		0

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	**Description**
Laboratory practice	The practical classes will consist of developing a basic multiagent system (MAS) or some specific parts of it. The delivery may have different deadlines to encourage continuous work. The practical instructions will be provided in advance for students to read in detail, and they must be strictly followed. Later, the work of the teachers will be to supervise the practical sessions, resolving doubts and correcting misinterpretations, errors, etc
Problem solving	In the problem classes, practical assumptions will be presented directly related to theoretical concepts. The students will have to look for alternative solutions outside the classroom. The aim is to encourage student participation and promote, as far as possible, open dialogue and the assessment of solutions.
Oral presentation	For some practical or problem, students must prepare a presentation where they expose their work in the classroom, highlighting the main contributions and conclusions.
Guest lecture / keynote speech	Oral presentation supplemented with the use of audiovisual media and introduction of some questions addressed to students for the purpose to transmit knowledge and facilitate learning.
Objective test	It will consist of theoretical-practical questions about any of the concepts included in the course agenda.

Personalized attention	
Methodologies	**Description**
Laboratory practice Problem solving	The adequate progress of the students will determine the development of master classes, problem-solving classes, and practical labs. Laboratory practicals will be carried out, primarily, as autonomous work. For its proper development, it will be necessary to monitor periodically the students' work to clarify errors and concepts as soon as possible and ensure the quality of work. Outside class hours, the official tutoring hours allow personalized attendance through the following channels: - E-mail: Use for short answer queries. - Teams: virtual meetings (upon request via e-mail)

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Objective test	B6 B8 C2	It will consist of theoretical and practical questions on any of the items included in the contents	40
Laboratory practice	A6 A9 B2 C3 C6 C7	Realization of the tasks, in time and form, is established in the instructions of any proposed practical. To pass the subject is essential to have made and approved the practicals. As part of it, issues such as school attendance, personal work, attitude, etc. will help to pass the practicals.	60
Oral presentation	B9 C2	It could be included in some problem solving/laboratory practice and it would affect the final grade of it, however it is not graded on its own.	0

Assessment comments

Sources of information

Basic	- Gerhard Weiss (2013). Multiagent Systems, Second Edition. MIT Press
	- Adelinde M. Uhrmacher, Danny Weyns (2009). Multi-Agent Systems Simulation and Applications. Routledge, Taylor & Francis Group
	- Michael Wooldridge (2009). An introduction to multiagent systems. Wiley
Complementary	

Recommendations
Subjects that it is recommended to have taken before
AI Fundamentals/614544001
Reasoning and Planning /614544003
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.